

Scope of Work and Specification

The scope of work includes the complete design, supply, installation, testing, commissioning, and integration of the Integrated Cyber Capability Centre, including a mini data centre and laboratory infrastructure. The project encompasses civil works, interior fit-outs, modular furniture, electrical installations, structured cabling, lighting, precision air-conditioning, UPS systems, diesel generator integration, fire detection and suppression systems, and all allied infrastructure required for the successful implementation of the project, in accordance with the Technical Specifications, Bill of Quantities (BoQ), approved drawings, and tender conditions. The proposed facility shall be designed, furnished, and commissioned to accommodate up to 140 personnel across different laboratories for training, research, cybersecurity operations, digital forensics, malware analysis, and related activities..

The scope of work covers:

Scope of Work

1. High-End Workstations for Training Lab

- Supply, installation, configuration and commissioning of high-end workstations for the Cyber Range & Cyber Training Centre.
- Installation of operating systems, required drivers, utilities and application software as specified.
- Integration of workstations with the proposed network, server, storage and virtualization infrastructure.
- Performance testing and validation of all workstations.
- Provision of necessary power, network connectivity, accessories and peripherals.

2. Enterprise Business Laptops

- Supply, installation, configuration and commissioning of enterprise-grade business laptops.
- Provision of 14-inch laptops with Intel® Core™ Ultra 7 vPro (or equivalent), Windows 11 Pro, minimum 16 GB RAM and 512 GB NVMe SSD.
- Installation and configuration of operating system, device drivers, security features, and required software.

- Integration with the existing network, domain, and enterprise security infrastructure.
- Performance, connectivity, and functional testing.
- Supply of all OEM accessories and documentation.
- Handover of configuration, warranty, and commissioning documents.

3. External Desktop Hard Disk Drive (8 TB)

- Supply, installation, configuration, and commissioning of enterprise-grade external desktop hard disk drives.
- Provision of minimum 8 TB, 7200 RPM, 3.5-inch SATA HDD with USB 3.2 Gen 1 or higher interface.
- Integration with Windows, Linux, and macOS systems for backup, archival, forensic image storage, and enterprise data protection.
- Installation and configuration of OEM drive management and backup utility (where applicable).
- Performance, connectivity, and functional testing.
- Supply of all OEM accessories, including USB interface cable, external AC power adapter, and user manual.
- Handover of configuration, warranty, and commissioning documentation.

3. High-End Workstations – Digital Forensic Laboratory

- Supply, installation, configuration and commissioning of high-end forensic workstations.
- Configuration for digital forensic investigation, evidence analysis and other approved forensic applications.
- Integration with the laboratory network, storage and required security infrastructure.
- Installation and configuration of required operating systems, drivers and software.
- Performance, connectivity and functional testing.
- Handover of configuration and commissioning documentation.

4. Rack Server & Enterprise Storage Infrastructure

4.1 Compute Rack Servers

- Supply, installation and commissioning of enterprise rack-mounted compute servers.
- Installation and configuration of the server operating environment/hypervisor.
- Integration with enterprise storage and network infrastructure.
- Configuration of RAID, firmware, BIOS/iDRAC or equivalent management interfaces and server health monitoring.
- Configuration of high availability and redundancy features wherever applicable.

- Performance, failover and connectivity testing.

4.2 GPU Rack Server

- Supply, installation and commissioning of GPU-enabled rack server.
- Installation and configuration of GPU accelerators, drivers and required CUDA/AI software stack, as applicable.
- Integration with compute, storage and high-speed network infrastructure.
- GPU performance and workload validation.

4.3 Enterprise SAN Storage

- Supply, installation, configuration and commissioning of enterprise SAN storage system.
- Configuration of storage pools, RAID, volumes/LUNs, host groups and access policies.
- Integration with the proposed compute and virtualization environment.
- Configuration of redundant storage controllers, power supplies and connectivity.
- Implementation of storage monitoring, alerts and health management.
- Performance, redundancy and failover testing.

4.4 High-Speed ToR Cluster Interconnect Switches

- Supply, installation and configuration of high-speed 25/100 GbE Top-of-Rack cluster interconnect switches.
- Configuration of required ports, VLANs, link aggregation, MLAG/stacking or equivalent redundancy mechanisms.
- Integration with compute servers, GPU server, storage and core network.
- Configuration and testing of high-speed data paths for compute/storage workloads.
- Validation of redundancy, throughput and connectivity.

4.5 VMware Cloud Foundation

- Supply and implementation of VMware Cloud Foundation licensing for 192 cores.
- Installation and configuration of the virtualization and private-cloud environment.
- Configuration of compute, storage and networking resources.
- Creation and configuration of clusters, virtual machines, resource pools and required policies.
- Integration with the enterprise SAN storage.
- Configuration of monitoring, management, backup integration and security policies as applicable.
- Testing and commissioning of the complete virtual infrastructure.
- Provision of licensing and deployment documentation.

5. GPU-Based AI Workstations

- Supply, installation and commissioning of GPU-based workstations for the AI Threat Laboratory.
- Installation and configuration of GPU hardware, drivers and AI/ML software prerequisites.
- Configuration for AI, machine learning, threat analytics and related workloads.
- Integration with the laboratory network and centralized storage where required.
- Performance and GPU workload testing.
- Documentation and handover.

6. Next-Generation Firewall Infrastructure

6.1 Enterprise Firewall

- Supply, installation, configuration and commissioning of enterprise NGFW appliances.
- Deployment in high-availability/redundant configuration.
- Configuration of WAN/LAN interfaces, VLANs, routing, NAT and security zones.
- Configuration of firewall policies, application control, IPS/IDS, malware protection, web filtering and other licensed security features.
- Configuration of VPN services wherever required.
- Integration with the proposed network and server infrastructure.
- Configuration of logging, monitoring and alerting.
- Failover and security policy testing.

6.2 Firewall Licenses

- Provision and activation of 3-year enterprise security subscription/licensing for firewalls.
- Registration and activation of licenses with the OEM/vendor.
- Verification that all subscribed security services are operational.

6.3 Web Server Protection

- Implementation of web server protection for the proposed firewall infrastructure.
- Configuration of required WAF/web application protection policies.
- Integration with protected web servers/applications.
- Testing and validation of protection policies, logging and alerts.

7. Video Wall

- Supply, installation and commissioning of the proposed video wall system.

- Installation of displays, mounting structure, controllers, processors and associated accessories.
- Provision of required signal, power and network connectivity.
- Configuration of display layouts and source management.
- Integration with the control/monitoring environment as applicable.
- Testing and commissioning.

8. Smart Board Infrastructure

Supply, installation, configuration and commissioning of smart boards for:

- **Cyber Range & Cyber Training Centre**
- **Cyber Crime Research & Advanced Crime Laboratory**
- **AI Threat Laboratory**
- **State Cyber Lab**

The scope shall include:

- Wall/stand mounting and installation.
- Power and network connectivity.
- Display and touch calibration.
- Installation of required software and drivers.
- Integration with presentation and collaboration systems.
- Testing and user demonstration.

9. Telepresence / Video Conferencing & Collaboration

9.1 Cyber Range & Cyber Training Centre

- Supply, installation and commissioning of complete telepresence/video conferencing and collaboration solution.

9.2 Cyber Crime Research & Advanced Crime Laboratory

- Supply, installation and commissioning of complete telepresence/video conferencing and collaboration solution.

The scope shall include:

- Displays and video conferencing equipment.
- Cameras, microphones and speakers.
- Collaboration equipment and required controllers.
- Room audio/video configuration.

- Network and power connectivity.
- Integration with supported conferencing/collaboration platforms.
- Acoustic and display optimization wherever applicable.
- Testing, commissioning and user training.

10. Network Setup & Configuration

10.1 High-Speed 1/10 GbE Core Switches

- Supply, installation and configuration of high-speed core switch.
- Configuration of VLANs, routing, inter-VLAN routing, link aggregation and redundancy.
- Integration with access switches, servers, firewalls, storage and other network devices.
- Configuration of network management, monitoring and logging.
- Performance and failover testing.

10.2 Managed Access Switches

- Supply, installation and configuration of **24-port managed Layer 2+/Layer 3 Lite switches**.
- VLAN, trunk, access port and security configuration.
- Integration with core switches.
- Configuration of required management and monitoring features.
- Port labelling and documentation.
- Testing of all connected network points.

11. Enterprise Structured Cabling

The scope shall include complete supply, installation, termination, testing, labeling and documentation of the structured cabling infrastructure.

11.1 Network Racks

- Supply and installation of 12U network racks with required accessories.
- Installation of PDU, cable managers, shelves and other required rack accessories.

11.2 Cat6A Cabling

- Supply and laying of Cat6A cable.
- Routing through appropriate pathways, conduits/trunking and cable management systems.
- Proper segregation of data and power cabling.

11.3 Patch Panels

- Supply and installation of patch panels.

- Termination and labeling of all applicable network cables.

11.4 I/O, WAO and Faceplates

- Supply and installation of I/O points for patch panels and work area outlets.
- Supply and installation of back boxes with faceplates.
- Proper termination, labeling and testing.

11.5 Patch Cords

- Supply and installation of:
 - 2 m Cat6A patch cords for work-area outlets
 - 0.5 m Cat6A patch cords for rack-side connections

11.6 Fiber LIU

- Supply and installation of:
 - 6 port LIU with required Pigtailed and all accessories

11.7 Fiber Backbone

- Supply and installation of OM4 fiber cable through HDPE pipe.
- Proper routing, termination, labeling and testing.

11.8 Fiber Patch Cords

- Supply and installation of LC-LC fiber patch cords as required.
- Testing of fiber links using suitable test equipment.

11.9 Conduits and Trunking

- Supply and installation of PVC conduit with all required accessories.
- Supply and installation of 50 × 50 mm trunking.
- Supply and installation of 100 × 100 mm trunking.

11.10 Testing & Documentation

- Complete Fluke testing and certification of all copper links.
- Fiber testing.
- Submission of test reports and cable schedules.
- Preparation of as-built drawings.
- Rack elevation and port mapping.
- Labeling of all network points and cables.
- Submission of OEM-backed 25-year system warranty documentation, wherever applicable.

12. Enterprise Smart Rack / Integrated Micro Data Centre

Supply, installation, integration and commissioning of complete enterprise smart rack/integrated micro data centre solution with approximately 20 kW N+1 precision cooling.

The scope shall include:

- Smart rack enclosure and associated accessories.
- Precision cooling system with N+1 redundancy.
- Environmental monitoring system.
- Temperature and humidity monitoring.
- Smoke/fire detection and fire suppression system.
- Access control system.
- Rack-level monitoring and alerts.
- Power distribution and monitoring.
- Integration of IT equipment within the rack.
- Cable management and power management.
- Remote monitoring and alerting.
- Testing of cooling, fire suppression, access control and environmental monitoring systems.
- Complete commissioning and handover documentation.

13. Power Distribution & Surge Protection

- Design, supply, installation and commissioning of the required power distribution infrastructure.
- Provision of suitable electrical panels, distribution boards, breakers, cables, sockets and accessories.
- Installation of surge protection devices.
- Provision of dedicated power circuits for IT equipment, network equipment, smart boards, AV equipment and other systems.
- Proper earthing and electrical safety provisions.
- Integration with UPS and DG power systems.
- Testing and commissioning of the complete electrical distribution system.

14. Power Backup System

14.1 150 kVA Diesel Generator

- Supply, installation, testing and commissioning of **DG set**.

- Associated AMF/ATS panel, cabling, earthing and accessories.
- Fuel system and required exhaust arrangements.
- Integration with the facility electrical distribution system.
- Load testing and commissioning.

14.2 80 kVA / 80 kW Online UPS

- Supply, installation, testing and commissioning of **online UPS systems**.
- Battery bank and associated battery cabinets/racks.
- Input/output panels and cabling.
- Bypass arrangement.
- Redundant/parallel configuration wherever specified.
- Integration with critical IT loads.
- UPS monitoring and alarm configuration.
- Battery and UPS performance testing.
- Full-load/appropriate load testing and commissioning.

15. Interior Fit-Out, Civil & Facility Infrastructure Works

The scope shall include all civil, interior and facility-related works necessary for the successful implementation and operation of the proposed Cyber Range, laboratories, server/data centre and associated facilities.

Civil & Interior Works

- Flooring works, including required raised flooring/finishing wherever applicable.
- Painting and wall finishing.
- False ceiling and associated works.
- Partition works and room segregation.
- Dismantling and removal of existing structures where required.
- Doors, access arrangements and other finishing works.
- Civil modifications required for installation of IT and electrical infrastructure.

Furniture

- Supply and installation of modular workstations/tables.
- Ergonomic chairs.
- Storage units and cabinets.
- Equipment tables and other required furniture.
- Cable management provisions.

- Furniture layout suitable for the respective laboratory and training environments.

Electrical & Lighting

- Electrical wiring and power cabling.
- Power sockets and dedicated IT power points.
- UPS power points.
- Distribution boards and protection devices.
- LED lighting and associated controls.
- Dedicated circuits for workstation, server, networking, AV and other equipment.

HVAC / Air Conditioning

- Supply, installation, testing and commissioning of suitable air-conditioning systems.
- Required copper piping, drain piping, insulation and electrical connections.
- Integration with the room layout and equipment heat-load requirements.
- Dedicated cooling provisions for server/network/data centre areas where applicable.

General Facility Infrastructure

- Network pathways and cable containment.
- Equipment mounting and support structures.
- Earthing and bonding.
- Equipment positioning and room layout implementation.
- Signage and identification.
- Coordination of civil, electrical, HVAC, networking and IT installations.
- Making good of all areas after installation.

16. Overall Integration, Testing & Commissioning

The bidder shall be responsible for the end-to-end integration and commissioning of all supplied systems, including:

- Workstations
- Compute servers
- GPU servers/workstations
- SAN storage
- VMware Cloud Foundation
- Core and access switches
- ToR cluster switches

- Firewalls
- Video wall
- Smart boards
- Telepresence systems
- Structured cabling
- Micro data centre
- Power distribution
- UPS
- DG
- Civil/facility infrastructure
- And any items required for the completion of work.

The bidder shall ensure that all systems operate as an integrated solution and meet the technical requirements specified in the tender.

17. Testing, Documentation & Handover

The bidder shall carry out:

- Factory acceptance testing wherever applicable.
- Site acceptance testing.
- Installation and configuration testing.
- Network performance testing.
- Server and storage performance testing.
- Firewall failover testing.
- UPS and DG testing.
- Structured cabling certification.
- Fiber testing.
- Environmental monitoring testing.
- Access control testing.
- AV and video conferencing testing.
- Complete system integration testing.

The bidder shall submit:

- As-built drawings.
- Network topology diagrams.
- IP address scheme.
- VLAN details.

- Rack elevation diagrams.
- Server configuration documents.
- Storage configuration documents.
- Firewall configuration documentation.
- UPS/DG documentation.
- OEM manuals.
- License certificates.
- Test and commissioning reports.
- Training records.
- Final handover document.

18. Training & Knowledge Transfer

The successful bidder shall provide hands-on training and knowledge transfer to the designated department personnel covering:

- Server and virtualization administration.
- SAN/storage administration.
- Network administration.
- Firewall administration.
- GPU/AI infrastructure.
- Smart board and telepresence systems.
- Data centre/environmental monitoring.
- UPS and power infrastructure.
- Basic troubleshooting and preventive maintenance.

Training shall include necessary operational manuals and administrator documentation.

19. Warranty, Support & Maintenance

- All supplied hardware, software and systems shall be covered under the applicable OEM warranty/support period specified in the tender.
- The bidder shall coordinate with respective OEMs for warranty support.
- The bidder shall provide installation and configuration support during the warranty period.
- Defective equipment/components shall be repaired or replaced as per the applicable warranty terms.
- Software licenses and subscriptions shall remain valid for the specified license period.
- The bidder shall provide technical support and troubleshooting for the complete

integrated solution.

Overall Responsibility

The bidder shall be responsible for the complete end-to-end supply, delivery, installation, configuration, integration, testing, commissioning, training, documentation and handover of the entire infrastructure covered under the BOM, including all necessary components, accessories, licenses, cables, connectors, mounting hardware, power connections and other items required for a fully functional solution, whether or not each individual item is explicitly mentioned in the BOQ. The entire project cost should be quoted in the BOQ as a whole.

2. Contract Period

The selected firm shall complete the delivery, installation, configuration and commissioning of all items listed in the annexures within **Ninety Days (90) days** from the date of issue of **Work Order/Supply Order**.

The timelines specified are mandatory and must be strictly adhered to by the firm.

- After successful installation, testing, and acceptance by the Department, the firm shall provide **Three (3) years of free maintenance, technical support, and necessary software/firmware upgrades** for all supplied hardware, software, tools, and systems.
- The selected firm shall execute an Agreement with the Department covering:
- All delivered items must remain **fully operational, updated, and properly maintained** throughout the entire contractual period. The Department reserves the right to impose penalties or take action as per norms in the SLA for any lapse in performance, maintenance, or support.

3. Eligibility Criteria

Sl	Technical Criteria	Supporting Documents
1	The Bidder must be registered in India and have been in operations for a minimum of 3 (three) years as on the date of bid opening.	Copy of GST Registration Certificate and PAN or COI
2	The bidder shall have achieved an average annual turnover of at least ₹50 Crores from IT Infrastructure business during the last three (3) financial years.	Audited financial statements for last 3 FYs
3	The bidder must not have been blacklisted, debarred, or suspended	Undertaking on company letterhead signed by Authorized Signatory.

	by any Central Government, State Government, or PSU organization during the last three (3) years as on the date of bid submission.	
4	Bidder must have positive net worth for each of the last 3 financial years.	Audited Balance Sheet and/or CA Certificate clearly stating net worth.
5	The bidder must be an authorized reseller/partner for all quoted products and solutions	Manufactures Authorization Form specific to this tender for all the quoted items
6	The bidder/OEM from a country which shares a land border with India will be eligible only if they are registered with the competent authority as per Govt. of India order, issued by Ministry of Finance vide No.F.No.6/18/2019-PPD dated 23/07/2020	Attach supporting documents
7	OEM should submit the undertaking stating that the items offered are not nearing end of life or end of support until the end of warranty	Attach supporting documents
8	The bidder must meet at least one of the following project experience criteria, with all projects having been executed within the past Five (5) years 1. The bidder must have successfully executed at least one (1) turnkey project comprising Servers, Storage, and Room Furnishing under a single Purchase Order, with a minimum project value of ₹10 Crore. OR 2. Two Projects Requirement The bidder must have successfully executed at least two (2) projects with a combined project value of not less than ₹15 Crore. OR 3. Three Projects Requirement The bidder must have successfully executed at least three (3) projects with a combined project value of not less than ₹20 Crore.	Attach PO copies and completion reports
9	Pre-Bid Meeting & Site Visit	The participation in the Pre-Bid

	Certificate	discussion is compulsory/mandatory through Offline mode. The offers/bids of those Service Providers who participate in the Pre-Bid discussion only will be considered for further evaluation. After attending the pre-bid discussion, the Service Provider shall submit a written consent conveying that they have understood all the terms and conditions and the quantum of work. Details of personnel participating in the pre-bid meeting along with ID proof details shall be emailed to cyberops-sec.pol@kerala.gov.in quoting the Tender no. as subject, on or before 28.08.2026. Late requests will NOT be considered. The bidder shall visit the site prior to submission of the bid and obtain a Site Visit Certificate from the concerned department. The duly signed Site Visit Certificate shall be submitted along with the Technical Bid as a mandatory document.
10	Payment Terms:	a. 45% (Fourty Five Percent) Advance against Bank Guarantee b.25% (Seventy Five Percent) of the contract value will be released after confirmation of shipment and acceptance by Kerala Police of each items. c.20% (Twenty Percent) of the contract price will be released after satisfactory installation, testing & commissioning of the item/equipment and on receipt of successful installation report of each item. c. The balance 5% amount can be released against the submission of bank guarantee from a Nationalized/scheduled Bank
11	Other Payment Terms	a.PBG in Director General of Police, Kerala State b.Valid for contract period + 3 months c.Advance will be adjusted in subsequent bills. d.No advance without BG as per KFC Rule 182A & KSPM Clause 15.15.

4. General Conditions

1. The Department reserves the right to accept or reject any or all bids, in full or in part, without assigning any reason. The contract may be awarded to the lowest evaluated bidder or to a technically qualified firm whose proposal is considered most advantageous.
2. The Department may adjust quantities, combine or shorten line items, or exceed the quoted amount within the approved budget to meet operational requirements.
3. Strict confidentiality of all departmental data, systems, and information must be maintained by the bidder.
4. No data or information shall be copied, transferred, or exported outside India under any circumstances.
5. The selected firm must commence work immediately upon issuance of the Work Order and signing of the Agreement.
6. Subcontracting of any part of the work is allowed only with prior written approval from the Department.
7. Penalties or liquidated damages shall apply for delays, non-performance, or breach of contractual obligations, as per rules.
8. Bidders may propose equivalent or superior items to those listed in the annexures, subject to technical evaluation and approval by the Department.
9. The decision of the Department on all matters relating to bid evaluation, award, and execution shall be final and binding, and no correspondence will be entertained.
10. The OEM/Solution Provider should submit the duly filled compliance statement as per the format. Non submission of compliance statement will lead to rejection of bid.
11. The bidder should ensure that all the quoted items are not declared End of Sale for the next five years period from the date of submission of the bid.

5. Mode of submission of bids: - Online. All Bid documents shall be submitted only in the online procedure through the eGP website 'www.etenders.kerala.gov.in' in their designated online covers. Details of covers are given separately. No other mode of submission shall be accepted, such tenders will be rejected outright.

6. Cover details: - No. of covers - 2. i) Technical Bid ii) Financial Bid. In the case of Foreign equipment, the rate must be quoted in Indian Rupees.

The documents to be uploaded under each online cover are specified on the website.

7. Downloading of e-Tender documents: - The tender documents can be downloaded from the e-GP website www.etenders.kerala.gov.in from the date and time of publication of the e-tender onwards to the last date and time for online

submission of the e-tender. Downloading of tender documents will not be possible after the date specified above.

8. Submission of e-Tender documents:- The digitally signed tender document and other specified documents shall be submitted online through the e-GP website other specified documents shall be submitted online through the e GP website www.etenders.kerala.gov.in well in advance before the last date and time mentioned above. No submission shall be allowed after the last date mentioned above.

9. Payment of Tender Fees: - A non-refundable tender fee shall be paid in online mode through the e-GP website www.etenders.kerala.gov.in at the time of bid submission. No other mode of payment shall be accepted.

THE TENDERS OR BIDDERS WHO DO NOT REMIT FEES THROUGH ONLINE WILL BE REJECTED OUTRIGHT.

10. Payment of Earnest Money Deposit (EMD): -The EMD shall be paid in online mode through the e-GP website www.etenders.kerala.gov.in at the time of bid submission. No other mode of remittance shall be accepted.

11. Exemption from payment of EMD: - Bidders who are registered with Store Purchase Department, Kerala or National Small Scale Industries Corporation Ltd., New Delhi (for the items tendered) are exempted from submission of EMD. Those bidders claiming exemption shall submit valid registration certificate from the SPD, Kerala or NSSIC, New Delhi. Tenders of bidders who do not remit EMD online or do not upload documental proof (digitally signed) for exemption of EMD will be rejected outright.

12 Withdrawal and re-submission of e-Tender: - The Bidders are at liberty to withdraw the submitted tender/documents and to submit fresh tender/documents till the last date and time of submission of e-tender after which withdrawal/re-submission will not be allowed.

13.Opening of e-Tenders : - The bids shall be opened online through the eGP website www.etenders.kerala.gov.in at the Office of State Police Chief, Police Headquarters, Thiruvananthapuram on the date and time mentioned above in the presence of the Bidders/ authorized representatives who wish to attend at the above address. If the tender opening date happens to be a holiday or non-working day due to any valid reason, the tender opening process will be done on the next working day at the same time and place specified. Any change in the opening date/time/venue due to other reasons shall be informed by way of Corrigendum published in the eGP website. The Technical Bids will, be evaluated by a Technical Evaluation committee and those that do not conform to the specifications or to the satisfaction of the committee will be rejected. The financial bids of the Technically qualified tenderer only will be considered for opening. The date of opening of financial bids will be intimated to the concerned technically qualified tenderer, over phone/e-mail.

14.Technical Evaluation:- All tenderer who quote for the supply of above items

are required to be ready for Technical evaluation to be held in the Office of the Thiruvananthapuram and the date will be intimated in due course. **Any clarification/doubts regarding the specification or related matters pertaining to the items tendered may be freely got cleared by contacting the Assistant Sub Inspector of Police, Cyber Security and Advanced Crimes, Cyber Operations, PHQ Ph. 9895258496.** All Bidders who participates in e-tender should produce hard copies of all relevant documents related to e tender at the time of technical evaluation, without fail.

15.Note to Bidders:-

i) Bidders have to procure legally valid Digital Certificate (Class III) as per Information Technology Act, 2000 for digitally signing their electronic bids. Bidders can procure the same from any of the license certifying authority of India. For more details, please visit the e-GP website www.etenders.kerala.gov.in

ii) Bidders are advised to note the Tender Id and Tender No. & Date for future reference.

iii) All uploaded documents should contain the signature and the office seal of the bidder/authorized persons and should be digitally signed while uploading. Documents uploaded without digitally signing shall entitle rejection of the tender.

iv) In the case of Foreign Equipment, the rate should be quoted in Indian Rupees. Preference will be given to those who are ready to supply the item without opening Letter of Credit. Ordinarily, no advance payment will be made for procuring the above item.

v). For obtaining Digital Signature Certificate and help on etendering process, contact Kerala State IT Mission, eGovernment Procurement PMU & Help desk, Basement floor of Pension Treasury Building, Uppalam Road, Statue, Thiruvananthapuram; Ph :0471-2577088, 2577 IBB; Toll free no: 18002337315; e-mail:etendershelo@kerala.gov.in; Website: www.etenders.kerala.gov.in on all government working days from 9:30 am to 5:30 pm.

16. Successful bidder should execute a Service Level Agreement format available at the Office of IGP Cyber Operations, Pattom Thiruvananthapuram. Cost of stamp paper for SLA is one rupee for every rupee 1000 or part thereof on the amount agreed in the contract, subject to a minimum of rupees 200 and a maximum of rupees one lakh.

17.Contact for Clarifications

For any clarifications regarding this tender, bidders may contact the Cyber Operations Wing, Kerala Police:

- **Email:** "cyberops-sec.pol@kerala.gov.in"

All queries should be sent well in advance of the bid submission deadline to ensure a response in time.

NOTE:-BIDDERS ARE ADVISED TO GO THROUGH THE CONDITIONS IN THE NOTICE INVITING TENDER AND THE TENDER DOCUMENT CAREFULLY AND COMPLY WITH THEM TO AVOID OUTRIGHT REJECTION OF THEIR TENDER.

Bidders are requested to make online payment of EMD and tender fee before 72 hours in advance of last date.

For any litigation relating to this order, the jurisdiction will be Thiruvananthapuram City.

