INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION
Powai, Mumbai 400076.

Technical Specifications and Terms & Conditions for Servers, Storage and Switches

The following are the technical specifications for the Servers, Storage and Switches.

Detailed Technical Specifications			
S/N	**Description**	**Parameters**	**Qty**
1	**Application Server**		1
1.1	Chassis	2U Rack Mountable	
1.2	CPU	Two numbers of 4th Generation Intel® Xeon® Scalable Processor with 16 Core each and server must support 16/28/32/36/40/44/48/52/56/60 Cores.	
1.3	Chipset	Intel® C741 Chipset	
1.4	Memory	32DIMM slots. 32GB*4 DIMMS or 64GB *2 scalable upto 8.0 TB using DDR5 Registered Smart Memory DIMM (RDIMM) operating at 4800 MT/s	
1.5	Bus Slots	Server should support upto eight PCI-Express 5.0 x16 slots. Additional two x8 or higher PCIe 5.0 slots	
1.6	HDD Bays / BOOT optimized storage	Upto 30 SFF SAS/SATA/SSD/NVMe 1.92TB * 2 NCMe SSD Drives	
1.7	Controller	On-board Embedded x 16 RAID controller which supports for raid 0, 1, 5, 6, 10, 50, 60 from day one with min. 24Gbps port speed and 8GB cache with support for Secure encryption/data at rest Encryption. Also, the controller must support Mixed Mode which combines RAID and HBA mode operation simultaneously and support 6G SATA, 12G/24G SAS, Gen 3/Gen4 16G NVMe. The disk must be directly visible to OS if not included in RAID. RAID controller should support standard drivers coming in Debian, Centos/RHEL, Proxmox.	

1.8	Networking features	1Gb 4-port OCP3 network adapter & 10GB 2 Port OCP3 Base network adapter & 2Port 16Gbps FC Card & 25G Multimode 4 port card with multimode modules must be configured Server should support below networking cards for future requirement 1. 1Gb 4-port network adaptors - 2. 10Gb 2-port Ethernet - 3. 10GBaseT 2-port Ethernet adaptor 4. 10/25Gb 2-port SFP28 Ethernet adaptor 5. 10/25Gb 4-port SFP28 Ethernet adaptor 6. 100Gb 2-port QSFP28 Ethernet 7. 100Gb 1-port QSFP56 Ethernet 8. 100Gb 2-port QSFP56 Ethernet 9. 200Gb QSFP56 Ethernet 10. Pensando Distributed Services Platform DSC-25 Enterprise 10/25Gb 2-port SFP28 Card Infiniband Options: 100Gb or 200Gb Single or Dual port Adapter	
1.9	Interfaces	USB 3.0 support with Up to 5 total: 1 front, 2 rear, 2 internal. 1GbE Dedicated management port	
1.1	Power Supply	Should support hot plug redundant low halogen power supplies with minimum 94% efficiency	
1.11	Fans	Redundant hot-plug system fans	
1.12	Industry Standard Compliance	ACPI 6.3 Compliant PCIe 5.0 Compliant WOL Support Microsoft® Logo certifications PXE Support Energy Star SMBIOS 3.2 UEFI 2.7 Redfish API IPMI 2.0 Secure Digital 4.0 Advanced Encryption Standard (AES) Triple Data Encryption Standard (3DES) SNMP v3 TLS 1.2 DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP) Active Directory v1.0 ASHRAE A3/A4	

1.13	System Security	UEFI Secure Boot and Secure Start support Tamper-free updates - components digitally signed and verified Immutable Silicon Root of Trust Ability to rollback firmware FIPS 140-2 validation Secure erase of NAND/User data Common Criteria certification TPM (Trusted Platform Module) 1.2 option Configurable for PCI DSS compliance TPM (Trusted Platform Module) 2.0 option Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser Bezel Locking Kit option Support for Commercial National Security Algorithms (CNSA) Chassis Intrusion detection option Secure Recovery - recover critical firmware to known good state on detection of compromised firmware	
1.14	Operating Systems and Virtualization Software Support	Windows Server. Red Hat Enterprise Linux (RHEL) SUSE Linux Enterprise Server (SLES) VMware ESXi. Canonical Ubuntu Oracle Linux and Oracle VM Citrix, Proxmox	
1.15	Provisioning	1. Should support tool to provision server using RESTful API to discover and deploy servers at scale 2, Provision one to many servers using own scripts to discover and deploy with Scripting Tool (STK) for Windows and Linux or Scripting Tools for Windows PowerShell	
1.16	Firmware security	1. For firmware security, system should support remote management chip creating a fingerprint in the silicon, preventing servers from booting up unless the firmware matches the fingerprint. This feature should be immutable 2. Should maintain repository for firmware and drivers recipes to aid rollback or patching of compromised firmware. Should also store Factory Recovery recipe preloaded to rollback to factory tested secured firmware	

1.17	Embedded Remote Management and firmware security	1. System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for multifactor authentication 2. Server should have dedicated 1Gbps remote management port 3. Server should have storage space earmarked to be used as a repository for firmware, drivers and software components. The components can be organized in to install sets and can be used to rollback/patch faulty firmware 4. Server should support agentless management using the out-of-band remote management port 5. The server should support monitoring and recording changes in the server hardware and system configuration. It assists in diagnosing problems and delivering rapid resolution when system failures occur 6. Two factor Authentication 7. Local or Directory-based user accounts with Role based access control 8. Remote console sharing upto 6 users simultaneously during pre-OS and OS runtime operation, Console replay - Console Replay captures and stores for replay the console video during a server's last major fault or boot sequence. Microsoft Terminal Services Integration, 128 bit SSL encryption and Secure Shell Version 2 support.Should provide support for AES and 3DES on browser.Should provide remote firmware update functionality.Should provide support for Java free graphical remote console. 9. Should support managing multiple servers as one via Group Power Control Group Power Capping Group Firmware Update Group Configuration Group Virtual Media and Encrypted Virtual Media Group License Activation 10. Should support RESTful API integration 11. System should support embedded remote support to transmit hardware events directly to OEM or an authorized partner for automated phone home support 12. Server should have a security dashboard : displaying the status of important security features, the Overall Security Status for the system, and the current configuration for the Security State and Server Configuration Lock features. 13. One-button Secure Erase designed to decommission/repurpose servers 14. NVMe wear level display 15. Workload Performance Advisor - Provides server tuning recommendations to improve server performance	

1.18	Server Management	Software should support dashboard views to quickly scan the managed resources to assess the overall health of the data center. It should provide an at-a-glance visual health summary of the resources the user is authorized to view.	
		The Dashboard minimum should display a health summary of the following: • Server Profiles • Server Hardware • Appliance alerts	
		The Systems Management software should provide Role-based access control	
		Zero Touch Provisioning (ZTP) using SSDP with remote access	
		Management software should support integration with popular virtualization platform management software like Vmware vCenter & vRealize Operations, and Microsoft System Center & Admin Center	
		Should help provide proactive notification of actual or impending component failure alerts on critical components like CPU, Memory and HDD.	
		Should provide an online portal that can be accessible from anywhere. The portal should provide one stop, online access to the product, support information and provide information to track warranties, support contracts and status. The Portal should also provide a personalised dashboard to monitor device heath, hardware events, contract and warranty status. Should provide a visual status of individual devices and device groups. The Portal should be available on premise (at our location - console based) or off premise (in the cloud).	
		Should help to proactively identify out-of-date BIOS, drivers, and Server Management agents and enable the remote update of system software/firmware components.	
		Should have dashboard for firmware baselines while performing minimum required firmware checks and highlighting out-of-compliance devices for updates with the selected firmware baseline	
		The Server Management Software should be of the same brand as the server supplier.	