Bill of Materials for the BOQ

SL.No	DESCRIPTION	QTY	UOM
1	HIGH-END WORKSTATION FOR TRAINING LAB	147	NOS
2	HIGH-END WORKSTATION FOR DIGITAL FORENSIC	25	NOS
3	RACK SERVERS & ENTERPRISE STORAGE INFRASTRUCTURE SAN		
3. a	RACK SERVERS FOR COMPUTE	3	NOS
3.b	RACK SERVERS FOR GPU	1	NOS
3 .c	ENTERPRISE STORAGE INFRASTRUCTURE SAN	1	NOS
3. d	HIGH-SPEED 25/100 GBE TOP-OF-RACK (TOR) CLUSTER INTERCONNECT SWITCH	2	NOS
3.e	VMWARE CLOUD FOUNDATION - 3 YEARS (PER CORE)	192	CORE
4	GPU BASED WORKSTATION FOR AI THREAT LAB	8	NOS
5	NEXT-GENERATION FIREWALL (NGFW)		
5. a	ENTERPRISE FIREWALL	2	NOS
5. b	3-YEAR LICENSE FOR ENTERPRISE FIREWALL	2	NOS
5. c	WEBSERVER PROTECTION FOR BOTH FIREWALL	1	NOS
6	VIDEO WALL	1	SET
7	SMART BOARD		
7. a	CYBER RANGE & CYBER TRAINING CENTRE	2	NOS
7. b	CYBER CRIME RESEARCH & ADVANCED CRIME	2	NOS
7. c	AI THREAT LAB	2	NOS
7. d	STATE CYBER LAB	1	NOS
8	TELEPRESENCE SYSTEMS – VIDEO CONFERENCING & COLLABORATION ROOM SOLUTION		
8. a	CYBER RANGE & CYBER TRAINING CENTRE	1	SET
8. b	CYBER CRIME RESEARCH & ADVANCED CRIME	1	SET
9	NETWORK SETUP & CONFIGURATION		
9.a	HIGH-SPEED 1/10 GBE CORE SWITCH	2	NOS

9.b	24-PORT MANAGED GIGABIT LAYER 2+/LAYER 3 LITE ACCESS SWITCH	7	NOS
10	ENTERPRISE STRUCTURED CABLING		
10. a	SUPPLY OF 12 U RACKS WITH ACCESSORIES & FIXING	2	NOS
10. b	SUPPLY OF CAT6A CABLE AND LAYING	5040	MTR
10 .c	SUPPLY OF PATCH PANNEL AND FIXING	7	NOS
10 .d	SUPPLY OF IO FOR PATCH PANNEL AND WAO AND FIXING	252	NOS
10. e	SUPPLY OF BACKBOX WITH FACE PLATE AND FIXING	67	NOS
10. f	SUPPLY OF CAT6A PATCH CORDS FOR WAO 2MTR AND FIXING	126	NOS
10. g	SUPPLY OF CAT6A PATCH CORDS FOR RACK SIDE 0.5 MTR AND FIXING	126	NOS
10. h	SUPPLY OF 6 PORT LIU AND INSTALLING	2	NOS
10. i	SUPPLY OF OM4 FIBER CABLE AND LAYING THROUGH HDPE PIPE	450	MTR
10. j	SUPPLY OF LC LC PATCH CORD AND FIXING	7	NOS
10. k	SUPPLY OF PVC CONDUIT AND LAYING WITH THE ALL THE ACCESSORIES AS REQUIRED	1800	MTR
10. l	SUPPLY OF TRUKING 50 X50 AND LAYING WITH THE ALL THE ACCESSORIES AS REQUIRED	100	MTR
10. m	SUPPLY OF TRUKING 100 X100 AND LAYING WITH THE ALL THE ACCESSORIES AS REQUIRED	30	NOS
10. n	DOCUMENTATION, FLUKE TESTING AND SUBMITTING REPORT FOR 25 YEARS WARRANTY FROM THE OEM	126	NODES
11	ENTERPRISE SMART RACK / INTEGRATED MICRO DATA CENTRE SOLUTION WITH 20 KW N+1 PRECISION COOLING, ENVIRONMENTAL MONITORING, FIRE SUPPRESSION & ACCESS CONTROL –	1	SET
12	POWER DISTRIBUTION & SURGE PROTECTION SYSTEM	1	SET
13	POWER BACKUP SYSTEM		
13. a	SUPPLY & INSTALLATION 150 KVA DIESEL GENERATOR SET	1	SET
13. b	SUPPLY & INSTALLATION 80 KVA / 80 KW ONLINE UPS SYSTEM	2	SET
14	INTERIOR FIT-OUT, CIVIL & FACILITY INFRASTRUCTURE WORKS	1	LS

1. WORKSTATIONS FOR TRAINING LAB

A. HIGH-END WORKSTATION (165 NOS.)

- ✓ Cyber Range & Cyber Training Centre : 50
- ✓ SOC Work Stations : 10
- ✓ Cyber Crime Research & Advanced Crime: 40
- ✓ Cyber Security & Malware Analysis Lab : 17

TECHNICAL SPECIFICATION (INTEL CORE ULTRA 9)

SL.N O	FEATURES	SPECIFICATIONS
1	Make & Model	Product model along with the technical datasheet to be provided by the vendor.
2	Processor	Intel® Core™ Ultra 9 285K Vpro (13 TOPS NPU, 36 TOPS, 24 cores, up to 5.7 GHz) or better.
3	Chipset	Intel® Q870 Chipset
4	Motherboard	OEM Motherboard with Hardware based endpoint security controller TPM 2.0 in the motherboard. Integrated Hardware Diagnostics software (same Desktop OEM make) in the BIOS. Desktop OEM logo must be embossed on the mother board (Sticker is not acceptable)".
5	Graphics	NVIDIA RTX A400, 4 GB GDDR6, 4 mDP to DP adapters, with provision to configure / expandable up to 16 GB VRAM or higher.
6	Memory	32 GB DDR5 RAM expandable up to 128 GB with min 4 DIMM Slots or better
7	Ports	10 USB Ports including 2 Type C port, 3 Display ports 1.4a with option of including 1 Thunderbolt 4 (40 Gbps) port
8	Slots	2 SATA Slots
		3 full-height PCIe Gen 3 slots (Min. 1 half height Gen 4 PCIe x16) or better
		4 M.2 slots with minimum 3 M.2 Slots for Storage of better
9	Primary Hard Drive	512GB, M.2 2280, PCIe NVMe Gen4 x4, SSD, Self-Encrypting Opal 2.0, Class 40
10	Display	23.8" display with 1920 x 1080 resolution, up to 100 Hz refresh rate, 3H Hard coating or better
11	LAN	Integrated Gigabit Ethernet LAN 10/100/1000
12	WLAN	Intel® Wi-Fi 6E AX211, 2x2, 802.11ax, MU-MIMO, Bluetooth® 5.3 wireless card
13	Form Factor	Small Form Factor less than 8.5 ltrs with Intrusion Switch
14	Power Supply	Minimum 360 W internal Power Supply Unit (PSU), 92% Efficient, 80 Plus Platinum
15	Keyboard	USB Keyboard (same make as pc)
16	Mouse	USB Optical mouse (same make as pc)
17	Security	Discrete TPM 2.0 (Hardware)

18	Certification	Energy star 8.0, Windows 11 Certified, EPEAT Climate+ India Certified, EPEAT GOLD India Certified for Desktop & TCO 10 for Monitor, MIL STD 810 G Test passed, ISO 9001:2008 certification for OEM or better.
19	BIOS	Configuration Tool to Enable these features in a single Tool power on password, set up password, USB port disable with life cycle management tool
20	Support	Drivers should be available for download form OEM site for at least 3 years form the date of the purchases order. (drive cab to be available in support site)
21	Warranty	3 years warranty Specifications and warranty of the offered Desktop should be available through serial number search / tracking on the website of the OEM.

2. WORKSTATION FOR FORENSIC

A. DIGITAL FORENSIC WORKSTATION – (25 NOS)

- ✓ Cyber Range & Cyber Training Centre : 10
- ✓ Cyber Crime Research & Advanced Crime: 15

TECHNICAL SPECIFICATION (INTEL CORE ULTRA 9: HIGHER-END SPECIFICATION)

SL. NO	FEATURES	SPECIFICATIONS
1	Make & Model	Product model along with the technical datasheet to be provided by the vendor.
2	Processor	Intel® Core™ Ultra 9 285K (13 TOPS NPU, 24 cores, up to 5.6 GHz) or better.
3	Chipset	Intel® Q870 Chipset
4	Motherboard	OEM Motherboard with Hardware based endpoint security controller TPM 2.0 in the motherboard. Integrated Hardware Diagnostics software (same Desktop OEM make) in the BIOS. Desktop OEM logo must be embossed on the mother board (Sticker is not acceptable)".
5	Graphics	NVIDIA® RTX™ 2000 Ada, 16 GB GDDR6
6	Memory	64 GB DDR5 RAM expandable up to 128 GB with min 4 DIMM Slots or better
7	Ports	10 USB Ports including 2 Type C port, 3 Display ports 1.4a with option of including 1 Thunderbolt 4 (40 Gbps) port
8	Slots	2 SATA Slots 3 full-height PCIe Gen 3 slots (Min. 1 half height Gen 4 PCIe x16) or better

		4 M.2 slots with minimum 3 M.2 Slots for Storage of better
9	Primary Hard Drive	1 TB, M.2 2280, PCIe NVMe Gen4 x4, SSD, Self-Encrypting Opal 2.0, Class 40
10	Secondary Hard Drive	4 TB, 3.5-inch, 7200 RPM, Enterprise HDD
11	Display	23.8" display with 1920 x 1080 resolution, up to 100 Hz refresh rate, 3H Hard coating or better
12	LAN	Integrated Gigabit Ethernet LAN 10/100/1000
13	WLAN	Intel® Wi-Fi 6E AX211, 2x2, 802.11ax, MU-MIMO, Bluetooth® 5.3 wireless card
14	Form Factor	Small Form Factor less than 8.5 ltrs with Intrusion Switch
15	Power Supply	Minimum 360 W internal Power Supply Unit (PSU), 92% Efficient, 80 Plus Platinum
16	Keyboard	USB Keyboard (same make as pc)
17	Mouse	USB Optical mouse (same make as pc)
18	Security	Discrete TPM 2.0 (Hardware)
19	Certification	Energy star 8.0, Windows 11 Certified, EPEAT Climate+ India Certified, EPEAT GOLD India Certified for Desktop & TCO 10 for Monitor, MIL STD 810 G Test passed, ISO 9001:2008 certification for OEM or better.
20	BIOS	Configuration Tool to Enable these features in a single Tool power on password, set up password, USB port disable with life cycle management tool
21	Support	Drivers should be available for download form OEM site for at least 3 years form the date of the purchases order. (drive cab to be available in support site)
22	Warranty	3 years warranty
		Specifications and warranty of the offered Desktop should be available through serial number search / tracking on the website of the OEM.

Purpose: Suitable for Cyber Range Training Labs, Digital Forensics, Malware Analysis, Vulnerability Assessment, Penetration Testing, Red Team/Blue Team exercises and advanced cyber security practical environments.

3. RACK SERVERS & ENTERPRISE STORAGE INFRASTRUCTURE SAN

Virtual Machines (VMs)

Rack Servers

- Cyber Range & Cyber Training Centre : 4 Virtual Servers
- Cyber Crime Research & Advanced Crime : 5 Virtual Servers

- AI threat Lab : 4 Virtual Servers
- GPU Server : 1 Physical Node

SAN

- Cyber Range & Cyber Training Centre : 2 Storage Partition
- Cyber Crime Research & Advanced Crime : 2 Storage Partition
- AI threat Lab : 2 Storage Partition
- State Cyber Lab & Training Centre : 1 Storage Partition

The proposed infrastructure shall comprise minimum 3 physical compute nodes and 1 enterprise SAN storage systems, consisting of 4 Virtual Servers for the Cyber Range & Cyber Training Centre, 5 Virtual Servers for the Cyber Crime Research & Advanced Crime Laboratory, 5 GPU-enabled AI Virtual Server for the AI Threat Analytics Laboratory

The bidder shall design and propose the appropriate compute-to-storage architecture, SAN allocation, high-speed Fibre Channel connectivity, redundancy, High Availability, virtualization integration and capacity sizing based on the respective workloads. The bidder shall submit detailed OEM-supported sizing and architecture with the technical bid.

TECHNICAL SPECIFICATION

A. COMPUTE NODE

Server Infrastructure for Rack/Compute Servers for deployment across the Cyber Range & Cyber Training Centre and Cyber Crime Research & Advanced Crime Lab

SL. NO	PARAMETER	DESCRIPTION
1	Make/Model	Product model along with the technical datasheet to be provided by the vendor.
2	Chipset	OEM Compatible Chipset
3	Form Factor	1U/2Urack mounted with sliding rails
4	Configured CPU	Dual Intel Xeon or AMD EPYC with 2.3GHz, 32C/64T, 144M Cache DDR5-6400 or better
5	Memory slots	32 DDR5 DIMM slots, supports RDIMM 2 TB max, speeds up to 6400 MT/s
6	Memory configured	512GB DDR5 RDIMM, 6400MT/s, Dual Rank (64GB x 8 NOS)
7	Disks supported	Front drive bays: Up to 8x 2.5" SAS/SATA/NVMe SSD
8	RAID Controller	12Gbps PCIe with RAID 1, 5, 6,10, 50
9	Network Adapters	Broadcom 57414 Dual Port 25GbE SFP28 Adapter, OCP 3.0 NIC +Sec 2 X SFP28 SR Optic, 25GbE, 85c High Temperature

10	Disks configured	2 Qty 1.92TB Data Center NVMe Read Intensive AG Drive SED E3s Gen5
11	I/O slots	2 PCIe Gen5 slots or better
12	HBA Card	HBA Dual Port Fibre Channel 32Gb Adapter, PCIe
13	Security	TPM 2.0 FIPS, CC-TCG certified
14	Certification and compliances	Microsoft Windows Server, Hyper-V, VMWare, Red Hat Enterprise Linux (RHEL), SUSE Linux Enterprise Server (SLES)
15	Power Supply	Redundant Power Supply of 1100W or Better
16	Management integration	Support for integration with Microsoft System Center, VMware vCenter,
17	Power & temperature	Real-time power meter, graphing, thresholds, alerts & capping with historical power counters. Temperature monitoring & graphing.
18	Pre-failure alert	Shall provide predictive failure monitoring & proactive alerts of actual or impending component failure for fan, power supply, memory, CPU, RAID, NIC, HDD.
19	Configuration & management	Real-time out-of-band hardware performance monitoring & alerting.
		Agent-free monitoring, driver updates & configuration, power monitoring & capping, RAID management, external storage management, monitoring of FC, HBA & CNA & system health.
		Out-of-band hardware & firmware inventory.
		Zero-touch auto configuration to auto deploy a baseline server configuration profile.
		Automated hardware configuration and Operating System deployment to multiple servers.
		Zero-touch repository manager and self-updating firmware system.
		Virtual IO management / stateless computing.
20	HTML5 support	HTML5 support for virtual console & virtual media without using Java or ActiveX plugins
21	Server security	Shall have a cyber resilient architecture for a hardened server design for protection, detection & recovery from cyber attacks
		Shall protect against firmware which executes before the OS boots
		Should provide effective protection, reliable detection & rapid recovery using:
		Cryptographically signed firmware
		Data at Rest Encryption (SEDs with local or external key mgmt)

		Secure Boot
		Secure Erase
		Secured Component Verification (Hardware integrity check)
		Silicon Root of Trust
		System Lockdown (requires iDRAC9 Enterprise or Datacenter)
		TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ
		Configuration upgrades shall be only with cryptographically signed firmware and software
		Shall provide system lockdown feature to prevent change (or "drift") in system firmware image(s) & prevent malicious modification of server firmware
22	Intrusion alert	Intrusion alert in case chassis cover being opened
23	Display	Should display system ID, status information and system error. Error code followed by descriptive text. LCD background should light up in different colours during normal system operation & error conditions.
24	Warranty	3 years On-site comprehensive warranty and Next business Day
25	Certificate	Bid/Tender specific OEM authorized certificate to be submitted by the vendor.

B. ENTERPRISE AI GPU NODE (AI THREAT LAB)

SL. NO	PARAMETER	DESCRIPTION
1	Make/Model	Product model along with the technical datasheet to be provided by the vendor.
2	Chipset	OEM Compatible Chipset
3	Form Factor	1U/2Urack mounted with sliding rails
4	Configured CPU	Intel® Xeon® 6 Performance 6760P 2.2G, 64C/128T, 24GT/s, 320M Cache, Turbo, (330W) DDR5-6400 x 2 Nos or better
5	Memory slots	32 DDR5 DIMM slots, RDIMMS supporting speeds Up to 6400 MT/s upto 8TB or better
6	Memory configured	512 GB DDR5 RDIMM, 6400MT/s, Dual Rank (64GB x 8 nos)
7	Disks supported	Drive bays: Up to 8 NVMe drive or more
8	Disks configured	3.84TB SSD SATA Read Intensive 6Gbps 512e 2.5in Hot-plug AG Drive, 1 DWPD x 2 nos or better
9	Disks configured	3.84TB Data Center NVMe Read Intensive AG Drive U2 with Carrier x 2 Nos or better

10	I/O slots	PCIe slots with DW GPU capable x 2 nos
11	GPU	1 x NVIDIA H200 NVL, PCIe, 450W ,141GB Passive, DW Full Height GPU or better
12	Ethernet ports	2 x 10/25Gbe Ports
13	HBA Card	HBA Dual Port Fibre Channel 32Gb Adapter,PCIe
14	Security	TPM 2.0 FIPS, CC-TCG certified
15	Certification and compliances	Microsoft Windows Server, Hyper-V, VMWare, Red Hat Enterprise Linux (RHEL), SUSE Linux Enterprise Server (SLES)
16	Power Supply	Redundant Power Supply of 3200W or Better
17	Management integration	Support for integration with Microsoft System Center, VMware vCenter,
18	Power & temperature	Real-time power meter, graphing, thresholds, alerts & capping with historical power counters. Temperature monitoring & graphing.
19	Pre-failure alert	Shall provide predictive failure monitoring & proactive alerts of actual or impending component failure for fan, power supply, memory, CPU, RAID, NIC, HDD.
20	Configuration & management	Real-time out-of-band hardware performance monitoring & alerting.
		Agent-free monitoring, driver updates & configuration, power monitoring & capping, RAID management, external storage management, monitoring of FC, HBA & CNA & system health.
		Out-of-band hardware & firmware inventory.
		Zero-touch auto configuration to auto deploy a baseline server configuration profile.
		Automated hardware configuration and Operating System deployment to multiple servers.
		Zero-touch repository manager and self-updating firmware system.
		Virtual IO management / stateless computing.
21	HTML5 support	HTML5 support for virtual console & virtual media without using Java or ActiveX plugins
22	Server security	Shall have a cyber resilient architecture for a hardened server design for protection, detection & recovery from cyber attacks
		Shall protect against firmware which executes before the OS boots
		Should provide effective protection, reliable detection & rapid recovery using:
		Cryptographically signed firmware

		Data at Rest Encryption (SEDs with local or external key mgmt)
		Secure Boot
		Secure Erase
		Secured Component Verification (Hardware integrity check)
		Silicon Root of Trust
		System Lockdown (requires iDRAC9 Enterprise or Datacenter)
		TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ
		Configuration upgrades shall be only with cryptographically signed firmware and software
		Shall provide system lockdown feature to prevent change (or "drift") in system firmware image(s) & prevent malicious modification of server firmware
23	Intrusion alert	Intrusion alert in case chassis cover being opened
24	Display	Should display system ID, status information and system error. Error code followed by descriptive text. LCD background should light up in different colours during normal system operation & error conditions.
25	Warranty	3 years On-site comprehensive warranty Next business Day Support
26	Certificate	Bid/Tender specific OEM authorized certificate to be submitted by the vendor.

Additional General Requirements

- **Product Lifecycle & OEM Support:** All offered equipment shall be of the OEM's current/latest generation, shall not be EOL/EOS at the time of bid, and shall have OEM-authorized service/support availability in India throughout the warranty period.
- **Complete Turnkey Supply:** The bidder shall supply all necessary rails, cables, transceivers, power cords, licenses and accessories and shall undertake complete installation, configuration, integration, testing, documentation, knowledge transfer and commissioning.
- **OEM Compliance Documentation:** The bidder shall submit tender-specific OEM authorization along with OEM datasheets/configuration documents demonstrating compliance with the tender specifications. Any deviation shall be clearly indicated in the technical compliance statement.

C. ENTERPRISE UNIFIED SAN STORAGE SOLUTION

7 storage partition should be made in which 2 for Cyber Range, 2 for Cyber Crime Research Lab, 2 for AI Threat Lab and 1 for State Cyber Lab & Training Centre

SL. NO	PARAMETER	DESCRIPTION
1	Make/Model	Product model along with the technical datasheet to be provided by the vendor.
2	Operating System & Clustering Support	a) The storage array should support industry-leading Operating System platforms including: Windows 2016 / 2019, 2022, VMware and Linux. Offered Storage Shall support all above operating systems in Clustering.
3	Capacity & Scalability	The Storage Array shall be offered with 100 TB Usable capacity after RAID 6 using not more than 16 TB drives. 1 Hot spare to be included. All necessary cables are to be supplied by OEM
4	Front-end Ports & Back-end Ports	The array shall support 32Gb Fibre Channel host ports (minimum 8 per array). Offered storage system shall have 12G SAS ports for Back-end connectivity.
5	Architecture	The storage array should support dual, redundant, hot-pluggable, active-active array controllers for high performance and reliability
6	Storage Scalability	The storage should be scalable to atleast 200 drives or higher using additional enclosures and without changing controller
7	No Single point of Failure	Offered Storage Array shall be configurable in a No Single Point of configuration including Cache memory, FAN, Power supply etc.
8	Disk Drive Support	1. Storage system shall also support Enterprise SAS spinning drives, SSD and near line SAS / 7.2K RPM drives. 2. Offered storage array shall also have support for self-encrypted SSD, SAS and near line SAS / 7.2K RPM.
9	Cache	1. Offered Storage Array shall be given with Minimum of 24 GB memory spread across both controllers
10	Raid Support	Offered Storage Subsystem shall support Raid 1, 5, 6, 10, or equivalent
11	Storage Software Lisc	All the following licenses should be provided for entire supported storage capacity of the proposed Array. 1. Thin Provisioning 2. ADAPT-Distributed RAID Groups 3. SSD Read Cache 4. IP Remote Replication 5. Snapshots 6. 3 level Tiering 7. Volume Copy
12	Warranty	Offered Storage should be bundled with 3years onsite Warranty

- Enterprise Storage Features: The proposed storage shall support enterprise data services including thin provisioning/reclamation, snapshots, compression/deduplication, replication, QoS, encryption and secure erase, with all required licenses included from Day One.
- Management & Interoperability: The storage shall provide centralized monitoring and management, hardware health/alerting, RBAC, audit logging and standard management/automation interfaces, and shall support seamless integration with the proposed compute, virtualization and network infrastructure.

D. HIGH-SPEED 25/100 GBE TOP-OF-RACK (TOR) CLUSTER INTERCONNECT SWITCH: 2 NOS

SL NO	PARAMETER	DESCRIPTION
1	Make & Model	Vendor shall specify the OEM, make and model and submit the corresponding OEM technical datasheet.
2	Purpose	High-performance Top-of-Rack Ethernet switch for redundant, low-latency interconnection of Enterprise AI Compute Cluster Nodes and associated network infrastructure.
3	Architecture	Enterprise-class managed Layer 3 data-centre switch supporting IPv4/IPv6 and advanced routing features.
4	Downlink Interfaces	Minimum 24 × 10/25 GbE SFP28 interfaces, supporting 10 GbE/25 GbE operation.
5	Uplink Interfaces	Minimum 4 × 100 GbE QSFP28 interfaces from day one.
6	25 GbE Optics	Minimum 24 × 25 GbE SFP28 multimode optical transceivers per switch.
7	100 GbE Accessories	Minimum 1 × 100 GbE DAC cable and 2 × 100 GbE QSFP28 multimode optical modules per switch.
8	Switching Capacity	Minimum 2 Tbps full-duplex switching/backplane capacity or better.
9	Latency	Shall support ultra-low-latency switching suitable for high-performance cluster/data-centre workloads.
10	High Availability	Shall support redundant deployment/stacking, MLAG or equivalent OEM-supported high-availability mechanism. All necessary licenses shall be included.
11	Power Supply	Dual redundant, hot-swappable power supplies.
12	Cooling	Redundant/hot-swappable fan modules suitable for continuous data-centre operation.
13	Layer 2 Features	Shall support Ethernet switching, IEEE 802.1Q VLAN tagging, link aggregation, multicast and associated

		enterprise Layer 2 functionality.
14	Overlay Networking	Shall support VXLAN or equivalent standards-based overlay networking and Layer 2 gateway functionality for integration of virtualised/overlay and physical infrastructure.
15	Mobility	Shall support workload/VM mobility across Layer 2 VLAN domains and data-centre network environments, wherever applicable.
16	Layer 3 Routing	Hardware-based IPv4 and IPv6 Layer 3 routing.
17	Routing Protocols	Shall support Static Routing, OSPF and BGP for IPv4/IPv6. IS-IS and other enterprise routing protocols may be supported as applicable.
18	BGP	Full enterprise BGP functionality shall be available from day one with all required licences.
19	QoS	Shall support DSCP-based policy maps, traffic classification, rate limiting/shaping and strict-priority queuing or equivalent enterprise QoS features.
20	Multicast	Shall support enterprise IPv4/IPv6 multicast functionality.
21	AAA	Shall support AAA integration using RADIUS and TACACS+ or equivalent secure centralised authentication mechanisms.
22	Access Control	Shall support Standard/Extended ACLs or equivalent IPv4/IPv6 traffic-filtering capabilities.
23	Security	Shall provide control-plane protection, traffic filtering and protection mechanisms against common malformed or malicious TCP/UDP/network traffic.
24	Management	Shall support secure CLI and web/API-based management as applicable, SSH, Ping, Traceroute, SNMP and other standard enterprise management mechanisms for IPv4/IPv6.
25	Management VLAN	Shall support dedicated management VLAN/interface and configurable descriptions/naming for individual interfaces.
26	Firmware	Switch shall be supplied with the latest stable OEM-recommended firmware. OEM-supported firmware/security updates shall be available throughout the warranty/support period.
27	Licensing	All hardware/software licences required to enable the specified Layer 2, Layer 3, VXLAN, BGP, HA, management and security functionality shall be included from day one.
28	Rack Mounting	Shall include all necessary rack-mounting accessories and cables required for installation and commissioning.
29	Warranty & Support	Minimum 3-year OEM warranty/support with 24x7 OEM technical assistance from day one.

E. VIRTUALIZATION SOFTWARE

SL. NO.	DESCRIPTION
1	VMware Cloud Foundation - 3 Years (Per Core) – 192 Nos (For Compute Node)

4. WORKSTATIONS FOR AI LAB

A. GPU BASED WORKSTATION FOR AI THREAT LAB : 8 NOS

Technical Specifications

SL. NO	FEATURES	SPECIFICATIONS
1	Make/Model	Product model along with the technical datasheet to be provided by the vendor.
2	Monitor	24 inch Monitor FHD IPS with height Adjustment , 1xHDMI, 1 x USB C port minimum
3	Architecture	Architecture optimized for AI workloads with tightly integrated CPU-GPU communication and AI-focused compute design
4	Performance	At least 1 PFLOP / 1000 TFLOPS of FP4 compute or equivalent AI inferencing capability
		Single system should support upto 200B parameter model.
		Support for 400B parameter models using a two-node configuration with OEM supplied QSFP cable
5	Processor	NVIDIA GB10 -16 MB L2 Cache, 20 ARM cores
6	RAM	At least 128GB unified or coherent system memory
7	Memory Architecture	Preference for unified or coherent memory rather than fragmented CPU and GPU memory pools
8	Storage	1 TB NVMe local storage.
9	Graphic	NVIDIA Blackwell
10	Operating System	Linux-based AI-optimized operating system
11	Networking	10GbE RJ-45 connectivity
		2 x QSFP ports (200 Gbps)
		AzureWave AW-EM637, 2x2, 802.11be, Bluetooth 5.4, combo module, internal antenna
12	Ports	1 USB 3.2 Gen 2x2 (20 Gbps) Type-C port with DisplayPort 1.4a alt-mode, power in
		3 USB 3.2 Gen 2x2 (20 Gbps) Type-C ports with DisplayPort 1.4a alt-mode
		1 HDMI 2.1b port
13	Security	Supports TPM 2.0

14	Warranty	3 years warranty
		NBD onsite support
		Premium support for business-critical deployments
15	End-to-End AI Factory Alignment	Same OEM to offer both the desktop AI appliance and the data center AI infrastructure, so the transition from GB10 to server-scale deployment is more seamless.

5. NEXT-GENERATION FIREWALL (NGFW) – 05 UNIT

- ✓ Enterprise Firewall : 2 Nos
- ✓ 3-year License for Enterprise firewall : 2 Nos
- ✓ Webserver protection for both firewall : 1 Nos

Scope:

Supply, installation, configuration, testing, commissioning, integration, documentation and Three (03) years comprehensive onsite warranty and support for an Enterprise Next-Generation Firewall with all required hardware, software, security subscriptions, licenses, accessories and management utilities.

TECHNICAL SPECIFICATIONS

SL.N O	FEATURES	SPECIFICATIONS
A	General & Architecture	
1	Appliance Type	Dedicated hardware-based Next-Generation Firewall (NGFW) security appliance; 1U rack-mountable.
2	Architecture	Multi-CPU architecture with dedicated Network Processing Unit (NPU) and dedicated memory/RAM.
3	Encrypted Traffic Visibility	Shall provide visibility into encrypted traffic flows and support TLS 1.3 without material degradation of specified performance.
4	Security Functions	Firewall, IPsec Site-to-Site VPN, SSL Client VPN, gateway anti-malware/antivirus, web filtering, application control, IPS, traffic shaping/QoS, sandboxing and DoS protection.
5	Zero-Day Protection	Advanced sandboxing with static and dynamic file analysis for zero-day threat detection.
6	Sandbox Logging	Shall log scanned files and provide screenshots/evidence of dynamic file execution.
7	MFA	Multi-factor authentication shall be supported locally or through an external authentication service for minimum 500 VPN users. MFA shall also support user portal and web administration access from Day 1.

8	Authentication Integration	Local authentication and integration with AD, LDAP, RADIUS, TACACS+, eDirectory and Kerberos.
9	Multi-WAN	Support more than two ISP/WAN connections with health monitoring, automatic failover, weighted load balancing and granular multipath rules.
10	XDR Integration	Shall be XDR-ready and capable of integration with the OEM's XDR platform, where required.
11	NDR	Network Detection and Response (NDR) capability shall be built-in or integrated from Day 1.
12	ZTNA	Built-in Zero Trust Network Access (ZTNA) functionality in addition to conventional VPN.
13	DNS Security	DNS security functionality with OEM-provided secure DNS server/service addresses.
14	Security Dashboard	Dashboard shall provide visibility of cloud applications, Shadow IT, suspicious payloads, risky users, advanced threats, network attacks and objectionable websites.
15	Encrypted Threat Detection	Capability to identify encrypted threat communications without requiring TLS decryption.
16	DGA Detection	Capability to detect Domain Generation Algorithm (DGA) activity.
17	Policy Simulation	GUI-based policy test/simulation capability for firewall and web policies based on parameters such as user, IP and time.
18	Reusable Objects	Searchable and reusable object definitions for networks, services, hosts, time periods, users/groups, clients and servers.
19	AI Assistance	GUI shall provide guided AI-assisted configuration help/support.
20	Updates	Centralized automatic/manual updates and support for offline updates.
21	Advanced Threat Protection	Detect and block network traffic communicating with malicious/C2 infrastructure using DNS, firewall and other security intelligence.
22	Threat Intelligence	Capability to ingest third-party threat intelligence feeds and enforce actions based on such feeds.
23	OEM Remote Support	Secure encrypted OEM support access with administrator-controlled enablement and configurable access duration.
24	Monitoring	Multi-timeframe graphs for SD-WAN, CPU, disk, interfaces, device load, memory, users and WAN utilization.
25	NAT & SSL Rules	Ability to configure separate NAT and SSL inspection rules with granular controls independent of firewall rules.
26	Application Control	Identify, allow, block, prioritize or limit applications beyond simple port/protocol identification.
27	Endpoint	Automatic isolation/restriction of endpoint devices based on

	Integration	health/security status through firewall policies.
28	Endpoint Health	Dashboard shall display health/security status of connected endpoints.
29	Management	Both local/on-premises and cloud-based management shall be supported.
B	SSL/TLS Inspection	
30	SSL Inspection Policy	Decryption profiles assignable based on source, destination, websites/categories or equivalent criteria.
31	Re-signing CA	Administrator shall be able to specify certificate authorities used for re-signing inspected SSL/TLS sessions.
32	Decryption Failure Handling	Configurable action for traffic that cannot be decrypted due to unsupported/insecure protocols, cipher suites, SSL compression or capacity limitations.
33	Certificate Validation	Configurable actions for certificate validation errors and insecure ciphers; capability to enforce RSA key size and permitted SSL/TLS versions.
34	Cipher Support	Shall support applicable enterprise cipher suites including AES-128/256, Camellia, ChaCha20-Poly1305, GCM, CCM and CBC; legacy ciphers such as RC4/3DES/IDEA, if supported, shall be controllable/disableable by policy.
C	Hardware & Performance	
35	Interfaces	Minimum 8 × GbE copper ports + 2 × SFP ports.
36	Firewall Throughput	Minimum 35 Gbps.
37	IPS Throughput	Minimum 7 Gbps.
38	Threat Protection Throughput	Minimum 5 Gbps.
39	VPN Throughput	Minimum 20 Gbps.
40	SSL Inspection Throughput	Minimum 1 Gbps.
41	Concurrent Connections	Minimum 6 million.
42	New Sessions	Minimum 140,000 new sessions/second.
43	Internal Storage	Minimum 120 GB SSD.
44	Memory	Minimum 8 GB RAM per appliance.
D	Web & Application Security	
45	Web Categories	Minimum 90+ predefined web-filtering categories.
46	Traffic Shaping	Network-, user-, web- and application-based traffic shaping/QoS policies.

47	Temporary Override	Temporary web-filter override using access codes without modifying the underlying security policy/rule.
48	User Notification	Support customized block/notification messages and URL redirection.
49	URL Lookup	GUI-based URL category lookup capability.
E	Intrusion Prevention System (IPS)	
50	IPS Signatures	Minimum 5,000+ IPS signatures .
51	Attack Protection	Protection against DoS/SYN, IP, ICMP, TCP, UDP and related network attacks.
52	Deep Packet Inspection	IPS shall provide Deep Packet Inspection (DPI).
53	Custom Signatures	Administrator shall be able to create custom IPS signatures.
54	Protocol Attack Protection	Protection against DNS cache poisoning, malformed/improper protocol commands and similar attacks.
F	SD-WAN	
55	Integrated SD-WAN	Built-in SD-WAN with application-aware path selection and routing.
56	Performance SLA	Dynamic WAN selection based on latency, jitter and packet loss.
57	WAN Technologies	Support WAN connectivity including VDSL/DSL, cable, LTE/cellular, MPLS and Ethernet-based Internet connectivity, as applicable.
58	WAN Monitoring	Real-time visibility into latency, jitter and packet loss for WAN links.
59	Session Continuity	Ability to transition application traffic to a better-performing WAN link when configured SLA thresholds are exceeded, subject to supported session-steering capability.
60	SD-WAN VPN	Centralized creation/management of site-to-site VPNs using hub-and-spoke, full-mesh or hybrid topology.
61	SD-WAN Management	Centralized management with guided/wizard-based creation of SD-WAN connections.
G	Logging, NDR & Reporting	
62	Firewall Logs	Logs shall identify the firewall/security policy rule responsible for the logged event.
63	System Statistics	Dashboard shall provide firewall health and traffic statistics.
64	NDR Risk Scoring	NDR module shall provide IoC summaries based on risk score/severity.
65	Connection Logging	Detailed logging of permitted and blocked connections.

66	Performance Statistics	Real-time performance statistics.
67	Reporting Storage	Minimum 100 GB reporting/log storage , provided by the same OEM solution.
68	Reports	Minimum 60+ drill-down reports available through the appliance/associated OEM reporting solution.
H	OEM / Compliance Requirements	
69	Common Criteria	Proposed product/solution shall have Common Criteria EAL4+ , where applicable to the offered product/version.
70	MAF	Tender-specific Manufacturer Authorization Form/Certificate from OEM.
71	MTCTE	Valid MTCTE certification from TEC, where applicable to the offered equipment/category under prevailing regulations.
72	Make in India	Offered solution shall comply with applicable Government of India Make in India / Public Procurement requirements.
73	ISO	OEM shall hold valid ISO/IEC 27001 certification.
74	Gartner	OEM/product shall be listed in the latest applicable Gartner Magic Quadrant for Enterprise Wired and Wireless LAN Infrastructure? [Requires correction—see note below.]
75	SOC	OEM shall be SOC 2 Type II compliant.
76	OEM Experience	OEM shall have minimum 15 years of relevant industry experience.
I	Licensing, Support & Warranty	
77	Subscription Period	3 years from date of activation/commissioning.
78	Security Licenses	Firewall security subscription shall include Advanced Threat Protection, DNS Security/Protection, IPS, anti-malware, web filtering, application visibility/control, sandboxing and other specified security services.
79	Updates	Security signatures, threat intelligence, firmware/software and security updates for the complete subscription period.
80	OEM Support	24x7 OEM technical support for three years.
81	Hardware Support	Advanced hardware replacement for the entire three-year support period.
82	Licensing Requirement	All licenses required to meet the specified functionality shall be included from Day 1 , unless explicitly stated otherwise in the tender.

6. VIDEO WALL 01 UNIT

- ✓ Cyber Range & Cyber Training Centre : 1
(Including Video Walls, Cameras, audios for two training halls & Operating Consoles for Red Team and Blue Team Operation)

Scope:

Supply, installation, configuration, integration, testing, commissioning, documentation, training, and three (03) years comprehensive onsite support for a Video Wall & Red/Blue Team Setup comprising video wall display system, video wall controller, operator consoles, audio-visual equipment, networking, furniture, accessories, and all associated hardware, software, cabling, and services required for Cyber Range monitoring, Security Operations Centre (SOC) and Red Team/Blue Team exercises.

TECHNICAL SPECIFICATIONS OF ENTERPRISE VIDEO WALL

SL NO	FEATURES	SPECIFICATIONS
1	Make & Model	Specify
	Panel	
2	Diagonal Size	55"
3	Panel Technology	IPS
4	Resolution	1920 X 1080 (16: 09) or better
5	Brightness	500 cd/m2 or above
6	Native Contrast Ratio	1100:1 or above
7	Dynamic Contrast Ratio	100,000:1 or above
8	Viewing Angle(H/V)	178/178
9	Response Time(G-to-G)	8ms or less
10	Color Gamut	72% or better
11	Operation Hour	24/7
12	Haze	28% or better
13	Orientation	Landscape / Portrait
	Input Connectivity	
14	HDMI 2.0	2 or More ports
15	Display Port 1.2	1 or more ports
16	HDCP	HDCP 2.2
17	AUDIO	Stereo mini Jack
	Output Connectivity	

18	Loop-out	DP1.2(Loop-out)
19	AUDIO	Stereo mini Jack
20	EXTERNAL CONTROL	RS232C(in/out), RJ45
	Power	
21	Power Supply	AC 100 - 240 V~ (+/- 10 %), 50/60 Hz
22	Power Consumption	165 Typical[W/h] or less
23	Bezel to Bezel Width (mm)	0.44mm(even)
24	Operating Temperature	0°C~ 40°C
25	Humidity	10~80%
	Certification	
26	Safety	UL , BIS, 60950,EMC-Class B
27	Accessories	Quick Setup Guide, Display Port cable, Power Cord, Remote Controller, Batteries
28	Warranty	3 Years onsite
29	IP rating	IP5X

TECHNICAL SPECIFICATIONS OF ACCESSORIES

SL NO	FEATURES	SPECIFICATIONS
1	Video Wall Controller	Hardware-based controller with minimum 16 inputs , 4K source support, IP streaming, HDMI/DisplayPort, multiple layouts, web-based management and redundant power supply.
3	Operator Consoles	Minimum 6 ergonomic operator consoles with monitor mounts, cable management, storage and high-back ergonomic chairs.
3	AV System	Wireless presentation, AV/HDMI matrix, amplifier, ceiling/wall speakers, wireless microphones and conferencing support.
4	Network Infrastructure	Managed 10GbE switch , Cat-6A/fibre cabling, patch panels, transceivers and required accessories.
5	Management Software	Centralized video-wall management with multiple layouts, screen sharing, drag-and-drop content, scheduling and remote administration.
6	Integration	Integration with Cyber Range, SIEM/Wazuh, AI/ML Threat Analytics, CCTV, presentation systems and third-party applications.
7	Power Protection	UPS Supply to be provided

8	Implementation & Support	Complete installation, integration, testing, commissioning, documentation, training and 3-year comprehensive onsite warranty/support.
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7. SMART BOARD

- ✓ Cyber Range & Cyber Training Centre : 2
- ✓ Cyber Crime Research & Advanced Crime: 2
- ✓ AI threat Lab : 2
- ✓ State Cyber Lab : 1

Scope:

Supply, installation, configuration, testing, commissioning, integration, documentation, and Three (03) years comprehensive onsite warranty and support for Enterprise Smart Interactive Displays with all required hardware, software, mounting accessories, cabling, and management tools.

SL NO	FEATURES	SPECIFICATIONS
1	Make & Model	Specify
2	Screen Size	Display size shall be selected based on room length, width, seating capacity, layout and maximum viewing distance. Suitable sizes such as 65", 75", 86", 98" or higher shall be proposed by the bidder based on site assessment and approved layout.
3	Panel Type	ADS/VA
4	Backlight Unit	Anti-Glare Direct LED (DLED)
5	Native Resolution	3840 x 2160 (UHD)
6	Pixel Pitch	0.5622×0.5622mm or better
7	Display Colour	1.07 billion colours (10-bit) or better
8	Response Time	6.5ms
9	Brightness	Minimum 450 nit
10	Contrast Ratio	5000 : 1
11	Viewing Angle (H x V)	178°(H/V)
12	Display Life Time	≥50,000 Hours
13	Multi touch point	50 Points
14	Touch Accuracy	±1 mm or more precise
15	Response Time	≤2.5ms or faster
16	Supported Operating Systems	Windows 11/10/8/7, Linux, Mac OS X, Chrome OS, Android

17	Built-in Operating System	Android 14.0 and upgrade to 16
18	Android Certification	EDLA Certified on OEM Name with Online Verification
19	CPU	Octa-Core ARM Cortex-A72 x 4 + A53 x 4 or better
20	Memory	8GB RAM on board or higher
21	Storage	128GB and expandable up to 256GB
22	Flicker Free Display	Required
23	Integrated NFC Module	Required
24	Built-in Microphone	Required, 8 Array microphone for audio recording capabilities with a pickup distance of up to 8 meters
25	Screen Recording with audio	Required
26	Built in Audio out	40W (2 x 20W front-facing speakers)
27	Expansion Slots	TF Card slot for up to 256 GB additional storage or better
28	Min. Input ports	HDMI x 3,
		USB (3.0) x 4
		USB (2.0) x 1
		USB Type C x 2
		USB TOUCH 3.0 x 2
		OPS Slot x 1
		VGA x 1
		DP IN x 1
		LAN x 1
		Audio In x1
		TF Card x1
29	Min. Output Ports	HDMI Out x1
		Audio Out x1
		LAN x 1
		SPDIF x1
30	External Control	Rs-232C
31	Wi-Fi	(2.4GHz/5GHz)) or better
32	Bluetooth	Version 5.3 or better
33	Certifications	BIS
34	Factory India Certificates/Approvals	ISO 9001:2015, ISO 45000:2018, and 14001:2015
35	Accessories &	Wall mount need to supply required accessories. Remote

	Installation type	Controller with batteries, Power Cord, HDMI Cable USB cable and 2 Writing Pen
36	Handwriting Recognition	Required and Recognizes at least 10 local languages
37	Google Play Store	Required
38	Device Management System (DMS)	Required
39	Warranty	3 years on Site

8. TELEPRESENCE SYSTEMS – VIDEO CONFERENCING & COLLABORATION ROOM SOLUTION

- ✓ Cyber Range & Cyber Training Centre : 1
- ✓ Cyber Crime Research & Advanced Crime: 1

SL NO	FEATURES	SPECIFICATIONS
	Make & Model	Specify
1	Audio System	The device shall include an integrated beamforming microphone array with support for voice tracking. It shall provide built-in high-quality stereo speakers suitable for medium-sized meeting rooms. The audio system shall support: - AI-based noise suppression - Acoustic echo cancellation - Automatic gain control - Voice activity detection The solution shall support expansion microphones for larger meeting rooms.
2	Video Collaboration	The system shall support Ultra HD video conferencing and 4K content sharing. It shall support wireless and wired content sharing. The solution shall support Bring Your Own Device (BYOD) mode through USB connectivity. The system shall provide one-touch meeting join using a touch controller.
3	Display Support	The device shall support connection to up to three external 4K displays through HDMI outputs.
4	Collaboration Platform Compatibility	The solution shall support native or interoperable operation with major Unified Communications platforms including: - Microsoft Teams - Cisco Webex - Zoom - Google Meet - WebRTC SIP/H.323 standards-based video conferencing systems

5	Connectivity	The device shall provide: Minimum 1 × Gigabit Ethernet port Dual-band Wi-Fi Bluetooth USB Type-A and USB Type-C ports HDMI input(s) HDMI output(s)
6	Network & Security	The solution shall support: IPv4 and IPv6 IEEE 802.1X authentication IEEE 802.1Q VLAN tagging HTTPS and SSH secure management Secure media encryption (SRTP/TLS) WPA2/WPA3 Enterprise wireless security Remote monitoring, diagnostics, analytics, and firmware upgrades through a centralized cloud or on-premises management platform.
7	AI Features	The system shall provide built-in AI capabilities including: Automatic participant framing Active speaker tracking People counting and occupancy analytics Intelligent meeting zones Background noise removal Meeting quality optimization
8	Accessories	The solution shall be supplied complete with: Touch control panel Wall or display mounting kit Power supply HDMI cables Network cable All accessories required for installation and commissioning.
9	Compliance	The offered equipment shall comply with applicable international safety, electromagnetic compatibility, environmental, and networking standards, including CE, FCC, RoHS, WEEE, and relevant IEC standards.
10	Warranty	The offered equipment shall carry a minimum 3-year comprehensive OEM warranty, including hardware replacement, software updates, firmware upgrades, and technical support if any.

9. NETWORK SETUP & CONFIGURATION

Scope:

Supply, installation, configuration, testing, commissioning, integration, documentation and Three (03) years comprehensive onsite support for a complete enterprise network infrastructure, including structured cabling and all associated accessories and services.

A. HIGH-SPEED 1/10 GBE CORE SWITCH -2 Nos

Sl. No.	Parameter	Minimum Technical Requirement
1	Switch Type	Enterprise-class, managed Layer-3 fibre Ethernet switch, 1U rack-mountable
2	Downlink Ports	Minimum 24 × SFP/SFP+ fibre ports
3	Downlink Speed	Each port shall support 1 Gbps and 10 Gbps Ethernet operation
4	Fibre Interface	SFP/SFP+ ports supporting standard 1G and 10G optical transceivers
5	Uplink Ports	Minimum 4 × 25 Gbps fibre uplink interfaces
6	Uplink Interface	SFP28
7	Uplink Speed	25G, with backward compatibility with 10G/1G wherever supported
8	Switching Capacity	Minimum 400 Gbps or higher
9	Forwarding Rate	Minimum 250 Mpps or higher
10	Layer 2	VLAN, 802.1Q, STP/RSTP/MSTP, LACP, LLDP/LLDP-MED, Port Security

11	Layer 3	Static routing, OSPF, IPv4/IPv6 routing, VRRP or equivalent
12	Security	802.1X, MAC authentication, ACL, DHCP Snooping, Dynamic ARP Inspection and IP Source Guard
13	QoS	DSCP/802.1p classification, marking, queuing and rate limiting
14	Multicast	IGMP Snooping and multicast routing
15	Management	CLI, Web GUI, SNMPv2/v3, SSH, HTTPS, Syslog and NTP
16	Automation	REST API/NETCONF/RESTCONF or equivalent
17	Stacking	Shall support high-speed physical stacking/virtual chassis
18	High Availability	Support for redundant power supply and high-availability features
19	MACsec	Hardware-based MACsec encryption preferred
20	IPv6	Full IPv6 routing and security support
21	Optics	Shall support industry-standard 1G/10G SFP/SFP+ and 25G SFP28 optics-Min 10 to be populated in each switch
22	Rack	19-inch rack mountable, maximum 1U
23	Warranty	Minimum 3 years OEM warranty
24	Support	Minimum 3 years OEM technical support including software updates/security patches

B. 24-Port Managed Gigabit Layer 2+/Layer Quantity: 7 Nos.

SL NO	PARAMETER	DESCRIPTION
1	Make & Model	Vendor shall specify the OEM, make and model. Relevant OEM technical datasheet shall be submitted along with the bid.
2	Switch Type	Managed Layer 2+/Layer 3 Lite Ethernet Access Switch or better
3	Form Factor	1RU rack-mountable with necessary rack-mounting accessories
4	Access Ports	Minimum 24 × 10/100/1000 Mbps Gigabit Ethernet RJ45 ports
5	Uplink Ports	Minimum 4 × 1 GbE SFP ports
6	Switching Capacity	Minimum 56 Gbps
7	Forwarding Rate	Minimum 41.66 Mpps
8	MAC Address Table	Minimum 16,000 MAC addresses
9	VLAN Support	Support for up to 4093 VLANs or better
10	Link Aggregation	IEEE 802.3ad LACP or equivalent
11	Spanning Tree	Support for STP, RSTP and MSTP
12	Layer 3 Features	Shall support Static IPv4 and IPv6 Routing
13	Static Routes	Support for minimum 990 static routes
14	IP Interfaces	Support for minimum 128 IP interfaces
15	Multicast	Support for IGMP Snooping v1/v2/v3
16	Processor	Minimum 1.4 GHz dual-core ARM processor or equivalent/better
17	System Memory	Minimum 1 GB DDR4 DRAM or better
18	Flash Memory	Minimum 512 MB flash memory
19	Packet Buffer	Minimum 1.5 MB packet buffer
20	Console Port	Minimum 1 × RJ45 console port or equivalent dedicated console interface
21	USB Port	Minimum 1 × USB Type-A port
22	Management	Shall support Web GUI, CLI and SNMP v1/v2c/v3
23	Security	Shall support IEEE 802.1X, ACLs, DHCP Snooping and Port Security

24	IPv6 Support	Shall support IPv6 addressing, management and static routing
25	Power Supply	Internal AC power supply
26	Input Voltage	100–240 VAC, 50/60 Hz
27	Accessories	All required power cables, rack-mounting kit and other accessories required for installation and commissioning shall be supplied.
28	Firmware	Switch shall be supplied with the latest stable OEM-recommended firmware. Firmware/security updates shall be available during the support period.
29	Warranty & Support	OEM warranty/support period shall be specified as per tender requirement.
30	OEM Authorisation	Bid/Tender-specific OEM authorisation may be submitted by the bidder, if required under the procurement conditions.