1.19	Cloud Enabled Monitoring and Management	1. Secure connection from customer sites to HPE cloud service 2. Unified Identity & Access Management 3. Manages and controls servers regardless of physical location 4. Subscription-based entitlement 5. Efficient Device Onboarding 6. Firmware Update Awareness with Intelligent delta-only based updates 7. Set Group firmware Baseline and Compliance monitoring and notification 8. Group based firmware management that can be scheduled or on-demand 9. Remote Site management with low bandwidth/high latency network connectivity 10. Role-based access and views for managed customer environments 11. GUI and Rest APIs for core features	
1.2	Warranty	5 Years Onsite	

S/N	Description	Parameters	Qty
2	**40 Bay Storage (Dual Controller Unified Storage)**		1
2.1	Drive Side Connectivity	Proposed storage must have minimum 12 G SAS Drive side connectivity, 12 G SAS internal data bus, 12 G SAS expansion ports	
2.2	Chassis & Architecture	Proposed storage should have maximum 4U Rack Mount Chassis with symmetric active-active controllers, dual PSU and dual FAN module. System components like power supplies, cooling fans, controllers, host boards & storage drives should be modular in design to lower maintenance complexity.	
2.3	Controller CPU	Each controller should have 1x Intel (4 core) or higher CPU	
2.4	Controller Memory	Each controller should have at least 96GB & Expandable upto 192GB or more per controller	
2.5	NVMe Flash Cache (per Controller)	Proposed Storage should have 1x 3.84TB NVMe flash Cache per controller from day one.	
2.6	Host Ports (25G)	Each controller should have minimum 2x 25G SFP28 ports, and 25G port should be backward compatible with 10G and required cables and connectors should be supply from day one.	
2.7	Modular Card Slots	Should have 2 numbers of replaceable modular Card Slot per controller and below Cards should be supported in each slot and possible to inter change the card without the need to change or upgrade the storage controller	

2.8	Supported Interface Cards	16Gb/s FC x 4 32Gb/s FC x 2 32Gb/s FC x 4 10GbE (SFP+) x 2 25GbE (SFP28) x 2 100GbE (QSFP28) x 2 12Gb/s SAS x 2	
2.9	Front-end / Back-end Ports	Initially Quoted with at least 2x 25GbE front end (data) ports & should have at least 2x 12G SAS port or more for back end ports per controller.	
2.1	Drive Support	Support drives including SSD,SAS, SATA HDD in the same enclosure	
2.11	Supported Drive Types	2.5" SAS SSD 2.5" 12Gb/s SAS 10,000 RPM and 15,000 RPM HDD 3.5" 12Gb/s NL-SAS 7,200 RPM HDD 2.5" SATA SSD, 3.5" 6Gb/s SATA 7,200 RPM HDD	
2.12	Unified Storage Architecture & Protocols	Proposed storage should have true unified storage architecture. should support File, Block and Object storage within the same system and it should support Scale out feature with at least 4 appliances or more in single cluster (single namespace) without adding additional node, File Gateway or metadata controller for file level, cloud level access or for Scale out feature . All these protocols should be supported and licenses for full storage capacity should be quoted for the duration of the product lifecycle NFS, CIFS/SMB, AFP, FTP, SFTP, WebDAV, REST API, 1Gb/s, 10Gb/s and (RJ-45, SFP+), 10Gb/s FCoE, 8Gb/s, 16Gb/s Fibre Channel.	
2.13	File Share Access Control	Storage should be able to separate the File Level share folder control with file protocols for secure file sharing process (like share a folder on HTTP or FTP only and share another on CIFS or AFP only.	
2.14	Automated Support Request	Automated support request Proposed Storage should have option to automatically create support ticket with relevant logs with the OEM support in case of critical event.	
2.15	Storage Capacity	Storage Capacity: Should be quoted with minimum 160TB Raw with 7200RPM Enterprise class 12G SAS HDD, Individual drive capacity should not be more than 16TB. Storage should have provision to support additional 480TB storage capacity by using same individual drive capacity so there should be enough empty drive slots/bays available from day one.	
2.16	Hot Spare	Each RAID group should have at least one dedicated hot spare drives should be there from day one.	
2.17	RAID Protection (IDR)	Storage should offer IDR or similar technology for superior RAID protection and recovery compared to generic RAID which helps increase integrity and system efficiency while keeping data secure against errors and loss.	
2.18	Scalability	System should be scalable to minimum 800 drives vai expansion enclosure per appliance and per cluster at least	

		3200 drives via scale-out.	
2.19	File System & Volume Size	Support inbuilt file system which can support single volume size up to 2PB. License for full capacity should be quoted upfront	
2.2	Cloud Support	Cloud - Support cloud provider: Amazon S3, Aliyun, Microsoft Azure, Openstack Swift, Google Cloud. If any additional hardware is required for cloud integration it should be quoted for the full capacity upfront	
2.21	Cloud Disaster Recovery	Cloud Disaster Recovery automatically makes the hidden snapshot to cloud, allowing administrators to use the last snapshot for roll-back.	
2.22	Deduplication / Compression	Support deduplication/compression feature before data migrate to cloud provider	
2.23	Software Features	Storage should support Automated Storage Tiering, SSD Cache, Thin Provisioning, Volume Mirror/Copy, Block level Remote replication, File level Remote Replication (Rsync), Snapshot.	
2.24	NVMe Flash Cache (RAID1)	Proposed storage should have at least 3TB NVMe Flash Cache in RAID1 for better Read/Write performance	
2.25	Power Supply	80 PLUS-certified power supplies delivering more than 80% energy efficiency	
2.26	Power Saving	Intelligent multi-level drive spin-down	
2.27	Environmental	Relative humidity: 5 to 95% non-condensing, operating and non-operating	
2.28	Warranty	Warranty 5 Years	

S/N	Description	Parameters	Qty
3	**24 Bay Storage (Dual Controller Unified Storage)**		1
3.1	Drive Side Connectivity	Proposed storage must have minimum 12G SAS Drive side connectivity, 12G SAS internal data bus, 12G SAS expansion ports	
3.2	Chassis & Architecture	Proposed storage should have symmetric active-active controllers, dual PSU and dual FAN module. System components like power supplies, cooling fans, controllers, host boards & storage drives should be modular in design to lower maintenance complexity.	
3.3	Controller CPU	Each controller should have 1x Intel (4 core) or higher CPU	
3.4	Controller Memory	Each controller should have at least 32GB & Expandable upto 192GB or more per controller	

3.5	Host Ports (25G)	Each controller should have 2 x 25G SFP28 ports,	
3.6	Modular Card Slots	Should have 2 numbers of replaceable modular Card Slot per controller and below Cards should be supported in each slot and possible to inter change the card without the need to change or upgrade the storage controller	
3.7	Supported Interface Cards	16Gb/s FC x 4 32Gb/s FC x 2 32Gb/s FC x 4 10GbE (SFP+) x 2 25GbE (SFP28) x 2 12Gb/s SAS x 2	
3.8	Front-end / Back-end Ports	Initially Quoted with at least 4x25GbE front end (data) ports with 25G SFP+ modules and cables & should have at least 4x12G SAS ports or more for back end ports.	
3.9	Drive Support	Support drives including SSD,SAS, SATA HDD in the same enclosure	
3.1	Supported Drive Types	2.5" SAS SSD 2.5" 12Gb/s SAS 10,000 RPM and 15,000 RPM HDD 3.5" 12Gb/s NL-SAS 7,200 RPM HDD 2.5" SATA SSD, 3.5" 6Gb/s SATA 7,200 RPM HDD	
3.11	Unified Storage Architecture & Protocols	Proposed storage should have true unified storage architecture. should support File, Block and Object storage within the same system and it should support Scale out feature with at least 4 appliances or more in single cluster (single namespace) without adding additional node, File Gateway or metadata controller for file level, cloud level access or for Scale out feature . All these protocols should be supported and licenses for full storage capacity should be quoted for the duration of the product lifecycle NFS, CIFS/SMB, AFP, FTP, SFTP, WebDAV, REST API, 1Gb/s, 10Gb/s and (RJ-45, SFP+), 10Gb/s FCoE, 8Gb/s, 16Gb/s Fibre Channel.	
3.12	File Share Access Control	Storage should be able to separate the File Level share folder control with file protocols for secure file sharing process (like share a folder on HTTP or FTP only and share another on CIFS or AFP only.	
3.13	Automated Support Request	Automated support request Proposed Storage should have option to automatically create support ticket with relevant logs with the OEM support in case of critical event.	
3.14	Storage Capacity	Storage Capacity: Should be quoted with minimum 160TB Raw with 7200RPM Enterprise class 12G SAS HDD, Individual drive capacity should not be more than 16TB. Storage should have provision to support additional 224TB storage capacity by using the same individual drive capacity	