10. ENTERPRISE STRUCTURED CABLING

SL NO	PARAMETER	DESCRIPTION
1	12 U Racks with Accessories	Supply and installation of 12U rack with following specification Wall Mount Network Rack – Size : 12 U Dimension 600mm (W) X (12U) X600 mm (D) Front glazed Door with handle and push button with key arrangement and vents at top & bottom. Surface finish: Sheets cleaned, degreased, phosphated, electro- dip coat primed and electro statically powder coated Wall Mounting Brackets 1U 19" Horizontal cable Manager-1 Number PDU: 19' Mountable with 6x 5A Universal socket Power cord. Rear cover with 2nos. of Copper earthing studs Captive hardware set
2	CAT6A cable	Supply, drawing, testing and commissioning of CAT6A cable with following specification Shielded U/FTP 23 AWG CAT 6A Cable with HDPE Insulation Material and LSZH Outer Jacket Cable should have NVP > 75% and Each pair enclosed separately in laminated aluminium foil with Drain Wire for excellent EMI & Alien Crosstalk Protection Operating Temperature -20 °C to +70 °C conforming to the standards ANSI/TIA-568.2-D, ISO/IEC 11801, IEEE802.3, ISO/IEC 60332-1, ISO/IEC 61034-2, ISO/IEC 61754-2 Colour Code as per TIA/EIA 568-B RoHS Compliant ETL 4 Channel transmission performance tested up to 600 MHz or better .
3	Patch Pannel	Supply and installation of Patch Pannbel with following specification 1U rack mountable, 24 Port Unloaded Shielded Patch Panel supporting Shielded /Unshielded RJ-45 Jacks and OFC LC Duplex Adapter, Panel should be made of cold rolled steel powder coated shall have Rear cable organizer front labelling Facility
4	IO for Patch Pannle and WAO	Supply, termination, testing, and commissioning Keystone Jack with following specification UL Listed ETL 4 Channel verified Unshielded CAT 6A Keystone Jack suitable for 22-24 AWG bare copper conductor Contact Plating: 50µ" Gold/50µ" Nickel TIA/EIA 568-B colour code conforming to the standards UL94V-0 rated or equivalent ANSI/TIA-568.2-D , ISO/IEC 11801, IEEE 802.3, ISO/IEC 60332-1, die cast zinc alloy housing 360° Shielding and 3 direction cable entry . Jack shall support Minimum 750 insertion cycles , 20 re terminations.

		dust protection covers on patch panel side RoHS Complaint.
5	Backbox with Face Plate	Supply, Mounting , testing, and commissioning Backbox with faceplate with following specification The backbox material should be ABS with provision for mounting RoHS Complaint. The face plate shall be suitable for structured LAN cabling systems and designed to accommodate RJ45 keystone jacks for Cat6/Cat6A data outlets. The face plate shall be manufactured from high-quality material. The Face plat should be complete with screws, labeling and shutters for protection against dust ingress Configuration: The face plate shall be supplied with single-port/ dual-port configurations as per site requirment
6	CAT6A Patch Cords for WAO 2mtr	Supply, installation, testing, and commissioning of CAT6A Patch cord with following specification Length : 2 Mtr UL Listed, ETL 4 Channel verified CAT 6A U/FTP Sheilded Patch Cord having LSZH jacket, 26 AWG bare copper conductor UTP 4 pair both end factory Crimped with modular male plugs with minimum 500 insertion cycles terminated as per TIA/EIA 568-B colour code conforming to the standards ANSI/TIA-568.2 , ISO/IEC 11801, IEEE 802.3, ISO/IEC 60332-1, RoHS Complaint.
7	CAT6A Patch Cords for Rack side 0.5 Mtr	Supply, installation, testing, and commissioning of CAT6A Patch cord with following specification Length : 0.5 Mtr UL Listed, ETL 4 Channel verified CAT 6A U/FTP Sheilded Patch Cord having LSZH jacket, 26 AWG bare copper conductor UTP 4 pair both end factory Crimped with modular male plugs with minimum 500 insertion cycles terminated as per TIA/EIA 568-B colour code conforming to the standards ANSI/TIA-568.2 , ISO/IEC 11801, IEEE 802.3, ISO/IEC 60332-1, RoHS Complaint.
8	6 Port LIU	Supply, installation, testing and commissioning of Fiber LIU with following specification 1U 6 Port Sliding type LIU Loaded with Ganged OM4 LC Adapters Coloured Pigtails for easy core identification Splice Trays, cable manager and should have sufficient blanking plug to cover unused slots, LIU shall be made of Powder Coated Cold Rolled Steel and have provision to support upto 96 LC Ports and CAT6A Uplinks in future.
9	OM4 fiber cable	Supply, laying, testing, and commissioning of Outdoor 6 Core OM4 cable with following specification, No of CORE: 6 Type : Multimode OM4 Unitube Gel Free Optical Fiber Cable, having ECCS Armouring and Glass Yarn Strength Member, LSOH Black Anti Rodent , Anti Termite Outer Sheath, Water Swellable Yarn Water Blocking, Max Tensile Strength: 1500N, Crush Resistance: 3000N/10 cm, Outer Diameter: 9±0.5mm, Operating Temperature: -20°C to +70°C, Attenuation @ 850 nm: ≤ 3.0 dB/km, Attenuation @ 1300 nm: ≤ 1.0 dB/km, Bandwidth (EMB) @ 850 nm: ≥ 4700 MHz.km : RoHS Compliant , AS/ACIF S008; AS/NZS 3080, TIA-492AAAD , GR 20 STDS, TIA/EIA 568.3-D, EIA455
10	LC LC Patch Cord	Supply, installation, testing and commissioning of LC LC Patch Cord Length : 3 Meter OM4 Duplex LC Erica Violet colored fiber patch cord confirming to LSZH IEC-60332-1 , IEC60754-1 & 2, ISO/IEC 11801-1:2017, ANSI/TIA/ EIA 568.3-D,ANSI/TIA/EIA-492,

		Durability: 500 insertions - , Zip Lock Jacket , Operating Temperature: -40°C to +85°C, RoHS Compliant
11	PVC Conduit	Supply, installation, testing and commissioning of 20/25/32 mm PVC conduit with ISI mark and all accessories including saddle as required.
12	Trunking 50 X50	Supply, installation, testing and commissioning of 50 x 50 mm Trunking with ISI mark and all accessories as required.
13	Trunking 100 X100	Supply, installation, testing and commissioning of 100 x 100 mm Trunking with ISI mark and all accessories as required.
14	Fluke Testing	Testing and Certification: All installed data nodes shall be tested and certified using a calibrated cable certification tester with a valid calibration certificate. Testing shall be carried out in accordance with the applicable ANSI/TIA and ISO/IEC structured cabling standards for the specified cable category Test reports for all data nodes shall be submitted to the Engineer-in-Charge/Client upon completion.

11. ENTERPRISE SMART RACK / INTEGRATED MICRO DATA CENTRE SOLUTION WITH 20 KW N+1 PRECISION COOLING, ENVIRONMENTAL MONITORING, FIRE SUPPRESSION & ACCESS CONTROL – 1 SET

Intelligent/Smart DC Solution essentially shall include internal redundant or backup power supplies, environmental controls (In-Rack cooling system, fire suppression, smoke detection, Water leak detection, temperature and humidity sensors), and security devices. In-Rack Precision cooling systems should have redundancy and higher availability. And ensure minimum 20 KW cooling is maintained 24*7. Environmental monitoring shall be done from IP based software. Cooling, Racks, PDU and monitoring system should be from same OEM. The detail specifications of the Intelligent/Smart DC Solution, standalone system shall be in adherence to standard Data Centre guidelines thus shall be composed of multiple active power to IT and cooling distribution paths, but only one path active. Shall have redundant components. Modular and scalable design of the Intelligent/Smart DC Solution for power and cooling: All the critical components used to design the system shall be redundant and in the Events of failure the components can be maintained easily. All the components of the infrastructure should be such that it can be easily dismantled and relocated to different location

SL No.	FEATURES	SPECIFICATIONS
1	Type	Smart DC solution
2	Expandability	DC Solution would have provision to add extra racks in future. It should be flexible, adaptable, controllable infrastructure for future expansion
3	Size	42U, 800Wx2000Hx1500D
4	Door Type	Rack solution should be Fitted with Front Glass door & Rear Sheet Steel double Door with 4 point locking system and comfort handle with locking. Rack Design should support closed loop High performance cooling. The door should be inter-changeable at site, at any point of time. Side panel should be with PU gasket with screw fixing to avoid air leakage and Side panel required only at the end of the row on each side.
5	Other Accessories	Top cover with slideable cable entry. Bottom cover with multi-piece gland plates for cable entry. Horizontal Earthing Busbar per cabinet, 20 point for earth connection. Captive Hardware pack and Baying kit as required. Base Plinth of 100mm height to mount the rack and cooling system, Stationery/component shelf 1 No. per racks. Tool less Blanking panels for 50% of Rack U space. IP 20 protection rating when installed (joined to neighboring cooling unit for closed loop). All Racks should be certified according to ISO 9001,14001, 45001. Complying EIA 310,DIN 41494 and IEC 297 standards

6	Load bearing capacity:	1400KG at Frame & 1000 KGs. On 19" mounting angles.
7	Surface Finish:	Nano Ceramic Coated, electro-dipcoat primed to 10 -15 microns and powder coated with textured polyester RAL 7035 to 80 to 120 microns. Status based LED lights to be provided for each rack.
8	Cooling Type	In Rack Based Cooling System in N+1 Redundancy
		The Intelligent/Smart DC solution shall be equipped with DX based In-Rack variable/ inverter-based scroll cooling units which should be able to cool the equipment uniformly right from 1st U to 42nd U of Rack through Rack Based Cooling.
		In-Rack Precision Air Cooling solution should cater to minimum 20 kW capacity IT equipment load with Redundancy and higher availability for racks.
		The dimension of the cooling system shall be less than of 600mm Width X 2000mm height X 1500mm Depth including any extension frame
		The cooling should be of modulating type and the modulation range should be of 10 - 20 KW or more.
		All units equipped with direct expansion circuit are suitable for R410A refrigerant.
		Units should be offered Hot swappable and with minimum 2 plugs EC Direct Drive Fan, High efficiency, minimum power consumption, EC motor with integrated electronics, True soft start characteristics (inrush current lower than operating current), Backward curve, corrosion resistant fan wheel, Maintenance free design and construction. The fan section shall be designed for higher air flow. The fan shall be protected from over temperature of motor, electronics, locked rotor protection, short circuit of motor output.
		The fans can be exchanged quickly and at any time, even while the system is operational (hot swapping). The fans are installed in the cold air section, which increases their service life
		An integrated display should be equipped in the front of the unit to display and set the physical parameters Cooling system should be equipped with minimum two sensors in each case for detection of the cold and warm air temperatures, providing for the appropriate redundancy. The controller shall allow setting and monitoring of the DC cabinet parameters. Unit utilizes the three temperature sensors placed in the front and rear of the cooling system to ensure management and control of temperature inside the cold aisle containment of the Datacenter
9	Controller Details	The controller should allow setting and monitoring of the following space parameters:
		Air inlet Temperature
		Air supply Temperature from the cooling system
		Supply Temperature Nominal set-point
		Supply Temperature band
		Humidity (inlet)
		Humidification - Enable/Disable (When applicable)
		De-Humidification - Enable/Disable (When applicable)
		Status of the cooling unit ,
		Status of fan speed
		Status of the compressor
		Automatic restart must be provided after a power failure.
10	Cooling Redundancy Features	The cooling system installed should have the facility to work independently or together In case of Teamwork
11	Condenser	The condenser frame shall be made up of a sturdy GI structure or CRCA painted.
		The condenser should be equipped with 3 no. of Axial fan for better efficiency
		The unit shall be powder painted panel to protect against corrosion.
		The unit shall be totally front and rear accessible including any component

		removal.
12	PDU	Vertical PDU, with C13 Sockets - 24nos, C19 Sockets - 6nos, With required 4 Pole MCB & Power cord as per standard with industrial Socket.
13	Rack Monitoring System and Fire Suppression	Rack based active fire suppression system with minimum space required for mounting including detection system, smoke extraction and extinguisher unit.
		The extinguishing process should begin automatically when the main fire alarm is triggered.
		Fire Alarm and Fire Suppression System: The integrated infrastructure solution should be designed as a complete stand-alone unit with security, fire detection and fire suppression systems. Each of the systems should be inter-operable and inter connected.
		Environmentally friendly clean agent should be used to ensure that no harm to human beings and environment is caused.
		NFPA approved Clean Agent for fire suppression system. The clean agent based system shall be designed and installed as per NFPA latest Edition.
		Should have Fire Detection and suppression system sized and the gas quantity to be designed for the cold aisle Containment and the racks.
		The system should monitors all IT racks for temperature and humidity, enclosures.
		The unit should be the central unit of the monitoring system up to 32 sensors can be connected.
		The unit should have TCP/IP connection to the data network via Ethernet, configured via Web / USB.
		The unit should send alarms via an e-mail server and connect to the Network Management System of a company via SNMP/OPC
		Racks to be equipped with Sufficient sensors for measuring the temperature, humidity, water leak detection, access sensors for rack doors etc
		Emergency automatic rear door opening kit in case of cooling failure/high temperature alarm must be provided.
		Email Notification & SMS Alerts required
		Should have Visual and Audible Alarm installed
		Access Control system
		Should provide IP based Biometric Access Control
		Each Rack doors should have Biometric Access Control to permit only authorized persons to open the door through finger print reader.
14	Warranty	The offered Solution shall carry a minimum 3-year comprehensive OEM warranty, including hardware replacement, software updates, firmware upgrades, and technical support if any.

12. POWER DISTRIBUTION & SURGE PROTECTION SYSTEM

Scope:

Supply, installation, testing, commissioning, integration, documentation, and five (05) years comprehensive onsite warranty and support for a complete Surge Protection System, including surge protection devices (SPDs), earthing accessories, monitoring modules, distribution panel integration, and all associated hardware, cabling, accessories, and services for protection of IT and networking infrastructure.

Technical Specifications

SL NO	PARAMETER	DESCRIPTION
A	MAIN POWER PANEL	

1	Scope	Design/fabrication, supply, transportation, installation, testing and commissioning of complete Main Power Panel with all required switchgear, protection, metering, control wiring and accessories.
2	Panel Type	Wall-mounted, cubicle-type, dust- and vermin-proof electrical panel with front access.
3	Construction	Panel enclosure shall be fabricated using CRCA sheet steel of suitable thickness and construction appropriate to the approved design, fault level and installed switchgear.
4	Form of Separation	Internal segregation/separation shall be provided as specified in the approved design, preferably Form 4 where required.
5	Standards	Panel assembly shall comply with applicable IS/IEC standards , including the applicable current standard for low-voltage switchgear and controlgear assemblies.
6	Doors & Compartments	Hinged doors shall be provided for switchgear compartments with suitable locking arrangement, cable alley and required equipment cut-outs.
7	Door Earthing	All metallic doors shall be bonded to the panel earth using minimum 4 sq. mm braided copper conductor or appropriately sized equivalent bonding conductor.
8	Surface Treatment	CRCA enclosure shall undergo appropriate pretreatment and powder coating suitable for indoor electrical-panel application.
9	Incomer	4-Pole MCCB, minimum 25 kA breaking capacity, microprocessor/electronic trip type , suitably rated for the connected/design load.
10	Busbar	Aluminium phase and neutral busbars of adequate current rating and short-circuit withstand capacity. Neutral busbar shall be appropriately sized for the intended load characteristics.
11	Outgoing Feeders	4-Pole MCCBs, minimum 25 kA breaking capacity , with quantity and current ratings as per approved SLD/load schedule.
12	Metering	Minimum 1 No. multifunction digital energy/power meter with required CTs.
13	Indication	R-Y-B phase indication – 1 set .
14	Voltage Monitoring	Digital/analog voltmeter with selector switch, where separately required in addition to multifunction meter.
15	Emergency Stop	Emergency stop/trip arrangement for the Main Power Panel, where required by the approved electrical design and safety scheme.
16	Internal Accessories	CTs, control wiring, fuses/MCBs, terminal blocks, cable glands, lugs, labels, ferrules and all accessories required for complete operation.
17	Identification	All incomers, outgoing feeders, meters, controls, busbars and terminals shall be properly labelled/identified.
18	Testing	Complete panel shall be inspected and tested prior to commissioning. Test reports shall be submitted.
B	UPS POWER PANEL	
19	Scope	Fabrication, supply, transportation, installation, testing and commissioning of complete UPS Power Distribution Panel.
20	Panel Construction	Wall-mounted, cubicle-type, dust- and vermin-proof CRCA sheet-steel enclosure with front access and suitable internal segregation.
21	Standards	Panel shall comply with applicable current IS/IEC standards for low-voltage switchgear and controlgear assemblies.
22	Door Earthing	Metallic doors shall be suitably bonded using minimum 4 sq. mm braided copper conductor or appropriately sized equivalent conductor.
23	Surface Treatment	Suitable pretreatment and powder-coated finish.
24	Incomer	4-Pole MCCB, minimum 25 kA breaking capacity, microprocessor/electronic trip type , suitably rated.
25	Busbar	Aluminium phase and neutral busbars of adequate current carrying and short-circuit withstand capacity.
26	Outgoing Feeders	4-Pole MCCBs, minimum 25 kA breaking capacity , quantity/rating as per approved SLD and UPS distribution requirements.
27	Metering	Minimum 1 No. multifunction digital meter with required CTs.
28	Indication	R-Y-B indication – 1 set .

29	Voltage Monitoring	Voltmeter with selector switch, where required.
30	Internal Accessories	CTs, control wiring, fuses/MCBs, terminal blocks, glands, lugs, ferrules, labels and all required accessories.
31	Testing & Commissioning	Complete functional testing shall be carried out and test reports submitted before commissioning.
C	EARTHING & EQUIPOTENTIAL BONDING SYSTEM	
32	Scope	Design, supply, installation, testing and commissioning of a complete earthing and equipotential bonding system for the Server Room/Data Centre and associated electrical infrastructure.
33	Standards	Earthing shall comply with IS 3043 , applicable IEC standards, equipment OEM requirements and local statutory requirements.
34	Earthing System	Maintenance-free chemical earthing electrodes with earth enhancement compound, inspection chambers, covers, strips/conductors, clamps, connectors and all accessories.
35	Electrical Power Earthing	Separate earth pit(s)/electrodes shall be provided as required by the approved design.
36	UPS Earthing	Dedicated UPS earthing arrangement shall be provided as required by UPS OEM recommendations and approved design.
37	DG Earthing	Dedicated DG body/neutral earthing arrangement shall be provided as required by applicable standards and approved design.
38	Earth Conductors	Copper/GI strips or conductors of appropriate size as specified in approved drawings/design.
39	Routing	Earth conductors shall be routed through suitable conduits, trenches, cable trays or other approved pathways.
40	Equipment Bonding	Server/network racks, electrical panels, PDUs, UPS, DG set, cable trays, metallic partitions, raised-floor metallic structure/pedestals, HVAC equipment and other exposed conductive parts shall be bonded to the earthing/equipotential bonding network as applicable.
41	Earth Grid	All applicable earthing points shall be interconnected/bonded in accordance with the approved earthing design while maintaining any functional requirements specified by equipment OEMs.
42	Earth Resistance	Required earth resistance shall comply with applicable standards, statutory requirements and equipment manufacturer recommendations.
43	Testing	Earth resistance and continuity/bonding tests shall be conducted after installation.
44	Documentation	Earth resistance test reports and final earthing layout/as-built drawings shall be submitted as part of commissioning documentation.
D	LT POWER CABLING	
45	Scope	Supply, laying, dressing, termination, testing and commissioning of all required LT power cables.
46	Cable Type	XLPE insulated, FRLS/LSZH, armoured copper/aluminium conductor cables , appropriately selected according to application and approved design.
47	Cable Sizing	Cable sizes shall be selected based on connected load, current-carrying capacity, voltage drop, short-circuit withstand, derating factors and applicable standards.
48	Cable Routing	Cables shall be installed through suitable cable trays, trenches, shafts, conduits or approved routes with proper supports and segregation.
49	Termination	Cable terminations shall use suitable compression-type glands and appropriately sized crimping/compression lugs.
50	Identification	Cables shall be properly tagged/identified at both ends and at appropriate intermediate locations.
51	Testing	Insulation resistance, continuity and other applicable tests shall be completed before energization.
52	Accessories	Cable glands, lugs, ferrules, markers, clamps, supports, hardware and all accessories required for complete installation shall be included.
E	STATUTORY APPROVALS & DOCUMENTATION	
53	Overall Responsibility	Successful bidder shall prepare and submit all electrical drawings, calculations,

		documents and reports required for statutory approval of the installation.
54	Single-Line Diagram	Preparation and submission of detailed Electrical Single-Line Diagram (SLD) .
55	Layout Drawings	Electrical layouts, floor plans, equipment layouts, cable-routing layouts, earthing layouts and other required drawings.
56	Technical Documents	Preparation of load schedules, panel schedules, cable schedules, protection details, test certificates and other technical documentation required by the statutory authority.
57	Scheme Approval	Submission of the electrical scheme to the Electrical Inspectorate/competent statutory authority and coordination for approval.
58	Revisions	Incorporation of comments, corrections and modifications required by the approving authority without additional professional/engineering charges, except statutory fees where excluded.
59	Completion Documentation	Preparation and submission of completion reports, test certificates and other documents required for inspection and energization.
60	Site Inspection	Coordination and technical assistance during inspection by Electrical Inspectorate/other statutory authorities.
61	Energization Approval	Bidder shall provide necessary technical assistance and documentation until receipt of the required Energization Order/Permission for commissioning.
62	As-Built Documentation	Final approved SLDs, layouts, cable schedules, earthing layouts and other drawings shall be submitted in as-built form after completion.
63	Statutory Fees	Statutory fees, inspection charges, approval fees, Government levies and other statutory charges shall be borne by Kerala Police and shall be excluded from bidder's scope unless specifically stated otherwise in the tender.

13. UPS SYSTEMS & GENERATOR

Scope:

Supply, installation, testing, commissioning, integration, documentation, and Three (03) years comprehensive onsite warranty and support for Enterprise Online UPS Systems, including battery banks, battery racks, input/output panels, monitoring software, cabling, earthing, accessories, and all associated hardware required for uninterrupted power supply to the Cyber Range and associated infrastructure.

Technical Specifications

A. 150 KVA DIESEL GENERATOR SET

SL.NO	PARAMETER	DESCRIPTION
1	Component	Diesel Generator Set with acoustic enclosure, AMF system and all accessories
2	DG Rating	150 kVA Prime Rated , or higher capacity if required based on approved connected/load calculations
3	Compliance	CPCB IV+ compliant and conforming to applicable statutory/emission requirements
4	Output	415 V, 3-Phase, 4-Wire, 50 Hz
5	Speed	1500 RPM
6	Power Factor	0.8 PF
7	Engine	Water/coolant-cooled, multi-cylinder diesel engine suitably rated to deliver the specified DG output
8	Engine Accessories	Fuel filter, air filter, bypass filter, starter, flywheel, coupling guard, governor, charging alternator, fuel/feed pump, hour meter and all OEM-recommended accessories

9	Alternator	Brushless/suitable industrial alternator, 3-Phase, 4-Wire, 50 Hz, 415 V, 1500 RPM and minimum 150 kVA output at 0.8 PF
10	Acoustic Enclosure	Weather-resistant acoustic enclosure meeting applicable statutory noise requirements
11	Base Frame	Heavy-duty common base frame with suitable anti-vibration mounts/pads
12	Fuel System	Base/day fuel tank of suitable capacity with fuel-level indication, piping and fuel/feed pump
13	Starting System	Electric starting system with suitably rated batteries, battery leads, terminals/clamps and battery mounting arrangement
14	Exhaust System	Residential/critical-grade exhaust silencer with required exhaust piping and accessories
15	Protection	Complete engine, alternator, electrical and safety protections as recommended by OEM
16	AMF Controller	Automatic Mains Failure controller/panel for automatic DG start/stop upon mains failure/restoration
17	Mains Monitoring	AMF shall continuously monitor mains voltage, frequency and phase conditions
18	Automatic Transfer	Automatic transfer/retransfer of load between utility supply and DG through suitably rated switching arrangement
19	Manual Operation	Provision for manual operation/testing in addition to automatic operation
20	Accessories	All control wiring, power connections, adaptor boxes, supports, cables and accessories required for a complete installation
21	Scope	Supply, installation, testing and commissioning of complete DG system

B. 80 KVA / 80 KW ONLINE UPS SYSTEM

SL.NO	PARAMETER	DESCRIPTION
1	UPS Capacity & Architecture	
1.1	Capacity	80 kVA / 80 kW
1.2	Input / Output	3-Phase Input / 3-Phase Output
1.3	Rated Output PF	1.0 (kVA = kW)
1.4	Technology	True Online Double-Conversion UPS
1.5	Control	DSP-based technology
1.6	Power Electronics	IGBT-based PFC/rectifier and inverter topology
1.7	Input Architecture	Dual-input design
1.8	Parallel Operation	Shall support parallel kit/configuration and N+X redundant operation
1.9	Battery Configuration	Capability for independent or common battery-bank operation when UPS units are configured in parallel
1.1	Redundancy	Hot-standby/parallel redundancy functionality
1.11	Generator Compatibility	Fully compatible with proposed DG supply
1.12	Future Battery Support	UPS shall be Lithium-ion compatible for future battery migration
2	Input Characteristics	
2.1	Input	3-Phase, 4-Wire + Ground

2.2	Nominal Voltage	220/380 V, 230/400 V or 240/415 V
2.3	Full-Load Input Range	Approximately 305–478 VAC or better, as supported by offered OEM model
2.4	Derated Input Range	Approximately 228–478 VAC at 70% load or better
2.5	Nominal Frequency	50/60 Hz auto-selectable
2.6	Input Frequency Range	Minimum 30–70 Hz
2.7	Input Power Factor	>0.99 at full load
3	Output Characteristics	
3.1	Output Voltage	220/380 V, 230/400 V or 240/415 V, 3-Phase, 4-Wire
3.2	Voltage Regulation	±1% or better
3.3	Output Frequency	50/60 Hz
3.4	Frequency Regulation	±0.05 Hz or better
3.5	Frequency Slew Rate	<1 Hz/sec
3.6	Output Waveform	Pure sine wave
3.7	Output THDv	<1.5% for linear load
3.8	Crest Factor	Minimum 3:1
3.9	Short-Circuit Protection	Electronic/MCB or equivalent protection
4	Transient Performance	
4.1	Transient Response	<±5% for specified 0–100% step linear load
4.2	Recovery	Recovery to within 3% in <20 ms
5	Transfer & Bypass	
5.1	Mains → Battery	0 ms
5.2	Battery → Mains	0 ms
5.3	UPS/Static Bypass Transfer	<1 ms or better, subject to synchronization and OEM design
5.4	Maintenance Bypass	Manual maintenance bypass shall be provided
5.5	Bypass Safety	Maintenance bypass cover/removal sensing or equivalent safety/interlock arrangement
5.6	Maintainability	Design shall facilitate maintenance/replacement of serviceable modules/components without unnecessary interruption to critical load, subject to OEM architecture
6	Efficiency	
6.1	Online Efficiency	>96%
6.2	ECO Mode Efficiency	Up to 99%
7	Overload Capability	
7.1	≤105% Load	Continuous
7.2	106–110%	Minimum 60 minutes
7.3	111–125%	Minimum 10 minutes
7.4	126–150%	Minimum 1 minute
7.5	>150%	Minimum 1 second / as per OEM protection design

8	Battery System	
8.1	Required Backup	Minimum 20 minutes at specified design load
8.2	Battery Bank Voltage	Flexible DC bus; proposed configuration and voltage shall be specified by bidder
8.3	Battery Sizing	Bidder shall submit detailed battery sizing calculations with the bid
8.4	Battery Type	Vendor shall specify
8.5	Battery Make/Model	Vendor shall specify
8.6	Number of Battery Banks	Vendor shall specify based on redundancy and backup requirement
8.7	Battery Capacity	Vendor shall provide Ah/VAh calculations
8.8	Charger	Charger shall be appropriately sized for the offered battery bank and required recharge performance
8.9	Charging	Multi-stage charging with float/boost/equalization, as applicable to offered battery chemistry
8.1	Charger Current	Minimum 16 A , or higher if required by battery sizing
8.11	Recharge Time	Vendor shall specify time to restore battery to 90% capacity following specified discharge
8.12	Battery Housing	Suitable battery rack/cabinet; GA drawing shall be submitted
8.13	End-Cell Voltage	Vendor shall specify according to battery manufacturer recommendation
9	Communication & Monitoring	
9.1	REPO	Remote Emergency Power-Off port shall be provided
9.2	SNMP	SNMP network management card with Ethernet connectivity
9.3	IPv6	SNMP/network interface shall support IPv6
9.4	NMS	UPS parameters, alarms and status shall be remotely monitorable through NMS
10	Start/Restart & Diagnostics	
10.1	Cold Start	UPS shall support startup from battery/DC source without mains
10.2	AC Start	UPS shall support startup from mains in accordance with OEM architecture
10.3	Automatic Restart	Automatic restart upon restoration of mains after battery-low shutdown
10.4	Self-Diagnostics	Self-test/diagnostics for rectifier/charger, battery and inverter
11	Environmental & Physical	
11.1	Operating Temperature	0°C to 40°C or better
11.2	Storage Temperature	-25°C to 70°C or better
11.3	Relative Humidity	Up to 95%, non-condensing
11.4	Operating Altitude	Minimum 0–1000 m without derating
11.5	Cooling	Forced-air cooling
11.6	Noise	<56 dB at 1 metre, where supported for offered capacity/model
11.7	Air Filtration	Internal dust/anti-corrosion filtration where available/applicable
11.8	Dimensions	Vendor shall specify
11.9	Weight	Vendor shall specify
11.1	Reliability	MTBF >100,000 hours or OEM-published equivalent

12	Standards & Certifications	
12.1	UPS Safety	IEC/EN 62040-1 or applicable latest equivalent
12.2	EMC	IEC/EN 62040-2 or applicable latest equivalent
12.3	Performance	IEC 62040-3 or applicable latest equivalent
12.4	EMC Immunity	Applicable IEC 61000 series requirements
12.5	RoHS	UPS shall be RoHS compliant
12.6	Type Test	Applicable type-test certificate/report for quoted model shall be submitted
12.7	OEM Certifications	Valid ISO 9001, ISO 14001 and applicable occupational health & safety management certification

14. INTERIOR FIT-OUT, CIVIL & FACILITY INFRASTRUCTURE WORKS

Scope:

Design, renovation, refurbishment, supply, installation, testing, commissioning, and completion of the existing 2nd Floor office space for establishing the Cyber Range, Security Operations Centre (SOC), Digital Forensics Laboratory, Training Hall and associated facilities, including all civil, electrical, HVAC, networking pathways, furniture, fixtures and interior works.