		so there should be enough empty drive slots/bays available from day one.	
3.15	RAID Protection (IDR)	Storage should offer IDR or similar technology for superior RAID protection and recovery compared to generic RAID which helps increase integrity and system efficiency while keeping data secure against errors and loss.	
3.16	Scalability	System should be scalable to minimum 800 drives via expansion enclosure per appliance and per cluster at least 3200 drives via scale-out.	
3.17	File System & Volume Size	Support inbuilt file system which can support single volume size up to 2PB. License for full capacity should be quoted upfront	
3.18	Cloud Support	Cloud - Support cloud provider: Amazon S3, Aliyun, Microsoft Azure, Openstack Swift, Google Cloud. If any additional hardware is required for cloud integration it should be quoted for the full capacity upfront	
3.19	Cloud Disaster Recovery	Cloud Disaster Recovery automatically makes the hidden snapshot to cloud, allow administrator to use the last snapshot for roll-back.	
3.2	Deduplication / Compression	Support deduplication/compression feature before data migrate to cloud provider	
3.21	Software Features	Storage should support Automated Storage Tiering, SSD Cache, Thin Provisioning, Volume Mirror/Copy, Block level Remote replication, File level Remote Replication (Rsync), Snapshot.	
3.22	Power Supply	80 PLUS-certified power supplies delivering more than 80% energy efficiency	
3.23	Power Saving	Intelligent multi-level drive spin-down	
3.24	Environmental	Relative humidity: 5 to 95% non-condensing, operating and non-operating	
3.25	Warranty	Warranty 5 Years Onsite	

S/N	Description	Parameters	Qty
4	**Existing Infortrend NAS HDD Expansion**		1
4.1	HDD Bays / BOOT optimized storage	10TB HDD x 6 No's	

4.2	Networking Interfaces	10G SFP28 ports x 4 Nos (Multimode) populated with SR4 Fibre Modules	
4.3	Compatibility Clause	Must be compatible with existing NAS box	
S/N	**Description**	**Parameters**	**Qty**
5	**Server/Storage Interconnect Accessories**		1
5.1	Power Cables	Must supply required power cords as required for connection of all hardwares to power supply.	
5.2	Fiber Cables	Must supply required Fiber Patch Cords as required for connection of all hardwares including Storage servers to Fibre network switch & SAN Switch	
5.3	Patch Cords	Must supply required Patch Cords as required for connection of all hardwares management ports to Network switchs with UTP ports.	
S/N	**Description**	**Parameters**	**Qty**
6	**SAN switches**		2
6.1	Architecture/Scalability/Performance/Management/Availability:	Minimum Dual SAN switches shall be configured where each SAN switch shall be configured with a minimum of 48 Ports scalable to 64 ports.	
		Required scalability shall not be achieved by cascading the number of switches and shall be offered within the common chassis only	
		Should deliver 32 Gbit/Sec Non-blocking architecture with 1:1 performance for up to 64 ports in a energy-efficient fashion	
		Should protect existing device investments with auto-sensing 8, 16, and 32 Gbit/sec capabilities.	
		The switch shall support different port types such as E_Port, D_Port, AE_Port, F_Port & EX_Port	
		The switch should be rack mountable	
		Should provide enterprise-class availability features such as redundant and hot pluggable components like power supply and FAN	
		The switch shall provide Aggregate bandwidth of 2Tbps end	

		to end.	
		Offered switch shall not have latency more than 700 ns for locally switched ports.	
		Offered switch shall support at-least 15000 frame buffer with dynamic buffer sharing capability across ports.	
		Switch shall have support for web based management and should also support CLI.	
		The switch should have a USB port for firmware download, support save, and configuration upload/download.	
		Offered SAN switches shall be highly efficient in power consumption. Bidders shall ensure that each offered SAN switch shall consume less than 250 Watt of power.	
		Switch shall support POST and online/offline diagnostics, including RAStrace logging, environmental monitoring, non-disruptive daemon restart, FCping and Pathinfo (FC traceroute), port mirroring (SPAN port).	
6.2	Intelligent Networking:	Offered SAN switch shall support services such as Quality of Service (QoS) to help optimize application performance in consolidated, virtual environments. It should be possible to define high, medium and low priority QOS zones to expidite high-priority traffic	
		The switch shall be able to support ISL trunk up to 256 Gbit/sec between a pair of switches for optimal bandwidth utilization and load balancing.	
		SAN switch shall support to restrict data flow from less critical hosts at preset bandwidths.	
		It should be possible to isolate the high bandwidth data flows traffic to specific ISLs by using simple zoning	
		The Switch should be configured with the Zoning and shall support ISL Trunking features when cascading more than 2 numbers of SAN switches into a single fabric.	
		Offered SAN switches shall support to measure the top bandwidth-consuming traffic in real time for a specific port or a fabric which should detail the physical or virtual device.	
6.3	Warranty	5 Years Onsite Warranty	