A. RELOCATION, RENOVATION AND RESTORATION OF EXISTING 60-BED DORMITORY, SLA ROOM AND ASSOCIATED FACILITIES TO THE DESIGNATED ADJACENT BUILDING – COMPLETE TURNKEY WORK

SL.NO	PARAMETER	DESCRIPTION
1	Overall Scope	The existing functional 60-bed dormitory, SLA Room and associated facilities occupying the identified Cyber Range area shall be relocated to the designated space in the adjacent building and restored to fully functional condition.
2	Existing Location	Second floor of the existing building.
3	Relocation Location	Designated fourth-floor area of the adjacent building, approximately 50 metres away.
4	Furniture & Items	Existing 60 beds/cots, mattresses, lockers, racks, tables, chairs and all associated furniture/fittings shall be safely relocated.
5	Shifting Work	Dismantling, packing, handling, transportation, lifting/shifting, reassembly, positioning and restoration of all existing items.
6	Protection During Shifting	Bidder shall ensure proper packing and handling to prevent damage to existing furniture, fixtures and equipment. Any damage caused during relocation shall be rectified/replaced by the bidder.
7	Renovation Area	Renovation/refurbishment of approximately 1,500 sq. ft. of the designated relocated accommodation.
8	Civil Repairs	Necessary masonry, plastering, patch repairs, floor repairs, waterproofing where required, doors/windows and associated civil finishing works.
9	Flooring	Repair/replacement of flooring wherever required, with suitable durable finish matching the intended use.
10	Painting	Surface preparation, putty/primer where required and minimum two coats of good-quality low-VOC interior paint.

11	Electrical Maintenance	Repair/replacement of electrical wiring, distribution components, modular switches, sockets and associated electrical fittings wherever required.
12	LED Lighting	Supply and installation of energy-efficient LED lighting to provide adequate illumination.
13	Ceiling Fans	Supply and installation of energy-efficient BLDC ceiling fans with required regulators/controls and electrical accessories.
14	Air Conditioning	Supply, installation, testing and commissioning of energy-efficient inverter AC units of adequate capacity , based on room size and heat-load requirement.
15	Existing Toilet-cum-Bathrooms	Complete renovation of 3 existing toilet-cum-bathrooms .
16	Toilet Civil Works	Civil repairs, waterproofing, wall/floor tiling and necessary finishing.
17	Toilet Plumbing	Replacement/modification of water supply and drainage lines wherever required.
18	Sanitary & CP Fittings	EWC, wash basin, taps, health faucet, valves and other required sanitary/CP fittings.
19	Toilet Electrical Works	LED lighting, switches, wiring and electrical fittings.
20	Toilet Ventilation	Exhaust fans and required ventilation provisions.
21	Bathroom Conversion	3 existing bathrooms shall be converted into complete toilet-cum-bathrooms.
22	EWC Provision	Each converted bathroom shall be provided with European Water Closet (EWC), associated flushing arrangement and required accessories.
23	Conversion Works	Plumbing, drainage, sanitary/CP fittings, tiling, electrical works, ventilation, doors and all necessary accessories shall be included.
24	SLA Room	Existing SLA Room facilities/items shall be shifted and suitably re-established in the designated location as directed by department.
25	Cleaning	Complete cleaning of relocated/renovated premises after completion.
26	Debris Disposal	Construction waste, packing materials and debris generated during the work shall be removed and disposed of at an approved location.
27	Testing	Electrical, plumbing, AC and other installed systems shall be tested before handover.
28	Handover	Entire relocated facility shall be handed over in fully functional, safe and ready-to-use condition .
29	Operational Continuity	Work shall be planned and executed with minimum disruption to ongoing activities of PTC .
30	Turnkey Responsibility	All labour, materials, transportation, tools, consumables, minor accessories and incidental works required for successful relocation and restoration shall be included in bidder's scope.

B. DEVELOPMENT OF CYBER RANGE & CYBER TRAINING CENTRE

SL.NO	PARAMETER	DESCRIPTION
B1	Civil, Interior & Renovation Works	
1	Renovation	Complete repair, renovation and refurbishment of the identified

		Cyber Range & Cyber Training Centre premises.
2	Civil Works	Masonry, plastering, wall finishing, waterproofing where required, repairs and associated civil works.
3	False Ceiling	Fire-retardant gypsum/mineral-fibre false ceiling with suitable grid system and access panels.
4	Partitioning	Aluminium-glass and/or gypsum modular partitioning with suitable acoustic insulation as per approved layout.
5	Flooring	Premium vitrified/commercial-grade flooring suitable for office, laboratory and training areas.
6	Server Room Flooring	Raised access flooring for Server Room/Data Centre shall be provided as per the separately specified technical requirement.
7	Interior Finishing	Wall panelling, blinds, decorative finishes, institutional branding, room identification and signage.
B2	Electrical, Lighting & HVAC Works	
8	Electrical Works	Complete electrical rewiring/modification, DBs, modular switches, sockets, cable trays, raceways and accessories.
9	IT Power	Dedicated electrical power points/circuits for workstations, servers, networking and other IT equipment.
10	Lighting	Energy-efficient LED lighting, emergency lighting and task lighting as required.
11	Fans	Energy-efficient ceiling/ventilation fans and associated fittings where required.
12	HVAC	Supply, installation/relocation, testing and commissioning of inverter AC/HVAC systems based on room-wise heat-load requirements.
13	Ventilation	Suitable ventilation and exhaust arrangements shall be provided wherever required.
B3	Laboratory Infrastructure	
14	Cyber Range Laboratory	Complete infrastructure for Cyber Range operations and training. (50 Trainees)
15	SOC	Complete physical infrastructure for the Security Operations Centre (SOC) . (10 Seat)
16	Digital Forensics Lab	Complete infrastructure for Digital Forensics Laboratory. (15 Seat)
17	State Cyber Lab	Complete infrastructure for State Cyber Lab (10 Seat)
18	AI Threat Analytics Lab	Complete infrastructure for AI Threat Analytics Laboratory. (8 Seat)
19	VC Room	Complete infrastructure for VC Room
20	Server Room	Supporting physical, electrical, cooling and structured-cabling infrastructure for Server Room.
21	Network Room	Racks, power, structured cabling, grounding, cable management and cooling/environmental provisions.
22	Common Lab Requirements	Workstation layouts, electrical outlets, structured cabling, equipment mounting, cable management, lighting and HVAC coordination shall be included for all laboratories.
B4	Modular Furniture	
23	Operator Workstations	Enterprise-grade modular operator workstations with integrated power/network cable management.
24	Training Furniture	Training desks, computer tables and instructor tables.
25	Meeting Furniture	Discussion tables and conference tables.
26	Reception Desk	Custom/modular reception counter appropriate to the approved interior layout.

27	Storage	Storage cabinets, pedestal drawers, wall-mounted storage and bookshelves wherever required.
28	Construction	Commercial-grade engineered wood/metal construction with durable finish and integrated cable management.
B5	Ergonomic Seating	
29	Waiting/lounge seating.	
30	Office Chairs	Medium-back ergonomic office chairs.
31	Other Seating	Visitor chairs and reception seating
B6	Conference Room	
32	Conference Furniture	Conference table, executive chairs and visitor seating.
33	AV Provisions	Display mounting, HDMI and audio connectivity provisions.
34	Connectivity	Integrated power and network outlets.
35	Cable Management	Concealed/organized cable-management arrangement.
36	Acoustic Treatment	Acoustic treatment wherever required based on room design.
37	Lighting	Appropriate conference-room and task lighting.
B7	Reception & Waiting Area	
38	Reception	Reception counter with power/network provisions and storage.
39	Waiting Area	Suitable visitor/lounge seating.
40	Information Display	Information display and digital-signage provisions.
41	Queue Management	Provision for queue-management facility, if required.
42	Interior	Branding, lighting, decoration and associated storage.
B8	CCTV Surveillance System	
43	System	Enterprise IP-based CCTV surveillance with centralized monitoring and recording.
44	Cameras	Fixed/dome IP cameras selected according to location and surveillance requirements.
45	Network	PoE switches, structured cabling and required accessories.
46	Recording	NVR with appropriately sized storage based on camera count and required recording-retention period.
47	Coverage	Laboratories, corridors, reception, waiting area, Server Room, Network Room, conference-room entrance and common areas.
48	Accessories	Mounts, junction boxes, connectors and all installation accessories.
B9	Biometric Access Control	
49	Access Control	Centralized biometric and smart-card-based access-control system.
50	Components	Biometric readers, smart-card readers, door controllers, electromagnetic locks, exit switches and door sensors.
51	Visitor Management	Visitor-access management facility.
52	Access Policies	User/group and time-based access policies.
53	Audit Logging	Centralized access/event logging and audit trail.
54	Coverage	Server Room, Network Room, SOC, Cyber Range, Digital Forensics Lab, AI Lab and other restricted areas.
55	Integration	Capability to integrate with Active Directory/LDAP/central authentication where required.
B10	Public Address (PA) System	
56	PA System	Centralized/network-enabled Public Address system.
57	Components	PA controller, amplifiers, ceiling/wall speakers, paging microphones, cabling and accessories.

58	Zoning	Zone-wise announcement and selection capability.
59	Coverage	Laboratories, conference room, reception, waiting area, corridors and common areas.
60	Announcements	General, scheduled and emergency announcement capability.
B11	Fire & Life Safety	
61	Fire Extinguishers	Appropriate fire extinguishers as per applicable fire-safety requirements.
62	Emergency Signage	Emergency-exit and evacuation-route signage.
63	Safety Signage	Required warning, safety and equipment-identification signage.
64	Fire Stopping	Fire-rated sealing of cable/utility penetrations using approved fire-stop systems.
65	Emergency Lighting	Emergency lighting along required areas and escape routes.
66	Evacuation Plan	Evacuation-plan displays at appropriate locations.
B12	Testing, Documentation & Handover	
67	Testing & Commissioning	Complete testing and commissioning of all supplied/installed infrastructure and systems.
68	Documentation	Product datasheets, certificates, test reports, equipment schedules and configuration details.
69	As-Built Drawings	Complete civil, interior, electrical, HVAC, furniture, CCTV, access-control, PA and related as-built drawings.
70	Cleaning	Final cleaning and disposal of construction waste/debris.
71	Defect Liability	Minimum 1-year Defect Liability Period for executed works.
72	Warranty	Minimum 3-year warranty/support for supplied equipment and modular furniture , wherever specified in the respective BOQ/technical specification.
73	Final Handover	Entire Cyber Range & Cyber Training Centre shall be handed over in fully operational, finished and ready-to-use condition .

C. CIVIL, INTERIOR, RAISED FLOORING, PARTITIONING AND ASSOCIATED INFRASTRUCTURE WORKS FOR MINI DATA CENTRE & SERVER ROOM

SL.NO	PARAMETER	DESCRIPTION
A	RAISED ACCESS FLOORING	
1	Scope	Design, supply, installation, testing and completion of steel cementitious raised access flooring system for the Server Room/Data Centre, including panels, pedestals, understructure and all accessories.
2	Finished Floor Height	300 mm from base floor to finished raised-floor level, unless otherwise indicated in approved drawings.
3	Panel Size	600 mm × 600 mm × 35 mm nominal.
4	Panel Type	Steel cementitious raised access floor panel, M1000 or equivalent/better .
5	Surface Finish	Anti-static High Pressure Laminate (HPL) suitable for Data Centre/server-room applications.
6	Understructure	Edge-support rigid-grid system with suitable stringers/support members.
7	Pedestal	All-steel construction with corrosion-resistant zinc-plated/approved equivalent finish; height adjustable to achieve required finished floor level.
8	Point Load	Minimum 450 kg or better.
9	Uniformly Distributed Load	Minimum 1,350 kg/m² or better.

10	Wear Resistance	≤ 0.08 g/cm² , or better, as per applicable test standard.
11	Bottom Profile	Hemispherical/profiled bottom construction or equivalent design providing required structural performance.
12	Panel Protection	Exposed surfaces shall have suitable corrosion/weather-resistant protective coating.
13	Levelling	Complete floor shall be properly levelled, aligned and securely supported without rocking or unacceptable panel movement.
14	Cable Management	Suitable under-floor cable management/wire-management accessories shall be provided as required by approved layout.
15	Tile Lifters	Minimum 2 Nos. three-prong tile lifters suitable for the offered flooring system.
16	Openings	Required cable-entry cut-outs/openings shall be finished with suitable edge protection/grommets to prevent cable damage and uncontrolled openings.
17	Earthing/Bonding	Metallic understructure shall be bonded to the Data Centre equipotential earthing system as applicable.
B	SERVER ROOM PARTITIONING	
18	Scope	Design, supply and installation of full-height modular partitioning to segregate the Server Room from Console/Electrical areas , as per approved layout.
19	Partition Height	Full height from finished floor level up to structural ceiling/soffit.
20	Framework	Powder-coated extruded aluminium sections of approved make and suitable structural strength.
21	Construction	Framework shall include supports, cleats, anchors, fasteners and all accessories required for a rigid and durable installation.
22	Finish	Aluminium sections shall be smooth, corrosion-resistant, properly aligned and mechanically secured.
23	Partition Panels	Suitable fire-rated solid panels and/or glazing arrangement as indicated in approved Data Centre layout.
24	Glazing	Where glazing is provided, glass type, thickness and fire rating shall comply with the approved fire-safety design and applicable requirements.
25	Sealing	Floor, ceiling, wall and frame junctions shall be sealed using EPDM/neoprene or equivalent approved materials.
26	Environmental Isolation	Partitioning shall provide suitable environmental and acoustic separation between designated areas.
27	Door Type	Sliding door with glazed viewing panel/half-glass configuration as per approved design.
28	Door Opening	Minimum 1,000 mm clear opening width to facilitate movement of IT equipment.
29	Door Hardware	Tracks, rollers, handles, locks, stoppers and all associated hardware shall be included.
30	Fire Safety	Partition, glazing, sealing materials and associated components shall be fire-rated/fire-resistant as required by the approved fire-safety design and applicable standards.
C	FIRE-RESISTANT INTERNAL WALL FINISHING	
31	Scope	Surface preparation and application of approved primer, putty where required, and fire-resistant coating/paint to internal Data Centre walls.
32	Surface Preparation	Existing surfaces shall be cleaned and prepared before application. Defects/uneven surfaces shall be rectified as required.
33	Putty	Up to two coats of suitable wall putty, where required to obtain

		the specified finish.
34	Primer	Minimum one coat of compatible approved primer.
35	Finish Coat	Minimum two coats of approved fire-resistant paint/coating .
36	Colour	Light-coloured finish to improve illumination and visibility inside the Data Centre.
37	Environmental Requirement	Paint/coating shall be non-toxic, environmentally friendly, water-based and low/very-low VOC.
38	Performance	Coating shall provide suitable UV, stain and heat resistance and other characteristics claimed by the manufacturer for the offered system.
39	Fire Performance	Minimum 30-minute fire-resistance/fire-protection performance , where applicable, shall be supported by appropriate test certification for the complete offered coating/system and substrate/application conditions.
40	Material Supply	Materials shall be supplied in original sealed manufacturer containers with product identification and batch details.
41	Documentation	Product datasheets and applicable fire/performance test certificates shall be submitted for approval before application.
D	DG RCC FOUNDATION / PLATFORM	
42	Scope	Design and construction of complete RCC foundation/platform suitable for installation of the proposed 150 kVA DG set or higher offered capacity .
43	Design Basis	Foundation shall be designed based on DG OEM recommendations, actual equipment dimensions/weight, static and dynamic loads and site conditions.
44	Civil Works	Excavation, PCC/RCC as applicable, reinforcement, shuttering/formwork, grouting, finishing and associated civil works shall be included.
45	Structural Capacity	Foundation shall safely withstand static, dynamic and operational loads of the DG set.
46	Anti-Vibration	Approved anti-vibration mounts/pads shall be provided to minimize transmission of vibration to surrounding structures.
47	Equipment Fixing	Suitable foundation bolts/anchoring arrangements shall be provided according to DG OEM recommendations.
48	Level & Alignment	Foundation shall ensure proper equipment levelling and alignment.
49	Drainage	Suitable drainage/water-disposal provisions shall be incorporated considering site conditions.
50	Standards	Design, materials and workmanship shall conform to applicable IS standards, DG OEM recommendations and statutory requirements.
E	DG WEATHER-PROTECTION ROOFING	
51	Scope	Design, fabrication, supply and installation of complete roofing/weather-protection structure for the DG installation.
52	Purpose	Protection against direct sunlight, heavy rain and adverse weather conditions without adversely affecting DG ventilation or operation.
53	Structural Design	Structure shall be designed considering local wind load, rainfall and other applicable site/environmental conditions.
54	Structure	Suitable structural-steel/approved equivalent framework with columns, supports, bracing, fasteners and required structural accessories.

55	Corrosion Protection	Structural members shall be corrosion-resistant or suitably treated and coated with approved anti-corrosive protective system.
56	Roofing Material	Durable, weather-resistant roofing material suitable for the installation location and approved design.
57	Clearance	Adequate clearances shall be maintained around and above the DG for ventilation, heat dissipation, exhaust routing, operation and maintenance.
58	Ventilation	Roofing/enclosure arrangement shall not obstruct cooling airflow, combustion-air requirements or hot-air discharge of the DG set.
59	Exhaust	Roofing arrangement shall accommodate safe exhaust routing and required clearances.
60	Rainwater Management	Gutters/downpipes/drainage arrangements shall be provided wherever required to prevent rainwater accumulation near the DG installation.
61	Maintenance Access	Sufficient access shall be maintained for routine maintenance and removal/replacement of major DG components.
62	Complete Installation	All supports, columns, anchors, fastening arrangements and associated civil/structural works required for complete installation shall be included.

Compliance Statement

1. WORKSTATIONS FOR TRAINING LAB

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make & Model	Product model along with the technical datasheet to be provided by the vendor.	
2	Processor	Intel® Core™ Ultra 9 285K Vpro (13 TOPS NPU, 36 TOPS, 24 cores, up to 5.7 GHz) or better.	
3	Chipset	Intel® Q870 Chipset	
4	Motherboard	OEM Motherboard with Hardware based endpoint security controller TPM 2.0 in the motherboard. Integrated Hardware Diagnostics software (same Desktop OEM make) in the BIOS. Desktop OEM logo must be embossed on the mother board (Sticker is not acceptable)".	
5	Graphics	NVIDIA RTX A400, 4 GB GDDR6, 4 mDP to DP adapters, with provision to configure / expandable up to 16 GB VRAM or higher.	
6	Memory	32 GB DDR5 RAM expandable up to 128 GB with min 4 DIMM Slots or better	
7	Ports	10 USB Ports including 2 Type C port, 3 Display ports 1.4a with option of including 1 Thunderbolt 4 (40 Gbps) port	
8	Slots	2 SATA Slots	
		3 full-height PCIe Gen 3 slots (Min. 1 half height Gen 4 PCIe x16) or better	
		4 M.2 slots with minimum 3 M.2 Slots for Storage or better	
9	Primary Hard Drive	512GB, M.2 2280, PCIe NVMe Gen4 x4, SSD, Self-Encrypting Opal 2.0, Class 40	

10	Display	23.8" display with 1920 x 1080 resolution, up to 100 Hz refresh rate, 3H Hard coating or better	
11	LAN	Integrated Gigabit Ethernet LAN 10/100/1000	
12	WLAN	Intel® Wi-Fi 6E AX211, 2x2, 802.11ax, MU-MIMO, Bluetooth® 5.3 wireless card	
13	Form Factor	Small Form Factor less than 8.5 ltrs with Intrusion Switch	
14	Power Supply	Minimum 360 W internal Power Supply Unit (PSU), 92% Efficient, 80 Plus Platinum	
15	Keyboard	USB Keyboard (same make as pc)	
16	Mouse	USB Optical mouse (same make as pc)	
17	Security	Discrete TPM 2.0 (Hardware)	
18	Certification	Energy star 8.0, Windows 11 Certified, EPEAT Climate+ India Certified, EPEAT GOLD India Certified for Desktop & TCO 10 for Monitor, MIL STD 810 G Test passed, ISO 9001:2008 certification for OEM or better.	
19	BIOS	Configuration Tool to Enable these features in a single Tool power on password, set up password, USB port disable with life cycle management tool	
20	Support	Drivers should be available for download from OEM site for at least 3 years from the date of the purchases order. (drive cab to be available in support site)	
21	Warranty	3 years warranty	
		Specifications and warranty of the offered Desktop should be available through serial number search / tracking on the website of the OEM.	

2. WORKSTATION FOR FORENSIC (25 Nos.)

SL.N O	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make & Model	Product model along with the technical datasheet to be provided by the vendor.	
2	Processor	Intel® Core™ Ultra 9 285K (13 TOPS NPU, 24 cores, up to 5.6 GHz) or better.	
3	Chipset	Intel® Q870 Chipset	
4	Motherboard	OEM Motherboard with Hardware based endpoint security controller TPM 2.0 in the motherboard. Integrated Hardware Diagnostics software (same Desktop OEM make) in the BIOS. Desktop OEM logo must be embossed on the mother board (Sticker is not acceptable)".	
5	Graphics	NVIDIA® RTX™ 2000 Ada, 16 GB GDDR6	
6	Memory	64 GB DDR5 RAM expandable up to 128 GB with min 4 DIMM Slots or better	
7	Ports	10 USB Ports including 2 Type C port, 3 Display ports 1.4a with option of including 1 Thunderbolt 4 (40 Gbps) port	
8	Slots	2 SATA Slots	

		3 full-height PCIe Gen 3 slots (Min. 1 half height Gen 4 PCIe x16) or better	
		4 M.2 slots with minimum 3 M.2 Slots for Storage of better	
9	Primary Hard Drive	1 TB, M.2 2280, PCIe NVMe Gen4 x4, SSD, Self-Encrypting Opal 2.0, Class 40	
10	Secondary Hard Drive	4 TB, 3.5-inch, 7200 RPM, Enterprise HDD	
11	Display	23.8" display with 1920 x 1080 resolution, up to 100 Hz refresh rate, 3H Hard coating or better	
12	LAN	Integrated Gigabit Ethernet LAN 10/100/1000	
13	WLAN	Intel® Wi-Fi 6E AX211, 2x2, 802.11ax, MU-MIMO, Bluetooth® 5.3 wireless card	
14	Form Factor	Small Form Factor less than 8.5 ltrs with Intrusion Switch	
15	Power Supply	Minimum 360 W internal Power Supply Unit (PSU), 92% Efficient, 80 Plus Platinum	
16	Keyboard	USB Keyboard (same make as pc)	
17	Mouse	USB Optical mouse (same make as pc)	
18	Security	Discrete TPM 2.0 (Hardware)	
19	Certification	Energy star 8.0, Windows 11 Certified, EPEAT Climate+ India Certified, EPEAT GOLD India Certified for Desktop & TCO 10 for Monitor, MIL STD 810 G Test passed, ISO 9001:2008 certification for OEM or better.	
20	BIOS	Configuration Tool to Enable these features in a single Tool power on password, set up password, USB port disable with life cycle management tool	
21	Support	Drivers should be available for download form OEM site for at least 3 years form the date of the purchases order. (drive cab to be available in support site)	
22	Warranty	3 years warranty	
		Specifications and warranty of the offered Desktop should be available through serial number search / tracking on the website of the OEM.	

3. COMPUTE NODE

SL.N O	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make/Model	Product model along with the technical datasheet to be provided by the vendor.	
2	Chipset	OEM Compatible Chipset	
3	Form Factor	1U/2Urack mounted with sliding rails	
4	Configured CPU	Dual Intel Xeon or AMD EPYC with 2.3GHz, 32C/64T, 144M Cache DDR5-6400 or better	
5	Memory slots	32 DDR5 DIMM slots, supports RDIMM 2 TB max, speeds up to 6400 MT/s	
6	Memory configured	512GB DDR5 RDIMM, 6400MT/s, Dual Rank (64GB x 8 NOS)	
7	Disks supported	Front drive bays: Up to 8x 2.5" SAS/SATA/NVMe SSD	

8	RAID Controller	12Gbps PCIe with RAID 1, 5, 6,10, 50	
9	Network Adapters	Broadcom 57414 Dual Port 25GbE SFP28 Adapter, OCP 3.0 NIC +Sec 2 X SFP28 SR Optic, 25GbE, 85c High Temperature	
10	Disks configured	2 Qty 1.92TB Data Center NVMe Read Intensive AG Drive SED E3s Gen5	
11	I/O slots	2 PCIe Gen5 slots or better	
12	HBA Card	HBA Dual Port Fibre Channel 32Gb Adapter,PCIe	
13	Security	TPM 2.0 FIPS, CC-TCG certified	
14	Certification and compliances	Microsoft Windows Server, Hyper-V, VMWare, Red Hat Enterprise Linux (RHEL), SUSE Linux Enterprise Server (SLES)	
15	Power Supply	Redundant Power Supply of 1100W or Better	
16	Management integration	Support for integration with Microsoft System Center, VMware vCenter,	
17	Power & temperature	Real-time power meter, graphing, thresholds, alerts & capping with historical power counters. Temperature monitoring & graphing.	
18	Pre-failure alert	Shall provide predictive failure monitoring & proactive alerts of actual or impending component failure for fan, power supply, memory, CPU, RAID, NIC, HDD.	
19	Configuration & management	Real-time out-of-band hardware performance monitoring & alerting.	
		Agent-free monitoring, driver updates & configuration, power monitoring & capping, RAID management, external storage management, monitoring of FC, HBA & CNA & system health.	
		Out-of-band hardware & firmware inventory.	
		Zero-touch auto configuration to auto deploy a baseline server configuration profile.	
		Automated hardware configuration and Operating System deployment to multiple servers.	
		Zero-touch repository manager and self-updating firmware system.	
		Virtual IO management / stateless computing.	
20	HTML5 support	HTML5 support for virtual console & virtual media without using Java or ActiveX plugins	
21	Server security	Shall have a cyber resilient architecture for a hardened server design for protection, detection & recovery from cyber attacks	
		Shall protect against firmware which executes before the OS boots	
		Should provide effective protection, reliable detection & rapid recovery using:	
		Cryptographically signed firmware	
		Data at Rest Encryption (SEDs with local or external key mgmt)	
		Secure Boot	
		Secure Erase	
		Secured Component Verification (Hardware integrity check)	
		Silicon Root of Trust	

		System Lockdown (requires iDRAC9 Enterprise or Datacenter)	
		TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ	
		Configuration upgrades shall be only with cryptographically signed firmware and software	
		Shall provide system lockdown feature to prevent change (or “drift”) in system firmware image(s) & prevent malicious modification of server firmware	
22	Intrusion alert	Intrusion alert in case chassis cover being opened	
23	Display	Should display system ID, status information and system error. Error code followed by descriptive text. LCD background should light up in different colours during normal system operation & error conditions.	
24	Warranty	3 years On-site comprehensive warranty and Next business Day	
25	Certificate	Bid/Tender specific OEM authorized certificate to be submitted by the vendor.	

4. ENTERPRISE AI GPU NODE (AI THREAT LAB)- 1No

SL.N O	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make/Model	Product model along with the technical datasheet to be provided by the vendor.	
2	Chipset	OEM Compatible Chipset	
3	Form Factor	1U/2Urack mounted with sliding rails	
4	Configured CPU	Intel® Xeon® 6 Performance 6760P 2.2G, 64C/128T, 24GT/s, 320M Cache, Turbo, (330W) DDR5-6400 x 2 Nos or better	
5	Memory slots	32 DDR5 DIMM slots, RDIMMS supporting speeds Up to 6400 MT/s upto 8TB or better	
6	Memory configured	512 GB DDR5 RDIMM, 6400MT/s, Dual Rank (64GB x 8 nos)	
7	Disks supported	Drive bays: Up to 8 NVMe drive or more	
8	Disks configured	3.84TB SSD SATA Read Intensive 6Gbps 512e 2.5in Hot-plug AG Drive, 1 DWPD x 2 nos or better	
9	Disks configured	3.84TB Data Center NVMe Read Intensive AG Drive U2 with Carrier x 2 Nos or better	
10	I/O slots	PCIe slots with DW GPU capable x 2 nos	
11	GPU	1 x NVIDIA H200 NVL, PCIe, 450W ,141GB Passive, DW Full Height GPU or better	
12	Ethernet ports	2 x 10/25Gbe Ports	
13	HBA Card	HBA Dual Port Fibre Channel 32Gb Adapter,PCIe	
14	Security	TPM 2.0 FIPS, CC-TCG certified	
15	Certification and compliances	Microsoft Windows Server, Hyper-V, VMWare, Red Hat Enterprise Linux (RHEL), SUSE Linux Enterprise Server (SLES)	
16	Power Supply	Redundant Power Supply of 3200W or Better	
17	Management integration	Support for integration with Microsoft System Center, VMware vCenter,	

18	Power & temperature	Real-time power meter, graphing, thresholds, alerts & capping with historical power counters. Temperature monitoring & graphing.	
19	Pre-failure alert	Shall provide predictive failure monitoring & proactive alerts of actual or impending component failure for fan, power supply, memory, CPU, RAID, NIC, HDD.	
20	Configuration & management	Real-time out-of-band hardware performance monitoring & alerting.	
		Agent-free monitoring, driver updates & configuration, power monitoring & capping, RAID management, external storage management, monitoring of FC, HBA & CNA & system health.	
		Out-of-band hardware & firmware inventory.	
		Zero-touch auto configuration to auto deploy a baseline server configuration profile.	
		Automated hardware configuration and Operating System deployment to multiple servers.	
		Zero-touch repository manager and self-updating firmware system.	
		Virtual IO management / stateless computing.	
21	HTML5 support	HTML5 support for virtual console & virtual media without using Java or ActiveX plugins	
22	Server security	Shall have a cyber resilient architecture for a hardened server design for protection, detection & recovery from cyber attacks	
		Shall protect against firmware which executes before the OS boots	
		Should provide effective protection, reliable detection & rapid recovery using:	
		Cryptographically signed firmware	
		Data at Rest Encryption (SEDs with local or external key mgmt)	
		Secure Boot	
		Secure Erase	
		Secured Component Verification (Hardware integrity check)	
		Silicon Root of Trust	
		System Lockdown (requires iDRAC9 Enterprise or Datacenter)	
		TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ	
		Configuration upgrades shall be only with cryptographically signed firmware and software	
		Shall provide system lockdown feature to prevent change (or “drift”) in system firmware image(s) & prevent malicious modification of server firmware	
23	Intrusion alert	Intrusion alert in case chassis cover being opened	
24	Display	Should display system ID, status information and system error. Error code followed by descriptive text. LCD background should light up in different colours during normal system operation & error conditions.	

25	Warranty	3 years On-site comprehensive warranty Next business Day Support	
26	Certificate	Bid/Tender specific OEM authorized certificate to be submitted by the vendor.	

5. ENTERPRISE UNIFIED SAN STORAGE SOLUTION – 1 No

SL.N O	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make/Model	Product model along with the technical datasheet to be provided by the vendor.	
2	Operating System & Clustering Support	a) The storage array should support industry-leading Operating System platforms including: Windows 2016 / 2019, 2022, VMware and Linux. Offered Storage Shall support all above operating systems in Clustering.	
3	Capacity & Scalability	The Storage Array shall be offered with 100 TB Usable capacity after RAID 6 using not more than 16 TB drives. 1 Hot spare to be included. All necessary cables are to be supplied by OEM	
4	Front-end Ports & Back-end Ports	The array shall support 32Gb Fibre Channel host ports (minimum 8 per array). Offered storage system shall have 12G SAS ports for Back-end connectivity.	
5	Architecture	The storage array should support dual, redundant, hot-pluggable, active-active array controllers for high performance and reliability	
6	Storage Scalability	The storage should be scalable to atleast 200 drives or higher using additional enclosures and without changing controller	
7	No Single point of Failure	Offered Storage Array shall be configurable in a No Single Point of configuration including Cache memory, FAN, Power supply etc.	
8	Disk Drive Support	1. Storage system shall also support Enterprise SAS spinning drives, SSD and near line SAS / 7.2K RPM drives. 2. Offered storage array shall also have support for self-encrypted SSD, SAS and near line SAS / 7.2K RPM.	
9	Cache	1. Offered Storage Array shall be given with Minimum of 24 GB memory spread across both controllers	
10	Raid Support	Offered Storage Subsystem shall support Raid 1, 5, 6, 10, or equivalent	
11	Storage Software Lisc	All the following licenses should be provided for entire supported storage capacity of the proposed Array. 1. Thin Provisioning 2. ADAPT-Distributed RAID Groups 3.SSD Read Cache 4. IP Remote Replication 5. Snapshots 6.3 level Tiering 7. Volume Copy	
12	Warranty	Offered Storage should be bundled with 3years onsite Warranty	

6. HIGH-SPEED 25/100 GBE TOP-OF-RACK (TOR) CLUSTER INTERCONNECT SWITCH: 2 NOS

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make & Model	Vendor shall specify the OEM, make and model and submit the corresponding OEM technical datasheet.	
2	Purpose	High-performance Top-of-Rack Ethernet switch for redundant, low-latency interconnection of Enterprise AI Compute Cluster Nodes and associated network infrastructure.	
3	Architecture	Enterprise-class managed Layer 3 data-centre switch supporting IPv4/IPv6 and advanced routing features.	
4	Downlink Interfaces	Minimum 24 × 10/25 GbE SFP28 interfaces, supporting 10 GbE/25 GbE operation.	
5	Uplink Interfaces	Minimum 4 × 100 GbE QSFP28 interfaces from day one.	
6	25 GbE Optics	Minimum 24 × 25 GbE SFP28 multimode optical transceivers per switch.	
7	100 GbE Accessories	Minimum 1 × 100 GbE DAC cable and 2 × 100 GbE QSFP28 multimode optical modules per switch.	
8	Switching Capacity	Minimum 2 Tbps full-duplex switching/backplane capacity or better.	
9	Latency	Shall support ultra-low-latency switching suitable for high-performance cluster/data-centre workloads.	
10	High Availability	Shall support redundant deployment/stacking, MLAG or equivalent OEM-supported high-availability mechanism. All necessary licenses shall be included.	
11	Power Supply	Dual redundant, hot-swappable power supplies.	
12	Cooling	Redundant/hot-swappable fan modules suitable for continuous data-centre operation.	
13	Layer 2 Features	Shall support Ethernet switching, IEEE 802.1Q VLAN tagging, link aggregation, multicast and associated enterprise Layer 2 functionality.	
14	Overlay Networking	Shall support VXLAN or equivalent standards-based overlay networking and Layer 2 gateway functionality for integration of virtualised/overlay and physical infrastructure.	
15	Mobility	Shall support workload/VM mobility across Layer 2 VLAN domains and data-centre network environments, wherever applicable.	
16	Layer 3 Routing	Hardware-based IPv4 and IPv6 Layer 3 routing.	
17	Routing Protocols	Shall support Static Routing, OSPF and BGP for IPv4/IPv6. IS-IS and other enterprise routing protocols may be supported as applicable.	
18	BGP	Full enterprise BGP functionality shall be available from day one with all required licences.	
19	QoS	Shall support DSCP-based policy maps, traffic classification, rate limiting/shaping and strict-priority queuing or equivalent enterprise QoS features.	
20	Multicast	Shall support enterprise IPv4/IPv6 multicast functionality.	
21	AAA	Shall support AAA integration using RADIUS and TACACS+ or equivalent secure centralised authentication mechanisms.	

22	Access Control	Shall support Standard/Extended ACLs or equivalent IPv4/IPv6 traffic-filtering capabilities.	
23	Security	Shall provide control-plane protection, traffic filtering and protection mechanisms against common malformed or malicious TCP/UDP/network traffic.	
24	Management	Shall support secure CLI and web/API-based management as applicable, SSH, Ping, Traceroute, SNMP and other standard enterprise management mechanisms for IPv4/IPv6.	
25	Management VLAN	Shall support dedicated management VLAN/interface and configurable descriptions/naming for individual interfaces.	
26	Firmware	Switch shall be supplied with the latest stable OEM-recommended firmware. OEM-supported firmware/security updates shall be available throughout the warranty/support period.	
27	Licensing	All hardware/software licences required to enable the specified Layer 2, Layer 3, VXLAN, BGP, HA, management and security functionality shall be included from day one.	
28	Rack Mounting	Shall include all necessary rack-mounting accessories and cables required for installation and commissioning.	
29	Warranty & Support	Minimum 3-year OEM warranty/support with 24x7 OEM technical assistance from day one.	

7. VIRTUALIZATION SOFTWARE

SL.NO	FEATURES	SPECIFICATIONS
1	VMware Cloud Foundation - 3 Years (Per Core) – 192 Nos (For Compute Node)	

8. WORKSTATIONS FOR AI LAB

B. GPU BASED WORKSTATION FOR AI THREAT LAB : 8 NOS

Technical Specifications

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make/Model	Product model along with the technical datasheet to be provided by the vendor.	
2	Monitor	24 inch Monitor FHD IPS with height Adjustment , 1xHDMI, 1 x USB C port minimum	
3	Architecture	Architecture optimized for AI workloads with tightly integrated CPU-GPU communication and AI-focused compute design	
4	Performance	At least 1 PFLOP / 1000 TFLOPS of FP4 compute or equivalent AI inferencing capability	
		Single system should support upto 200B	

		parameter model.	
		Support for 400B parameter models using a two-node configuration with OEM supplied QSFP cable	
5	Processor	NVIDIA GB10 -16 MB L2 Cache, 20 ARM cores	
6	RAM	At least 128GB unified or coherent system memory	
7	Memory Architecture	Preference for unified or coherent memory rather than fragmented CPU and GPU memory pools	
8	Storage	1 TB NVMe local storage.	
9	Graphic	NVIDIA Blackwell	
10	Operating System	Linux-based AI-optimized operating system	
11	Networking	10GbE RJ-45 connectivity	
		2 x QSFP ports (200 Gbps)	
		AzureWave AW-EM637, 2x2, 802.11be, Bluetooth 5.4, combo module, internal antenna	
12	Ports	1 USB 3.2 Gen 2x2 (20 Gbps) Type-C port with DisplayPort 1.4a alt-mode, power in	
		3 USB 3.2 Gen 2x2 (20 Gbps) Type-C ports with DisplayPort 1.4a alt-mode	
		1 HDMI 2.1b port	
13	Security	Supports TPM 2.0	
14	Warranty	3 years warranty	
		NBD onsite support	
		Premium support for business-critical deployments	
15	End-to-End AI Factory Alignment	Same OEM to offer both the desktop AI appliance and the data center AI infrastructure, so the transition from GB10 to server-scale deployment is more seamless.	

9. NEXT-GENERATION FIREWALL (NGFW) – 05 UNIT

TECHNICAL SPECIFICATIONS

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
A	General & Architecture		
1	Appliance Type	Dedicated hardware-based Next-Generation Firewall (NGFW) security appliance; 1U rack-mountable.	
2	Architecture	Multi-CPU architecture with dedicated Network Processing Unit (NPU) and dedicated memory/RAM.	
3	Encrypted Traffic Visibility	Shall provide visibility into encrypted traffic flows and support TLS 1.3 without material degradation of specified performance.	
4	Security Functions	Firewall, IPsec Site-to-Site VPN, SSL Client VPN, gateway anti-malware/antivirus, web filtering, application control, IPS, traffic shaping/QoS, sandboxing and DoS protection.	
5	Zero-Day Protection	Advanced sandboxing with static and dynamic file analysis for zero-day threat detection.	

6	Sandbox Logging	Shall log scanned files and provide screenshots/evidence of dynamic file execution.	
7	MFA	Multi-factor authentication shall be supported locally or through an external authentication service for minimum 500 VPN users. MFA shall also support user portal and web administration access from Day 1.	
8	Authentication Integration	Local authentication and integration with AD, LDAP, RADIUS, TACACS+, eDirectory and Kerberos.	
9	Multi-WAN	Support more than two ISP/WAN connections with health monitoring, automatic failover, weighted load balancing and granular multipath rules.	
10	XDR Integration	Shall be XDR-ready and capable of integration with the OEM's XDR platform, where required.	
11	NDR	Network Detection and Response (NDR) capability shall be built-in or integrated from Day 1.	
12	ZTNA	Built-in Zero Trust Network Access (ZTNA) functionality in addition to conventional VPN.	
13	DNS Security	DNS security functionality with OEM-provided secure DNS server/service addresses.	
14	Security Dashboard	Dashboard shall provide visibility of cloud applications, Shadow IT, suspicious payloads, risky users, advanced threats, network attacks and objectionable websites.	
15	Encrypted Threat Detection	Capability to identify encrypted threat communications without requiring TLS decryption.	
16	DGA Detection	Capability to detect Domain Generation Algorithm (DGA) activity.	
17	Policy Simulation	GUI-based policy test/simulation capability for firewall and web policies based on parameters such as user, IP and time.	
18	Reusable Objects	Searchable and reusable object definitions for networks, services, hosts, time periods, users/groups, clients and servers.	
19	AI Assistance	GUI shall provide guided AI-assisted configuration help/support.	
20	Updates	Centralized automatic/manual updates and support for offline updates.	
21	Advanced Threat Protection	Detect and block network traffic communicating with malicious/C2 infrastructure using DNS, firewall and other security intelligence.	
22	Threat Intelligence	Capability to ingest third-party threat intelligence feeds and enforce actions based on such feeds.	
23	OEM Remote Support	Secure encrypted OEM support access with administrator-controlled enablement and configurable access duration.	
24	Monitoring	Multi-timeframe graphs for SD-WAN, CPU, disk, interfaces, device load, memory, users and WAN utilization.	
25	NAT & SSL Rules	Ability to configure separate NAT and SSL inspection rules with granular controls independent of firewall rules.	
26	Application Control	Identify, allow, block, prioritize or limit applications beyond simple port/protocol identification.	
27	Endpoint Integration	Automatic isolation/restriction of endpoint devices based on health/security status through firewall policies.	

28	Endpoint Health	Dashboard shall display health/security status of connected endpoints.	
29	Management	Both local/on-premises and cloud-based management shall be supported.	
B	SSL/TLS Inspection		
30	SSL Inspection Policy	Decryption profiles assignable based on source, destination, websites/categories or equivalent criteria.	
31	Re-signing CA	Administrator shall be able to specify certificate authorities used for re-signing inspected SSL/TLS sessions.	
32	Decryption Failure Handling	Configurable action for traffic that cannot be decrypted due to unsupported/insecure protocols, cipher suites, SSL compression or capacity limitations.	
33	Certificate Validation	Configurable actions for certificate validation errors and insecure ciphers; capability to enforce RSA key size and permitted SSL/TLS versions.	
34	Cipher Support	Shall support applicable enterprise cipher suites including AES-128/256, Camellia, ChaCha20-Poly1305, GCM, CCM and CBC; legacy ciphers such as RC4/3DES/IDEA, if supported, shall be controllable/disableable by policy.	
C	Hardware & Performance		
35	Interfaces	Minimum 8 × GbE copper ports + 2 × SFP ports.	
36	Firewall Throughput	Minimum 35 Gbps.	
37	IPS Throughput	Minimum 7 Gbps.	
38	Threat Protection Throughput	Minimum 5 Gbps.	
39	VPN Throughput	Minimum 20 Gbps.	
40	SSL Inspection Throughput	Minimum 1 Gbps.	
41	Concurrent Connections	Minimum 6 million.	
42	New Sessions	Minimum 140,000 new sessions/second.	
43	Internal Storage	Minimum 120 GB SSD.	
44	Memory	Minimum 8 GB RAM per appliance.	
D	Web & Application Security		
45	Web Categories	Minimum 90+ predefined web-filtering categories.	
46	Traffic Shaping	Network-, user-, web- and application-based traffic shaping/QoS policies.	
47	Temporary Override	Temporary web-filter override using access codes without modifying the underlying security policy/rule.	
48	User Notification	Support customized block/notification messages and URL redirection.	
49	URL Lookup	GUI-based URL category lookup capability.	
E	Intrusion Prevention System (IPS)		
50	IPS Signatures	Minimum 5,000+ IPS signatures.	

51	Attack Protection	Protection against DoS/SYN, IP, ICMP, TCP, UDP and related network attacks.	
52	Deep Packet Inspection	IPS shall provide Deep Packet Inspection (DPI).	
53	Custom Signatures	Administrator shall be able to create custom IPS signatures.	
54	Protocol Attack Protection	Protection against DNS cache poisoning, malformed/improper protocol commands and similar attacks.	
F	SD-WAN		
55	Integrated SD-WAN	Built-in SD-WAN with application-aware path selection and routing.	
56	Performance SLA	Dynamic WAN selection based on latency, jitter and packet loss.	
57	WAN Technologies	Support WAN connectivity including VDSL/DSL, cable, LTE/cellular, MPLS and Ethernet-based Internet connectivity, as applicable.	
58	WAN Monitoring	Real-time visibility into latency, jitter and packet loss for WAN links.	
59	Session Continuity	Ability to transition application traffic to a better-performing WAN link when configured SLA thresholds are exceeded, subject to supported session-steering capability.	
60	SD-WAN VPN	Centralized creation/management of site-to-site VPNs using hub-and-spoke, full-mesh or hybrid topology.	
61	SD-WAN Management	Centralized management with guided/wizard-based creation of SD-WAN connections.	
G	Logging, NDR & Reporting		
62	Firewall Logs	Logs shall identify the firewall/security policy rule responsible for the logged event.	
63	System Statistics	Dashboard shall provide firewall health and traffic statistics.	
64	NDR Risk Scoring	NDR module shall provide IoC summaries based on risk score/severity.	
65	Connection Logging	Detailed logging of permitted and blocked connections.	
66	Performance Statistics	Real-time performance statistics.	
67	Reporting Storage	Minimum 100 GB reporting/log storage , provided by the same OEM solution.	
68	Reports	Minimum 60+ drill-down reports available through the appliance/associated OEM reporting solution.	
H	OEM / Compliance Requirements		
69	Common Criteria	Proposed product/solution shall have Common Criteria EAL4+ , where applicable to the offered product/version.	
70	MAF	Tender-specific Manufacturer Authorization Form/Certificate from OEM.	
71	MTCTE	Valid MTCTE certification from TEC, where applicable to the offered equipment/category under prevailing regulations.	
72	Make in India	Offered solution shall comply with applicable Government of India Make in India / Public Procurement requirements.	
73	ISO	OEM shall hold valid ISO/IEC 27001 certification.	

74	Gartner	OEM/product shall be listed in the latest applicable Gartner Magic Quadrant for Enterprise Wired and Wireless LAN Infrastructure? [Requires correction—see note below.]	
75	SOC	OEM shall be SOC 2 Type II compliant.	
76	OEM Experience	OEM shall have minimum 15 years of relevant industry experience.	
I	Licensing, Support & Warranty		
77	Subscription Period	3 years from date of activation/commissioning.	
78	Security Licenses	Firewall security subscription shall include Advanced Threat Protection, DNS Security/Protection, IPS, anti-malware, web filtering, application visibility/control, sandboxing and other specified security services.	
79	Updates	Security signatures, threat intelligence, firmware/software and security updates for the complete subscription period.	
80	OEM Support	24×7 OEM technical support for three years.	
81	Hardware Support	Advanced hardware replacement for the entire three-year support period.	
82	Licensing Requirement	All licenses required to meet the specified functionality shall be included from Day 1 , unless explicitly stated otherwise in the tender.	

10. VIDEO WALL 01 UNIT

TECHNICAL SPECIFICATIONS OF ENTERPRISE VIDEO WALL

SL.N O	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make & Model	Specify	
	Panel		
2	Diagonal Size	55"	
3	Panel Technology	IPS	
4	Resolution	1920 X 1080 (16: 09) or better	
5	Brightness	500 cd/m2 or above	
6	Native Contrast Ratio	1100:1 or above	
7	Dynamic Contrast Ratio	100,000:1 or above	
8	Viewing Angle(H/V)	178/178	
9	Response Time(G-to-G)	8ms or less	
10	Color Gamut	72% or better	
11	Operation Hour	24/7	
12	Haze	28% or better	
13	Orientation	Landscape / Portrait	
	Input Connectivity		

14	HDMI 2.0	2 or More ports	
15	Display Port 1.2	1 or more ports	
16	HDCP	HDCP 2.2	
17	AUDIO	Stereo mini Jack	
	Output Connectivity		
18	Loop-out	DP1.2(Loop-out)	
19	AUDIO	Stereo mini Jack	
20	EXTERNAL CONTROL	RS232C(in/out), RJ45	
	Power		
21	Power Supply	AC 100 - 240 V~ (+/- 10 %), 50/60 Hz	
22	Power Consumption	165 Typical[W/h] or less	
23	Bezel to Bezel Width (mm)	0.44mm(even)	
24	Operating Temperature	0°C~ 40°C	
25	Humidity	10~80%	
	Certification		
26	Safety	UL , BIS, 60950,EMC-Class B	
27	Accessories	Quick Setup Guide, Display Port cable, Power Cord, Remote Controller, Batteries	
28	Warranty	3 Years onsite	
29	IP rating	IP5X	

TECHNICAL SPECIFICATIONS OF ACCESSORIES

SL.N O	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Video Wall Controller	Hardware-based controller with minimum 16 inputs , 4K source support, IP streaming, HDMI/DisplayPort, multiple layouts, web-based management and redundant power supply.	
3	Operator Consoles	Minimum 6 ergonomic operator consoles with monitor mounts, cable management, storage and high-back ergonomic chairs.	
3	AV System	Wireless presentation, AV/HDMI matrix, amplifier, ceiling/wall speakers, wireless microphones and conferencing support.	
4	Network Infrastructure	Managed 10GbE switch , Cat-6A/fibre cabling, patch panels, transceivers and required accessories.	
5	Management Software	Centralized video-wall management with multiple layouts, screen sharing, drag-and-drop content, scheduling and remote administration.	
6	Integration	Integration with Cyber Range, SIEM/Wazuh, AI/ML Threat Analytics, CCTV, presentation systems and third-party applications.	
7	Power Protection	UPS Supply to be provided	
8	Implementation & Support	Complete installation, integration, testing, commissioning, documentation, training and 3-	

		year comprehensive onsite warranty/support.	
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11. SMART BOARD (4 Nos.)

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make & Model	Specify	
2	Screen Size	Display size shall be selected based on room length, width, seating capacity, layout and maximum viewing distance. Suitable sizes such as 65", 75", 86", 98" or higher shall be proposed by the bidder based on site assessment and approved layout.	
3	Panel Type	ADS/VA	
4	Backlight Unit	Anti-Glare Direct LED (DLED)	
5	Native Resolution	3840 x 2160 (UHD)	
6	Pixel Pitch	0.5622×0.5622mm or better	
7	Display Colour	1.07 billion colours (10-bit) or better	
8	Response Time	6.5ms	
9	Brightness	Minimum 450 nit	
10	Contrast Ratio	5000 : 1	
11	Viewing Angle (H x V)	178°(H/V)	
12	Display Life Time	≥50,000 Hours	
13	Multi touch point	50 Points	
14	Touch Accuracy	±1 mm or more precise	
15	Response Time	≤2.5ms or faster	
16	Supported Operating Systems	Windows 11/10/8/7, Linux, Mac OS X, Chrome OS, Android	
17	Built-in Operating System	Android 14.0 and upgrade to 16	
18	Android Certification	EDLA Certified on OEM Name with Online Verification	
19	CPU	Octa-Core ARM Cortex-A72 x 4 + A53 x 4 or better	
20	Memory	8GB RAM on board or higher	
21	Storage	128GB and expandable up to 256GB	
22	Flicker Free Display	Required	
23	Integrated NFC Module	Required	
24	Built-in Microphone	Required, 8 Array microphone for audio recording capabilities with a pickup distance of up to 8 meters	

25	Screen Recording with audio	Required	
26	Built in Audio out	40W (2 x 20W front-facing speakers)	
27	Expansion Slots	TF Card slot for up to 256 GB additional storage or better	
28	Min. Input ports	HDMI x 3,	
		USB (3.0) x 4	
		USB (2.0) x 1	
		USB Type C x 2	
		USB TOUCH 3.0 x 2	
		OPS Slot x 1	
		VGA x 1	
		DP IN x 1	
		LAN x 1	
		Audio In x1	
		TF Card x1	
29	Min. Output Ports	HDMI Out x1	
		Audio Out x1	
		LAN x 1	
		SPDIF x1	
30	External Control	Rs-232C	
31	Wi-Fi	(2.4GHz/5GHz)) or better	
32	Bluetooth	Version 5.3 or better	
33	Certifications	BIS	
34	Factory India Certificates/Approvals	ISO 9001:2015, ISO 45000:2018, and 14001:2015	
35	Accessories & Installation type	Wall mount need to supply required accessories. Remote Controller with batteries, Power Cord, HDMI Cable USB cable and 2 Writing Pen	
36	Handwriting Recognition	Required and Recognizes at least 10 local languages	
37	Google Play Store	Required	
38	Device Management System (DMS)	Required	
39	Warranty	3 years on Site	

12. TELEPRESENCE SYSTEMS – VIDEO CONFERENCING & COLLABORATION ROOM SOLUTION

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
	Make & Model	Specify	
1	Audio System	The device shall include an integrated beamforming microphone array with support	

		for voice tracking. It shall provide built-in high-quality stereo speakers suitable for medium-sized meeting rooms. The audio system shall support: AI-based noise suppression Acoustic echo cancellation Automatic gain control Voice activity detection The solution shall support expansion microphones for larger meeting rooms.	
2	Video Collaboration	The system shall support Ultra HD video conferencing and 4K content sharing. It shall support wireless and wired content sharing. The solution shall support Bring Your Own Device (BYOD) mode through USB connectivity. The system shall provide one-touch meeting join using a touch controller.	
3	Display Support	The device shall support connection to up to three external 4K displays through HDMI outputs.	
4	Collaboration Platform Compatibility	The solution shall support native or interoperable operation with major Unified Communications platforms including: Microsoft Teams Cisco Webex Zoom Google Meet WebRTC SIP/H.323 standards-based video conferencing systems	
5	Connectivity	The device shall provide: Minimum 1 × Gigabit Ethernet port Dual-band Wi-Fi Bluetooth USB Type-A and USB Type-C ports HDMI input(s) HDMI output(s)	
6	Network & Security	The solution shall support: IPv4 and IPv6 IEEE 802.1X authentication IEEE 802.1Q VLAN tagging HTTPS and SSH secure management Secure media encryption (SRTP/TLS) WPA2/WPA3 Enterprise wireless security Remote monitoring, diagnostics, analytics, and firmware upgrades through a centralized cloud or on-premises management platform.	
7	AI Features	The system shall provide built-in AI capabilities including: Automatic participant framing Active speaker tracking People counting and occupancy analytics Intelligent meeting zones Background noise removal Meeting quality optimization	
8	Accessories	The solution shall be supplied complete with: Touch control panel Wall or display mounting kit Power supply HDMI cables Network cable All accessories required for installation and	

		commissioning.	
9	Compliance	The offered equipment shall comply with applicable international safety, electromagnetic compatibility, environmental, and networking standards, including CE, FCC, RoHS, WEEE, and relevant IEC standards.	
10	Warranty	The offered equipment shall carry a minimum 3-year comprehensive OEM warranty, including hardware replacement, software updates, firmware upgrades, and technical support if any.	

13. NETWORK SETUP & CONFIGURATION

C. HIGH-SPEED 1/10 GBE CORE SWITCH

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Switch Type	Enterprise-class, managed Layer-3 fibre Ethernet switch, 1U rack-mountable	
2	Downlink Ports	Minimum 24 × SFP/SFP+ fibre ports	
3	Downlink Speed	Each port shall support 1 Gbps and 10 Gbps Ethernet operation	
4	Fibre Interface	SFP/SFP+ ports supporting standard 1G and 10G optical transceivers	
5	Uplink Ports	Minimum 4 × 25 Gbps fibre uplink interfaces	
6	Uplink Interface	SFP28	
7	Uplink Speed	25G, with backward compatibility with 10G/1G wherever supported	
8	Switching Capacity	Minimum 400 Gbps or higher	
9	Forwarding Rate	Minimum 250 Mpps or higher	
10	Layer 2	VLAN, 802.1Q, STP/RSTP/MSTP, LACP, LLDP/LLDP-MED, Port Security	
11	Layer 3	Static routing, OSPF, IPv4/IPv6 routing, VRRP or equivalent	
12	Security	802.1X, MAC authentication, ACL, DHCP Snooping, Dynamic ARP Inspection and IP Source Guard	
13	QoS	DSCP/802.1p classification, marking, queuing and rate limiting	
14	Multicast	IGMP Snooping and multicast routing	
15	Management	CLI, Web GUI, SNMPv2/v3, SSH, HTTPS, Syslog and NTP	
16	Automation	REST API/NETCONF/RESTCONF or equivalent	
17	Stacking	Shall support high-speed physical stacking/virtual chassis	
18	High Availability	Support for redundant power supply and high-availability features	
19	MACsec	Hardware-based MACsec encryption preferred	
20	IPv6	Full IPv6 routing and security support	
21	Optics	Shall support industry-standard 1G/10G SFP/SFP+ and 25G SFP28 optics-Min 10 to be populated in each switch	
22	Rack	19-inch rack mountable, maximum 1U	
23	Warranty	Minimum 3 years OEM warranty	
24	Support	Minimum 3 years OEM technical support including software updates/security patches	

14. 24-Port Managed Gigabit Layer 2+/Layer Quantity: 7 Nos.

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Make & Model	Vendor shall specify the OEM, make and model. Relevant OEM technical datasheet shall be submitted along with the bid.	
2	Switch Type	Managed Layer 2+/Layer 3 Lite Ethernet Access Switch or better	
3	Form Factor	1RU rack-mountable with necessary rack-mounting accessories	
4	Access Ports	Minimum 24 × 10/100/1000 Mbps Gigabit Ethernet RJ45 ports	
5	Uplink Ports	Minimum 4 × 1 GbE SFP ports	
6	Switching Capacity	Minimum 56 Gbps	
7	Forwarding Rate	Minimum 41.66 Mpps	
8	MAC Address Table	Minimum 16,000 MAC addresses	
9	VLAN Support	Support for up to 4093 VLANs or better	
10	Link Aggregation	IEEE 802.3ad LACP or equivalent	
11	Spanning Tree	Support for STP, RSTP and MSTP	
12	Layer 3 Features	Shall support Static IPv4 and IPv6 Routing	
13	Static Routes	Support for minimum 990 static routes	
14	IP Interfaces	Support for minimum 128 IP interfaces	
15	Multicast	Support for IGMP Snooping v1/v2/v3	
16	Processor	Minimum 1.4 GHz dual-core ARM processor or equivalent/better	
17	System Memory	Minimum 1 GB DDR4 DRAM or better	
18	Flash Memory	Minimum 512 MB flash memory	
19	Packet Buffer	Minimum 1.5 MB packet buffer	
20	Console Port	Minimum 1 × RJ45 console port or equivalent dedicated console interface	
21	USB Port	Minimum 1 × USB Type-A port	
22	Management	Shall support Web GUI, CLI and SNMP v1/v2c/v3	
23	Security	Shall support IEEE 802.1X, ACLs, DHCP Snooping and Port Security	
24	IPv6 Support	Shall support IPv6 addressing, management and static routing	
25	Power Supply	Internal AC power supply	
26	Input Voltage	100–240 VAC, 50/60 Hz	
27	Accessories	All required power cables, rack-mounting kit and other accessories required for installation and commissioning shall be supplied.	
28	Firmware	Switch shall be supplied with the latest stable OEM-recommended firmware. Firmware/security updates shall be available during the support period.	
29	Warranty & Support	OEM warranty/support period shall be specified as per tender requirement.	
30	OEM Authorisation	Bid/Tender-specific OEM authorisation may be submitted by the bidder, if required under the procurement conditions.	

15. ENTERPRISE STRUCTURED CABLING

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	12 U Racks with Accessories	Supply and installation of 12U rack with following specification Wall Mount Network Rack – Size : 12 U Dimension 600mm (W) X (12U) X600 mm (D) Front glazed Door with handle and push button with key arrangement and vents at top & bottom. Surface finish: Sheets cleaned, degreased, phosphated, electro- dip coat primed and electro statically powder coated Wall Mounting Brackets 1U 19" Horizontal cable Manager-1 Number PDU: 19' Mountable with 6x 5A Universal socket Power cord. Rear cover with 2nos. of Copper earthing studs Captive hardware set	
2	CAT6A cable	Supply, drawing, testing and commissioning of CAT6A cable with following specification Shielded U/FTP 23 AWG CAT 6A Cable with HDPE Insulation Material and LSZH Outer Jacket Cable should have NVP > 75% and Each pair enclosed separately in laminated aluminium foil with Drain Wire for excellent EMI & Alien Crosstalk Protection Operating Temperature -20 °C to +70 °C conforming to the standards ANSI/TIA-568.2-D, ISO/IEC 11801, IEEE802.3, ISO/IEC 60332-1, ISO/IEC 61034-2, ISO/IEC 61754-2 Colour Code as per TIA/EIA 568-B RoHS Compliant ETL 4 Channel transmission performance tested up to 600 MHz or better .	
3	Patch Pannel	Supply and installation of Patch Pannbel with following specification 1U rack mountable, 24 Port Unloaded Shielded Patch Panel supporting Shielded /Unshielded RJ-45 Jacks and OFC LC Duplex Adapter, Panel should be made of cold rolled steel powder coated shall have Rear cable organizer front labelling Facility	
4	IO for Patch Pannle and WAO	Supply, termination, testing, and commissioning Keystone Jack with following specification UL Listed ETL 4 Channel verified Unshielded CAT 6A Keystone Jack suitable for 22- 24 AWG bare copper conductor Contact Plating: 50µ" Gold/50µ" Nickel TIA/EIA 568-B colour code conforming to the standards UL94V-0 rated or equivalent ANSI/TIA-568.2-D , ISO/IEC 11801, IEEE 802.3, ISO/IEC 60332-1, die cast zinc alloy housing 360° Shielding and 3 direction cable entry . Jack shall support Minimum 750 insertion cycles , 20 re terminations. dust protection covers on patch panel side	

		RoHS Complaint.	
5	Backbox with Face Plate	Supply, Mounting , testing, and commissioning Backbox with faceplate with following specification The backbox material should be ABS with provision for mounting RoHS Complaint. The face plate shall be suitable for structured LAN cabling systems and designed to accommodate RJ45 keystone jacks for Cat6/Cat6A data outlets. The face plate shall be manufactured from high-quality material. The Face plat should be complete with screws, labeling and shutters for protection against dust ingress Configuration: The face plate shall be supplied with single-port/ dual-port configurations as per site requirement	
6	CAT6A Patch Cords for WAO 2mtr	Supply, installation, testing, and commissioning of CAT6A Patch cord with following specification Length : 2 Mtr UL Listed, ETL 4 Channel verified CAT 6A U/FTP Sheilded Patch Cord having LSZH jacket, 26 AWG bare copper conductor UTP 4 pair both end factory Crimped with modular male plugs with minimum 500 insertion cycles terminated as per TIA/EIA 568-B colour code conforming to the standards ANSI/TIA-568.2 , ISO/IEC 11801, IEEE 802.3, ISO/IEC 60332-1, RoHS Complaint.	
7	CAT6A Patch Cords for Rack side 0.5 Mtr	Supply, installation, testing, and commissioning of CAT6A Patch cord with following specification Length : 0.5 Mtr UL Listed, ETL 4 Channel verified CAT 6A U/FTP Sheilded Patch Cord having LSZH jacket, 26 AWG bare copper conductor UTP 4 pair both end factory Crimped with modular male plugs with minimum 500 insertion cycles terminated as per TIA/EIA 568-B colour code conforming to the standards ANSI/TIA-568.2 , ISO/IEC 11801, IEEE 802.3, ISO/IEC 60332-1, RoHS Complaint.	
8	6 Port LIU	Supply, installation, testing and commissioning of Fiber LIU with following specification 1U 6 Port Sliding type LIU Loaded with Ganged OM4 LC Adapters Coloured Pigtails for easy core identification Splice Trays, cable manager and should have sufficient blanking plug to cover unused slots, LIU shall be made of Powder Coated Cold Rolled Steel and have provision to support upto 96 LC Ports and CAT6A Uplinks in future.	
9	OM4 fiber cable	Supply, laying, testing, and commissioning of Outdoor 6 Core OM4 cable with following specification, No of CORE: 6 Type : Multimode OM4 Unitube Gel Free Optical Fiber Cable, having	

		ECCS Armouring and Glass Yarn Strength Member, LSOH Black Anti Rodent , Anti Termite Outer Sheath, Water Swellable Yarn Water Blocking, Max Tensile Strength: 1500N, Crush Resistance: 3000N/10 cm, Outer Diameter: 9±0.5mm, Operating Temperature: -20°C to +70°C, Attenuation @ 850 nm: ≤ 3.0 dB/km, Attenuation @ 1300 nm: ≤ 1.0 dB/km, Bandwidth (EMB) @ 850 nm: ≥ 4700 MHz.km : RoHS Compliant , AS/ACIF S008; AS/NZS 3080, TIA-492AAAD , GR 20 STDS, TIA/EIA 568.3-D, EIA455	
10	LC LC Patch Cord	Supply, installation, testing and commissioning of LC LC Patch Cord Length : 3 Meter OM4 Duplex LC Erica Violet colored fiber patch cord confirming to LSZH IEC-60332-1 , IEC60754-1 & 2, ISO/IEC 11801-1:2017, ANSI/TIA/ EIA 568.3-D,ANSI/TIA/EIA-492, Durability: 500 insertions - , Zip Lock Jacket , Operating Temperature: -40°C to +85°C, RoHS Compliant	
11	PVC Conduit	Supply, installation, testing and commissioning of 20/25/32 mm PVC conduit with ISI mark and all accessories including saddle as required.	
12	Truking 50 X50	Supply, installation, testing and commissioning of 50 x 50 mm Trunking with ISI mark and all accessories as required.	
13	Truking 100 X100	Supply, installation, testing and commissioning of 100 x 100 mm Trunking with ISI mark and all accessories as required.	
14	Fluke Testing	Testing and Certification: All installed data nodes shall be tested and certified using a calibrated cable certification tester with a valid calibration certificate. Testing shall be carried out in accordance with the applicable ANSI/TIA and ISO/IEC structured cabling standards for the specified cable category Test reports for all data nodes shall be submitted to the Engineer-in-Charge/Client upon completion.	

16. ENTERPRISE SMART RACK / INTEGRATED MICRO DATA CENTRE SOLUTION WITH 20 KW N+1 PRECISION COOLING, ENVIRONMENTAL MONITORING, FIRE SUPPRESSION & ACCESS CONTROL – 1 SET

SL.N O	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Type	Smart DC solution	
2	Expandability	DC Solution would have provision to add extra racks in future. It should be flexible, adaptable, controllable infrastructure for future expansion	

3	Size	42U, 800Wx2000Hx1500D	
4	Door Type	Rack solution should be Fitted with Front Glass door & Rear Sheet Steel double Door with 4 point locking system and comfort handle with locking. Rack Design should support closed loop High performance cooling. The door should be inter-changeable at site, at any point of time. Side panel should be with PU gasket with screw fixing to avoid air leakage and Side panel required only at the end of the row on each side.	
5	Other Accessories	Top cover with slideable cable entry. Bottom cover with multi-piece gland plates for cable entry. Horizontal Earthing Busbar per cabinet, 20 point for earth connection. Captive Hardware pack and Baying kit as required. Base Plinth of 100mm height to mount the rack and cooling system, Stationery/component shelf 1 No. per racks. Tool less Blanking panels for 50% of Rack U space. IP 20 protection rating when installed (joined to neighboring cooling unit for closed loop). All Racks should be certified according to ISO 9001,14001, 45001. Complying EIA 310,DIN 41494 and IEC 297 standards	
6	Load bearing capacity:	1400KG at Frame & 1000 KGs. On 19" mounting angles.	
7	Surface Finish:	Nano Ceramic Coated, electro-dipcoat primed to 10 -15 microns and powder coated with textured polyester RAL 7035 to 80 to 120 microns. Status based LED lights to be provided for each rack.	
8	Cooling Type	In Rack Based Cooling System in N+1 Redundancy	
		The Intelligent/Smart DC solution shall be equipped with DX based In-Rack variable/ inverter-based scroll cooling units which should be able to cool the equipment uniformly right from 1st U to 42nd U of Rack through Rack Based Cooling.	
		In-Rack Precision Air Cooling solution should cater to minimum 20 kW capacity IT equipment load with Redundancy and higher availability for racks.	
		The dimension of the cooling system shall be less than of 600mm Width X 2000mm height X 1500mm Depth including any extension frame	
		The cooling should be of modulating type and the modulation range should be of 10 - 20 KW or more.	
		All units equipped with direct expansion circuit are suitable for R410A refrigerant.	
		Units should be offered Hot swappable and with minimum 2 plugs EC Direct Drive Fan, High efficiency, minimum power consumption, EC motor with integrated electronics, True soft start characteristics (inrush current lower than operating current), Backward curve, corrosion resistant fan wheel, Maintenance free design and construction. The fan section shall be designed for higher air flow. The fan shall be protected	

		from over temperature of motor, electronics, locked rotor protection, short circuit of motor output.	
		The fans can be exchanged quickly and at any time, even while the system is operational (hot swapping). The fans are installed in the cold air section, which increases their service life	
		An integrated display should be equipped in the front of the unit to display and set the physical parameters Cooling system should be equipped with minimum two sensors in each case for detection of the cold and warm air temperatures, providing for the appropriate redundancy. The controller shall allow setting and monitoring of the DC cabinet parameters. Unit utilizes the three temperature sensors placed in the front and rear of the cooling system to ensure management and control of temperature inside the cold aisle containment of the Datacenter	
9	Controller Details	The controller should allow setting and monitoring of the following space parameters:	
		Air inlet Temperature	
		Air supply Temperature from the cooling system	
		Supply Temperature Nominal set-point	
		Supply Temperature band	
		Humidity (inlet)	
		Humidification - Enable/Disable (When applicable)	
		De-Humidification - Enable/Disable (When applicable)	
		Status of the cooling unit ,	
		Status of fan speed	
		Status of the compressor	
		Automatic restart must be provided after a power failure.	
10	Cooling Redundancy Features	The cooling system installed should have the facility to work independently or together In case of Teamwork	
11	Condenser	The condenser frame shall be made up of a sturdy GI structure or CRCA painted.	
		The condenser should be equipped with 3 no. of Axial fan for better efficiency	
		The unit shall be powder painted panel to protect against corrosion.	
		The unit shall be totally front and rear accessible including any component removal.	
12	PDU	Vertical PDU, with C13 Sockets - 24nos, C19 Sockets - 6nos, With required 4 Pole MCB & Power cord as per standard with industrial Socket.	
13	Rack Monitoring System and Fire Suppression	Rack based active fire suppression system with minimum space required for mounting including detection system, smoke extraction and extinguisher unit.	
		The extinguishing process should begin automatically when the main fire alarm is triggered.	
		Fire Alarm and Fire Suppression System: The	

		integrated infrastructure solution should be designed as a complete stand-alone unit with security, fire detection and fire suppression systems. Each of the systems should be inter-operable and inter connected.	
		Environmentally friendly clean agent should be used to ensure that no harm to human beings and environment is caused.	
		NFPA approved Clean Agent for fire suppression system. The clean agent based system shall be designed and installed as per NFPA latest Edition.	
		Should have Fire Detection and suppression system sized and the gas quantity to be designed for the cold aisle Containment and the racks.	
		The system should monitors all IT racks for temperature and humidity, enclosures.	
		The unit should be the central unit of the monitoring system up to 32 sensors can be connected.	
		The unit should have TCP/IP connection to the data network via Ethernet, configured via Web / USB.	
		The unit should send alarms via an e-mail server and connect to the Network Management System of a company via SNMP/OPC	
		Racks to be equipped with Sufficient sensors for measuring the temperature, humidity,water leak detection, access sensors for rack doors etc	
		Emergency automatic rear door opening kit in case of cooling failure/high temperature alarm must be provided.	
		Email Notification & SMS Alerts required	
		Should have Visual and Audible Alarm installed	
		Access Control system	
		Should provide IP based Biometric Access Control	
		Each Rack doors should have Biometric Access Control to permit only authorized persons to open the door through finger print reader.	
14	Warranty	The offered Solution shall carry a minimum 3-year comprehensive OEM warranty, including hardware replacement, software updates, firmware upgrades, and technical support if any.	

17. POWER DISTRIBUTION & SURGE PROTECTION SYSTEM

Technical Specifications

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
A	MAIN POWER PANEL		
1	Scope	Design/fabrication, supply, transportation, installation, testing and commissioning of complete Main Power Panel with all required switchgear, protection, metering, control wiring and accessories.	

2	Panel Type	Wall-mounted, cubicle-type, dust- and vermin-proof electrical panel with front access.	
3	Construction	Panel enclosure shall be fabricated using CRCA sheet steel of suitable thickness and construction appropriate to the approved design, fault level and installed switchgear.	
4	Form of Separation	Internal segregation/separation shall be provided as specified in the approved design, preferably Form 4 where required.	
5	Standards	Panel assembly shall comply with applicable IS/IEC standards , including the applicable current standard for low-voltage switchgear and controlgear assemblies.	
6	Doors & Compartments	Hinged doors shall be provided for switchgear compartments with suitable locking arrangement, cable alley and required equipment cut-outs.	
7	Door Earthing	All metallic doors shall be bonded to the panel earth using minimum 4 sq. mm braided copper conductor or appropriately sized equivalent bonding conductor.	
8	Surface Treatment	CRCA enclosure shall undergo appropriate pretreatment and powder coating suitable for indoor electrical-panel application.	
9	Incomer	4-Pole MCCB, minimum 25 kA breaking capacity, microprocessor/electronic trip type , suitably rated for the connected/design load.	
10	Busbar	Aluminium phase and neutral busbars of adequate current rating and short-circuit withstand capacity. Neutral busbar shall be appropriately sized for the intended load characteristics.	
11	Outgoing Feeders	4-Pole MCCBs, minimum 25 kA breaking capacity , with quantity and current ratings as per approved SLD/load schedule.	
12	Metering	Minimum 1 No. multifunction digital energy/power meter with required CTs.	
13	Indication	R-Y-B phase indication – 1 set .	
14	Voltage Monitoring	Digital/analog voltmeter with selector switch, where separately required in addition to multifunction meter.	
15	Emergency Stop	Emergency stop/trip arrangement for the Main Power Panel, where required by the approved electrical design and safety scheme.	
16	Internal Accessories	CTs, control wiring, fuses/MCBs, terminal blocks, cable glands, lugs, labels, ferrules and all accessories required for complete operation.	
17	Identification	All incomers, outgoing feeders, meters, controls, busbars and terminals shall be properly labelled/identified.	
18	Testing	Complete panel shall be inspected and tested prior to commissioning. Test reports shall be submitted.	
B	UPS POWER PANEL		
19	Scope	Fabrication, supply, transportation, installation, testing and commissioning of complete UPS Power Distribution Panel.	
20	Panel Construction	Wall-mounted, cubicle-type, dust- and vermin-proof CRCA sheet-steel enclosure with front access and suitable internal segregation.	
21	Standards	Panel shall comply with applicable current	

		IS/IEC standards for low-voltage switchgear and controlgear assemblies.	
22	Door Earthing	Metallic doors shall be suitably bonded using minimum 4 sq. mm braided copper conductor or appropriately sized equivalent conductor.	
23	Surface Treatment	Suitable pretreatment and powder-coated finish.	
24	Incomer	4-Pole MCCB, minimum 25 kA breaking capacity, microprocessor/electronic trip type , suitably rated.	
25	Busbar	Aluminium phase and neutral busbars of adequate current carrying and short-circuit withstand capacity.	
26	Outgoing Feeders	4-Pole MCCBs, minimum 25 kA breaking capacity , quantity/rating as per approved SLD and UPS distribution requirements.	
27	Metering	Minimum 1 No. multifunction digital meter with required CTs.	
28	Indication	R-Y-B indication – 1 set .	
29	Voltage Monitoring	Voltmeter with selector switch, where required.	
30	Internal Accessories	CTs, control wiring, fuses/MCBs, terminal blocks, glands, lugs, ferrules, labels and all required accessories.	
31	Testing & Commissioning	Complete functional testing shall be carried out and test reports submitted before commissioning.	
C	EARTHING & EQUIPOTENTIAL BONDING SYSTEM		
32	Scope	Design, supply, installation, testing and commissioning of a complete earthing and equipotential bonding system for the Server Room/Data Centre and associated electrical infrastructure.	
33	Standards	Earthing shall comply with IS 3043 , applicable IEC standards, equipment OEM requirements and local statutory requirements.	
34	Earthing System	Maintenance-free chemical earthing electrodes with earth enhancement compound, inspection chambers, covers, strips/conductors, clamps, connectors and all accessories.	
35	Electrical Power Earthing	Separate earth pit(s)/electrodes shall be provided as required by the approved design.	
36	UPS Earthing	Dedicated UPS earthing arrangement shall be provided as required by UPS OEM recommendations and approved design.	
37	DG Earthing	Dedicated DG body/neutral earthing arrangement shall be provided as required by applicable standards and approved design.	
38	Earth Conductors	Copper/GI strips or conductors of appropriate size as specified in approved drawings/design.	
39	Routing	Earth conductors shall be routed through suitable conduits, trenches, cable trays or other approved pathways.	
40	Equipment Bonding	Server/network racks, electrical panels, PDUs, UPS, DG set, cable trays, metallic partitions, raised-floor metallic structure/pedestals, HVAC equipment and other exposed conductive parts shall be bonded to the earthing/equipotential bonding network as applicable.	
41	Earth Grid	All applicable earthing points shall be interconnected/bonded in accordance with the	

		approved earthing design while maintaining any functional requirements specified by equipment OEMs.	
42	Earth Resistance	Required earth resistance shall comply with applicable standards, statutory requirements and equipment manufacturer recommendations.	
43	Testing	Earth resistance and continuity/bonding tests shall be conducted after installation.	
44	Documentation	Earth resistance test reports and final earthing layout/as-built drawings shall be submitted as part of commissioning documentation.	
D	LT POWER CABLING		
45	Scope	Supply, laying, dressing, termination, testing and commissioning of all required LT power cables.	
46	Cable Type	XLPE insulated, FRLS/LSZH, armoured copper/aluminium conductor cables, appropriately selected according to application and approved design.	
47	Cable Sizing	Cable sizes shall be selected based on connected load, current-carrying capacity, voltage drop, short-circuit withstand, derating factors and applicable standards.	
48	Cable Routing	Cables shall be installed through suitable cable trays, trenches, shafts, conduits or approved routes with proper supports and segregation.	
49	Termination	Cable terminations shall use suitable compression-type glands and appropriately sized crimping/compression lugs.	
50	Identification	Cables shall be properly tagged/identified at both ends and at appropriate intermediate locations.	
51	Testing	Insulation resistance, continuity and other applicable tests shall be completed before energization.	
52	Accessories	Cable glands, lugs, ferrules, markers, clamps, supports, hardware and all accessories required for complete installation shall be included.	
E	STATUTORY APPROVALS & DOCUMENTATION		
53	Overall Responsibility	Successful bidder shall prepare and submit all electrical drawings, calculations, documents and reports required for statutory approval of the installation.	
54	Single-Line Diagram	Preparation and submission of detailed Electrical Single-Line Diagram (SLD).	
55	Layout Drawings	Electrical layouts, floor plans, equipment layouts, cable-routing layouts, earthing layouts and other required drawings.	
56	Technical Documents	Preparation of load schedules, panel schedules, cable schedules, protection details, test certificates and other technical documentation required by the statutory authority.	
57	Scheme Approval	Submission of the electrical scheme to the Electrical Inspectorate/competent statutory authority and coordination for approval.	
58	Revisions	Incorporation of comments, corrections and modifications required by the approving authority without additional professional/engineering charges, except statutory fees where excluded.	

59	Completion Documentation	Preparation and submission of completion reports, test certificates and other documents required for inspection and energization.	
60	Site Inspection	Coordination and technical assistance during inspection by Electrical Inspectorate/other statutory authorities.	
61	Energization Approval	Bidder shall provide necessary technical assistance and documentation until receipt of the required Energization Order/Permission for commissioning.	
62	As-Built Documentation	Final approved SLDs, layouts, cable schedules, earthing layouts and other drawings shall be submitted in as-built form after completion.	
63	Statutory Fees	Statutory fees, inspection charges, approval fees, Government levies and other statutory charges shall be borne by Kerala Police and shall be excluded from bidder's scope unless specifically stated otherwise in the tender.	

18. UPS SYSTEMS & GENERATOR

C. 150 KVA DIESEL GENERATOR SET

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Component	Diesel Generator Set with acoustic enclosure, AMF system and all accessories	
2	DG Rating	150 kVA Prime Rated , or higher capacity if required based on approved connected/load calculations	
3	Compliance	CPCB IV+ compliant and conforming to applicable statutory/emission requirements	
4	Output	415 V, 3-Phase, 4-Wire, 50 Hz	
5	Speed	1500 RPM	
6	Power Factor	0.8 PF	
7	Engine	Water/coolant-cooled, multi-cylinder diesel engine suitably rated to deliver the specified DG output	
8	Engine Accessories	Fuel filter, air filter, bypass filter, starter, flywheel, coupling guard, governor, charging alternator, fuel/feed pump, hour meter and all OEM-recommended accessories	
9	Alternator	Brushless/suitable industrial alternator, 3-Phase, 4-Wire, 50 Hz, 415 V, 1500 RPM and minimum 150 kVA output at 0.8 PF	
10	Acoustic Enclosure	Weather-resistant acoustic enclosure meeting applicable statutory noise requirements	
11	Base Frame	Heavy-duty common base frame with suitable anti-vibration mounts/pads	
12	Fuel System	Base/day fuel tank of suitable capacity with fuel-level indication, piping and fuel/feed pump	
13	Starting System	Electric starting system with suitably rated batteries, battery leads, terminals/clamps and battery mounting arrangement	
14	Exhaust System	Residential/critical-grade exhaust silencer with required exhaust piping and accessories	

15	Protection	Complete engine, alternator, electrical and safety protections as recommended by OEM	
16	AMF Controller	Automatic Mains Failure controller/panel for automatic DG start/stop upon mains failure/restoration	
17	Mains Monitoring	AMF shall continuously monitor mains voltage, frequency and phase conditions	
18	Automatic Transfer	Automatic transfer/retransfer of load between utility supply and DG through suitably rated switching arrangement	
19	Manual Operation	Provision for manual operation/testing in addition to automatic operation	
20	Accessories	All control wiring, power connections, adaptor boxes, supports, cables and accessories required for a complete installation	
21	Scope	Supply, installation, testing and commissioning of complete DG system	

19. 80 KVA / 80 KW ONLINE UPS SYSTEM

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	UPS Capacity & Architecture		
1.1	Capacity	80 kVA / 80 kW	
1.2	Input / Output	3-Phase Input / 3-Phase Output	
1.3	Rated Output PF	1.0 (kVA = kW)	
1.4	Technology	True Online Double-Conversion UPS	
1.5	Control	DSP-based technology	
1.6	Power Electronics	IGBT-based PFC/rectifier and inverter topology	
1.7	Input Architecture	Dual-input design	
1.8	Parallel Operation	Shall support parallel kit/configuration and N+X redundant operation	
1.9	Battery Configuration	Capability for independent or common battery-bank operation when UPS units are configured in parallel	
1.1	Redundancy	Hot-standby/parallel redundancy functionality	
1.11	Generator Compatibility	Fully compatible with proposed DG supply	
1.12	Future Battery Support	UPS shall be Lithium-ion compatible for future battery migration	
2	Input Characteristics		
2.1	Input	3-Phase, 4-Wire + Ground	
2.2	Nominal Voltage	220/380 V, 230/400 V or 240/415 V	
2.3	Full-Load Input Range	Approximately 305–478 VAC or better, as supported by offered OEM model	
2.4	Derated Input Range	Approximately 228–478 VAC at 70% load or better	
2.5	Nominal Frequency	50/60 Hz auto-selectable	
2.6	Input Frequency Range	Minimum 30–70 Hz	
2.7	Input Power Factor	>0.99 at full load	

3	Output Characteristics		
3.1	Output Voltage	220/380 V, 230/400 V or 240/415 V, 3-Phase, 4-Wire	
3.2	Voltage Regulation	±1% or better	
3.3	Output Frequency	50/60 Hz	
3.4	Frequency Regulation	±0.05 Hz or better	
3.5	Frequency Slew Rate	<1 Hz/sec	
3.6	Output Waveform	Pure sine wave	
3.7	Output THDv	<1.5% for linear load	
3.8	Crest Factor	Minimum 3:1	
3.9	Short-Circuit Protection	Electronic/MCB or equivalent protection	
4	Transient Performance		
4.1	Transient Response	<±5% for specified 0–100% step linear load	
4.2	Recovery	Recovery to within 3% in <20 ms	
5	Transfer & Bypass		
5.1	Mains → Battery	0 ms	
5.2	Battery → Mains	0 ms	
5.3	UPS/Static Bypass Transfer	<1 ms or better, subject to synchronization and OEM design	
5.4	Maintenance Bypass	Manual maintenance bypass shall be provided	
5.5	Bypass Safety	Maintenance bypass cover/removal sensing or equivalent safety/interlock arrangement	
5.6	Maintainability	Design shall facilitate maintenance/replacement of serviceable modules/components without unnecessary interruption to critical load, subject to OEM architecture	
6	Efficiency		
6.1	Online Efficiency	>96%	
6.2	ECO Mode Efficiency	Up to 99%	
7	Overload Capability		
7.1	≤105% Load	Continuous	
7.2	106–110%	Minimum 60 minutes	
7.3	111–125%	Minimum 10 minutes	
7.4	126–150%	Minimum 1 minute	
7.5	>150%	Minimum 1 second / as per OEM protection design	
8	Battery System		
8.1	Required Backup	Minimum 20 minutes at specified design load	
8.2	Battery Bank Voltage	Flexible DC bus; proposed configuration and voltage shall be specified by bidder	
8.3	Battery Sizing	Bidder shall submit detailed battery sizing calculations with the bid	

8.4	Battery Type	Vendor shall specify	
8.5	Battery Make/Model	Vendor shall specify	
8.6	Number of Battery Banks	Vendor shall specify based on redundancy and backup requirement	
8.7	Battery Capacity	Vendor shall provide Ah/VAh calculations	
8.8	Charger	Charger shall be appropriately sized for the offered battery bank and required recharge performance	
8.9	Charging	Multi-stage charging with float/boost/equalization, as applicable to offered battery chemistry	
8.1	Charger Current	Minimum 16 A , or higher if required by battery sizing	
8.11	Recharge Time	Vendor shall specify time to restore battery to 90% capacity following specified discharge	
8.12	Battery Housing	Suitable battery rack/cabinet; GA drawing shall be submitted	
8.13	End-Cell Voltage	Vendor shall specify according to battery manufacturer recommendation	
9	Communication & Monitoring		
9.1	REPO	Remote Emergency Power-Off port shall be provided	
9.2	SNMP	SNMP network management card with Ethernet connectivity	
9.3	IPv6	SNMP/network interface shall support IPv6	
9.4	NMS	UPS parameters, alarms and status shall be remotely monitorable through NMS	
10	Start/Restart & Diagnostics		
10.1	Cold Start	UPS shall support startup from battery/DC source without mains	
10.2	AC Start	UPS shall support startup from mains in accordance with OEM architecture	
10.3	Automatic Restart	Automatic restart upon restoration of mains after battery-low shutdown	
10.4	Self-Diagnostics	Self-test/diagnostics for rectifier/charger, battery and inverter	
11	Environmental & Physical		
11.1	Operating Temperature	0°C to 40°C or better	
11.2	Storage Temperature	-25°C to 70°C or better	
11.3	Relative Humidity	Up to 95%, non-condensing	
11.4	Operating Altitude	Minimum 0–1000 m without derating	
11.5	Cooling	Forced-air cooling	
11.6	Noise	<56 dB at 1 metre, where supported for offered capacity/model	
11.7	Air Filtration	Internal dust/anti-corrosion filtration where available/applicable	
11.8	Dimensions	Vendor shall specify	
11.9	Weight	Vendor shall specify	
11.1	Reliability	MTBF >100,000 hours or OEM-published equivalent	

12	Standards & Certifications		
12.1	UPS Safety	IEC/EN 62040-1 or applicable latest equivalent	
12.2	EMC	IEC/EN 62040-2 or applicable latest equivalent	
12.3	Performance	IEC 62040-3 or applicable latest equivalent	
12.4	EMC Immunity	Applicable IEC 61000 series requirements	
12.5	RoHS	UPS shall be RoHS compliant	
12.6	Type Test	Applicable type-test certificate/report for quoted model shall be submitted	
12.7	OEM Certifications	Valid ISO 9001, ISO 14001 and applicable occupational health & safety management certification	

20. INTERIOR FIT-OUT, CIVIL & FACILITY INFRASTRUCTURE WORKS

D. RELOCATION, RENOVATION AND RESTORATION OF EXISTING 60-BED DORMITORY, SLA ROOM AND ASSOCIATED FACILITIES TO THE DESIGNATED ADJACENT BUILDING – COMPLETE TURNKEY WORK

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
1	Overall Scope	The existing functional 60-bed dormitory, SLA Room and associated facilities occupying the identified Cyber Range area shall be relocated to the designated space in the adjacent building and restored to fully functional condition.	
2	Existing Location	Second floor of the existing building.	
3	Relocation Location	Designated fourth-floor area of the adjacent building, approximately 50 metres away.	
4	Furniture & Items	Existing 60 beds/cots, mattresses, lockers, racks, tables, chairs and all associated furniture/fittings shall be safely relocated.	
5	Shifting Work	Dismantling, packing, handling, transportation, lifting/shifting, reassembly, positioning and restoration of all existing items.	
6	Protection During Shifting	Bidder shall ensure proper packing and handling to prevent damage to existing furniture, fixtures and equipment. Any damage caused during relocation shall be rectified/replaced by the bidder.	
7	Renovation Area	Renovation/refurbishment of approximately 1,500 sq. ft. of the designated relocated accommodation.	
8	Civil Repairs	Necessary masonry, plastering, patch repairs, floor repairs, waterproofing where required, doors/windows and associated civil finishing works.	
9	Flooring	Repair/replacement of flooring wherever required, with suitable durable finish matching the intended use.	

10	Painting	Surface preparation, putty/primer where required and minimum two coats of good-quality low-VOC interior paint.	
11	Electrical Maintenance	Repair/replacement of electrical wiring, distribution components, modular switches, sockets and associated electrical fittings wherever required.	
12	LED Lighting	Supply and installation of energy-efficient LED lighting to provide adequate illumination.	
13	Ceiling Fans	Supply and installation of energy-efficient BLDC ceiling fans with required regulators/controls and electrical accessories.	
14	Air Conditioning	Supply, installation, testing and commissioning of energy-efficient inverter AC units of adequate capacity , based on room size and heat-load requirement.	
15	Existing Toilet-cum-Bathrooms	Complete renovation of 3 existing toilet-cum-bathrooms .	
16	Toilet Civil Works	Civil repairs, waterproofing, wall/floor tiling and necessary finishing.	
17	Toilet Plumbing	Replacement/modification of water supply and drainage lines wherever required.	
18	Sanitary & CP Fittings	EWC, wash basin, taps, health faucet, valves and other required sanitary/CP fittings.	
19	Toilet Electrical Works	LED lighting, switches, wiring and electrical fittings.	
20	Toilet Ventilation	Exhaust fans and required ventilation provisions.	
21	Bathroom Conversion	3 existing bathrooms shall be converted into complete toilet-cum-bathrooms.	
22	EWC Provision	Each converted bathroom shall be provided with European Water Closet (EWC), associated flushing arrangement and required accessories.	
23	Conversion Works	Plumbing, drainage, sanitary/CP fittings, tiling, electrical works, ventilation, doors and all necessary accessories shall be included.	
24	SLA Room	Existing SLA Room facilities/items shall be shifted and suitably re-established in the designated location as directed by department.	
25	Cleaning	Complete cleaning of relocated/renovated premises after completion.	
26	Debris Disposal	Construction waste, packing materials and debris generated during the work shall be removed and disposed of at an approved location.	
27	Testing	Electrical, plumbing, AC and other	

		installed systems shall be tested before handover.	
28	Handover	Entire relocated facility shall be handed over in fully functional, safe and ready-to-use condition .	
29	Operational Continuity	Work shall be planned and executed with minimum disruption to ongoing activities of PTC .	
30	Turnkey Responsibility	All labour, materials, transportation, tools, consumables, minor accessories and incidental works required for successful relocation and restoration shall be included in bidder's scope.	

E. DEVELOPMENT OF CYBER RANGE & CYBER TRAINING CENTRE

SL.NO	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
B1	Civil, Interior & Renovation Works		
1	Renovation	Complete repair, renovation and refurbishment of the identified Cyber Range & Cyber Training Centre premises.	
2	Civil Works	Masonry, plastering, wall finishing, waterproofing where required, repairs and associated civil works.	
3	False Ceiling	Fire-retardant gypsum/mineral-fibre false ceiling with suitable grid system and access panels.	
4	Partitioning	Aluminium-glass and/or gypsum modular partitioning with suitable acoustic insulation as per approved layout.	
5	Flooring	Premium vitrified/commercial-grade flooring suitable for office, laboratory and training areas.	
6	Server Room Flooring	Raised access flooring for Server Room/Data Centre shall be provided as per the separately specified technical requirement.	
7	Interior Finishing	Wall panelling, blinds, decorative finishes, institutional branding, room identification and signage.	
B2	Electrical, Lighting & HVAC Works		
8	Electrical Works	Complete electrical rewiring/modification, DBs, modular switches, sockets, cable trays, raceways and accessories.	
9	IT Power	Dedicated electrical power points/circuits for workstations, servers, networking and other IT equipment.	
10	Lighting	Energy-efficient LED lighting, emergency lighting and task lighting as required.	
11	Fans	Energy-efficient ceiling/ventilation fans	

		and associated fittings where required.	
12	HVAC	Supply, installation/relocation, testing and commissioning of inverter AC/HVAC systems based on room-wise heat-load requirements.	
13	Ventilation	Suitable ventilation and exhaust arrangements shall be provided wherever required.	
B3	Laboratory Infrastructure		
14	Cyber Range Laboratory	Complete infrastructure for Cyber Range operations and training. (50 Trainees)	
15	SOC	Complete physical infrastructure for the Security Operations Centre (SOC) . (10 Seat)	
16	Digital Forensics Lab (A)	Complete infrastructure for Digital Forensics Laboratory. (10 Seat)	
17	Cyber Crime Research & Advanced Crime Labs	Complete infrastructure for Cyber Range operations and training. (40 Trainees)	
18	Digital Forensics Lab (B)	Complete infrastructure for Digital Forensics Laboratory. (15 Seat)	
19	State Cyber Lab	Complete infrastructure for State Cyber Lab (10 Seat)	
20	AI Threat Analytics Lab	Complete infrastructure for AI Threat Analytics Laboratory. (8 Seat)	
21	VC Room	Complete infrastructure for VC Room (10 Seat)	
22	Server Room	Supporting physical, electrical, cooling and structured-cabling infrastructure for Server Room.	
23	Network Room	Racks, power, structured cabling, grounding, cable management and cooling/environmental provisions.	
24	Common Lab Requirements	Workstation layouts, electrical outlets, structured cabling, equipment mounting, cable management, lighting and HVAC coordination shall be included for all laboratories.	
B4	Modular Furniture		
23	Operator Workstations	Enterprise-grade modular operator workstations with integrated power/network cable management.	
24	Training Furniture	Training desks, computer tables and instructor tables.	
25	Meeting Furniture	Discussion tables and conference tables.	
26	Reception Desk	Custom/modular reception counter appropriate to the approved interior layout.	
27	Storage	Storage cabinets, pedestal drawers, wall-mounted storage and bookshelves wherever required.	

28	Construction	Commercial-grade engineered wood/metal construction with durable finish and integrated cable management.	
B5	Ergonomic Seating		
29	Waiting/lounge seating.		
30	Office Chairs	Medium-back ergonomic office chairs.	
31	Other Seating	Visitor chairs and reception seating	
B6	Conference Room		
32	Conference Furniture	Conference table, executive chairs and visitor seating.	
33	AV Provisions	Display mounting, HDMI and audio connectivity provisions.	
34	Connectivity	Integrated power and network outlets.	
35	Cable Management	Concealed/organized cable-management arrangement.	
36	Acoustic Treatment	Acoustic treatment wherever required based on room design.	
37	Lighting	Appropriate conference-room and task lighting.	
B7	Reception & Waiting Area		
38	Reception	Reception counter with power/network provisions and storage.	
39	Waiting Area	Suitable visitor/lounge seating.	
40	Information Display	Information display and digital-signage provisions.	
41	Queue Management	Provision for queue-management facility, if required.	
42	Interior	Branding, lighting, decoration and associated storage.	
B8	CCTV Surveillance System		
43	System	Enterprise IP-based CCTV surveillance with centralized monitoring and recording.	
44	Cameras	Fixed/dome IP cameras selected according to location and surveillance requirements.	
45	Network	PoE switches, structured cabling and required accessories.	
46	Recording	NVR with appropriately sized storage based on camera count and required recording-retention period.	
47	Coverage	Laboratories, corridors, reception, waiting area, Server Room, Network Room, conference-room entrance and common areas.	
48	Accessories	Mounts, junction boxes, connectors and all installation accessories.	
B9	Biometric Access Control		
49	Access Control	Centralized biometric and smart-card-based access-control system.	
50	Components	Biometric readers, smart-card readers, door controllers, electromagnetic locks,	

		exit switches and door sensors.	
51	Visitor Management	Visitor-access management facility.	
52	Access Policies	User/group and time-based access policies.	
53	Audit Logging	Centralized access/event logging and audit trail.	
54	Coverage	Server Room, Network Room, SOC, Cyber Range, Digital Forensics Lab, AI Lab and other restricted areas.	
55	Integration	Capability to integrate with Active Directory/LDAP/central authentication where required.	
B10	Public Address (PA) System		
56	PA System	Centralized/network-enabled Public Address system.	
57	Components	PA controller, amplifiers, ceiling/wall speakers, paging microphones, cabling and accessories.	
58	Zoning	Zone-wise announcement and selection capability.	
59	Coverage	Laboratories, conference room, reception, waiting area, corridors and common areas.	
60	Announcements	General, scheduled and emergency announcement capability.	
B11	Fire & Life Safety		
61	Fire Extinguishers	Appropriate fire extinguishers as per applicable fire-safety requirements.	
62	Emergency Signage	Emergency-exit and evacuation-route signage.	
63	Safety Signage	Required warning, safety and equipment-identification signage.	
64	Fire Stopping	Fire-rated sealing of cable/utility penetrations using approved fire-stop systems.	
65	Emergency Lighting	Emergency lighting along required areas and escape routes.	
66	Evacuation Plan	Evacuation-plan displays at appropriate locations.	
B12	Testing, Documentation & Handover		
67	Testing & Commissioning	Complete testing and commissioning of all supplied/installed infrastructure and systems.	
68	Documentation	Product datasheets, certificates, test reports, equipment schedules and configuration details.	
69	As-Built Drawings	Complete civil, interior, electrical, HVAC, furniture, CCTV, access-control, PA and related as-built drawings.	
70	Cleaning	Final cleaning and disposal of construction waste/debris.	

71	Defect Liability	Minimum 1-year Defect Liability Period for executed works.	
72	Warranty	Minimum 3-year warranty/support for supplied equipment and modular furniture , wherever specified in the respective BOQ/technical specification.	
73	Final Handover	Entire Cyber Range & Cyber Training Centre shall be handed over in fully operational, finished and ready-to-use condition .	

F. CIVIL, INTERIOR, RAISED FLOORING, PARTITIONING AND ASSOCIATED INFRASTRUCTURE WORKS FOR MINI DATA CENTRE & SERVER ROOM

SL.N O	FEATURES	SPECIFICATIONS	COMPLIANCE (YES/NO)
A	RAISED ACCESS FLOORING		
1	Scope	Design, supply, installation, testing and completion of steel cementitious raised access flooring system for the Server Room/Data Centre, including panels, pedestals, understructure and all accessories.	
2	Finished Floor Height	300 mm from base floor to finished raised-floor level, unless otherwise indicated in approved drawings.	
3	Panel Size	600 mm × 600 mm × 35 mm nominal.	
4	Panel Type	Steel cementitious raised access floor panel, M1000 or equivalent/better .	
5	Surface Finish	Anti-static High Pressure Laminate (HPL) suitable for Data Centre/server-room applications.	
6	Understructure	Edge-support rigid-grid system with suitable stringers/support members.	
7	Pedestal	All-steel construction with corrosion-resistant zinc-plated/approved equivalent finish; height adjustable to achieve required finished floor level.	
8	Point Load	Minimum 450 kg or better.	
9	Uniformly Distributed Load	Minimum 1,350 kg/m² or better.	
10	Wear Resistance	≤ 0.08 g/cm² , or better, as per applicable test standard.	
11	Bottom Profile	Hemispherical/profiled bottom construction or equivalent design providing required structural performance.	
12	Panel Protection	Exposed surfaces shall have suitable corrosion/weather-resistant protective coating.	
13	Levelling	Complete floor shall be properly levelled, aligned and securely supported without rocking or unacceptable panel movement.	

14	Cable Management	Suitable under-floor cable management/wire-management accessories shall be provided as required by approved layout.	
15	Tile Lifters	Minimum 2 Nos. three-prong tile lifters suitable for the offered flooring system.	
16	Openings	Required cable-entry cut-outs/openings shall be finished with suitable edge protection/grommets to prevent cable damage and uncontrolled openings.	
17	Earthing/Bonding	Metallic understructure shall be bonded to the Data Centre equipotential earthing system as applicable.	
B	SERVER ROOM PARTITIONING		
18	Scope	Design, supply and installation of full-height modular partitioning to segregate the Server Room from Console/Electrical areas , as per approved layout.	
19	Partition Height	Full height from finished floor level up to structural ceiling/soffit.	
20	Framework	Powder-coated extruded aluminium sections of approved make and suitable structural strength.	
21	Construction	Framework shall include supports, cleats, anchors, fasteners and all accessories required for a rigid and durable installation.	
22	Finish	Aluminium sections shall be smooth, corrosion-resistant, properly aligned and mechanically secured.	
23	Partition Panels	Suitable fire-rated solid panels and/or glazing arrangement as indicated in approved Data Centre layout.	
24	Glazing	Where glazing is provided, glass type, thickness and fire rating shall comply with the approved fire-safety design and applicable requirements.	
25	Sealing	Floor, ceiling, wall and frame junctions shall be sealed using EPDM/neoprene or equivalent approved materials.	
26	Environmental Isolation	Partitioning shall provide suitable environmental and acoustic separation between designated areas.	
27	Door Type	Sliding door with glazed viewing panel/half-glass configuration as per approved design.	
28	Door Opening	Minimum 1,000 mm clear opening width to facilitate movement of IT equipment.	
29	Door Hardware	Tracks, rollers, handles, locks, stoppers and all associated hardware shall be included.	

30	Fire Safety	Partition, glazing, sealing materials and associated components shall be fire-rated/fire-resistant as required by the approved fire-safety design and applicable standards.	
C	FIRE-RESISTANT INTERNAL WALL FINISHING		
31	Scope	Surface preparation and application of approved primer, putty where required, and fire-resistant coating/paint to internal Data Centre walls.	
32	Surface Preparation	Existing surfaces shall be cleaned and prepared before application. Defects/uneven surfaces shall be rectified as required.	
33	Putty	Up to two coats of suitable wall putty, where required to obtain the specified finish.	
34	Primer	Minimum one coat of compatible approved primer.	
35	Finish Coat	Minimum two coats of approved fire-resistant paint/coating .	
36	Colour	Light-coloured finish to improve illumination and visibility inside the Data Centre.	
37	Environmental Requirement	Paint/coating shall be non-toxic, environmentally friendly, water-based and low/very-low VOC.	
38	Performance	Coating shall provide suitable UV, stain and heat resistance and other characteristics claimed by the manufacturer for the offered system.	
39	Fire Performance	Minimum 30-minute fire-resistance/fire-protection performance , where applicable, shall be supported by appropriate test certification for the complete offered coating/system and substrate/application conditions.	
40	Material Supply	Materials shall be supplied in original sealed manufacturer containers with product identification and batch details.	
41	Documentation	Product datasheets and applicable fire/performance test certificates shall be submitted for approval before application.	
D	DG RCC FOUNDATION / PLATFORM		
42	Scope	Design and construction of complete RCC foundation/platform suitable for installation of the proposed 150 kVA DG set or higher offered capacity .	
43	Design Basis	Foundation shall be designed based on DG OEM recommendations, actual equipment dimensions/weight, static and dynamic loads and site conditions.	

44	Civil Works	Excavation, PCC/RCC as applicable, reinforcement, shuttering/formwork, grouting, finishing and associated civil works shall be included.	
45	Structural Capacity	Foundation shall safely withstand static, dynamic and operational loads of the DG set.	
46	Anti-Vibration	Approved anti-vibration mounts/pads shall be provided to minimize transmission of vibration to surrounding structures.	
47	Equipment Fixing	Suitable foundation bolts/anchoring arrangements shall be provided according to DG OEM recommendations.	
48	Level & Alignment	Foundation shall ensure proper equipment levelling and alignment.	
49	Drainage	Suitable drainage/water-disposal provisions shall be incorporated considering site conditions.	
50	Standards	Design, materials and workmanship shall conform to applicable IS standards, DG OEM recommendations and statutory requirements.	
E	DG WEATHER-PROTECTION ROOFING		
51	Scope	Design, fabrication, supply and installation of complete roofing/weather-protection structure for the DG installation.	
52	Purpose	Protection against direct sunlight, heavy rain and adverse weather conditions without adversely affecting DG ventilation or operation.	
53	Structural Design	Structure shall be designed considering local wind load, rainfall and other applicable site/environmental conditions.	
54	Structure	Suitable structural-steel/approved equivalent framework with columns, supports, bracing, fasteners and required structural accessories.	
55	Corrosion Protection	Structural members shall be corrosion-resistant or suitably treated and coated with approved anti-corrosive protective system.	
56	Roofing Material	Durable, weather-resistant roofing material suitable for the installation location and approved design.	
57	Clearance	Adequate clearances shall be maintained around and above the DG for ventilation, heat dissipation, exhaust routing, operation and maintenance.	
58	Ventilation	Roofing/enclosure arrangement shall not obstruct cooling airflow, combustion-air requirements or hot-air discharge	

		of the DG set.	
59	Exhaust	Roofing arrangement shall accommodate safe exhaust routing and required clearances.	
60	Rainwater Management	Gutters/downpipes/drainage arrangements shall be provided wherever required to prevent rainwater accumulation near the DG installation.	
61	Maintenance Access	Sufficient access shall be maintained for routine maintenance and removal/replacement of major DG components.	
62	Complete Installation	All supports, columns, anchors, fastening arrangements and associated civil/structural works required for complete installation shall be included.	

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For DIRECTOR GENERAL OF POLICE &
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