S/N	Description	Parameters	Qty
7	**HBA (Host Bus Adapters) cards for existing servers and storages**		13

7.1	Type	Fibre Channel Host Bus Adapter (HBA), PCIe plug-in card	
7.2	Ports	Minimum 2 (dual-port) Fibre Channel ports per card	
7.3	Port Speed	32 Gb Fibre Channel per port, with auto-negotiation/backward compatibility to 16 Gb and 8 Gb	
7.4	Host Interface	PCI Express (PCIe) Gen 4.0, x8 lane width	
7.5	Form Factor	Low-profile plug-in card; should include both low-profile and full-height brackets	
7.6	Transceivers	Should be supplied with SFP+ transceivers (Short Wave, multi-mode LC) for both ports, included from day one	
7.7	Performance	Minimum 2 million IOPS and aggregate throughput of at least 12,800 Mbps (12.8 Gbps) across both ports	
7.8	Compatibility	Should Support existing Storage	

S/N	Description	Parameters	Qty
8	**PBS Application Server (Proxmox Backup server)**		1
8.1	Chassis	2U Rack Mountable	
8.2	CPU	Two numbers of 4th Generation Intel® Xeon® Scalable Processor with 16 Core each and server must support 16/28/32/36/40/44/48/52/56/60 Cores.	
8.3	Chipset	Intel® C741 Chipset	
8.4	Memory	32DIMM slots. 32GB*4 DIMMS or 64GB *2 scalable upto 8.0 TB using DDR5 Registered Smart Memory DIMM (RDIMM) operating at 4800 MT/s	
8.5	Bus Slots	Server should support upto eight PCI-Express 5.0 x16 slots. Additional two x8 or higher PCIe 5.0 slots	
8.6	HDD Bays / BOOT optimized storage	Upto 30 SFF SAS/SATA/SSD/NVMe 1.92TB * 2 NCMe SSD Drives	
8.7	Controller	On-board Embedded x 16 RAID controller which supports for raid 0, 1, 5, 6, 10, 50, 60 from day one with min. 24Gbps port speed and 8GB cache with support for Secure encryption/data at rest Encryption. Also, the controller must support Mixed Mode which combines RAID and HBA mode operation simultaneously and support 6G SATA, 12G/24G SAS, Gen 3/Gen4 16G NVMe. The disk must be directly visible to OS if not included in RAID. RAID controller should	

		support standard drivers coming in Debian, Centos/RHEL, Proxmox.	
8.8	Networking features	1Gb 4-port OCP3 network adapter & 10GB 2 Port OCP3 Base network adapter & 2Port 16Gbps FC Card & 25G Multimode 4 port card with multimode modules must be configured Server should support below networking cards for future requirement 1. 1Gb 4-port network adaptors - 2. 10Gb 2-port Ethernet - 3. 10GBaseT 2-port Ethernet adaptor 4. 10/25Gb 2-port SFP28 Ethernet adaptor 5. 10/25Gb 4-port SFP28 Ethernet adaptor 6. 100Gb 2-port QSFP28 Ethernet 7. 100Gb 1-port QSFP56 Ethernet 8. 100Gb 2-port QSFP56 Ethernet 9. 200Gb QSFP56 Ethernet 10. Pensando Distributed Services Platform DSC-25 Enterprise 10/25Gb 2-port SFP28 Card Infiniband Options: 100Gb or 200Gb Single or Dual port Adapter	
8.9	Interfaces	USB 3.0 support with Up to 5 total: 1 front, 2 rear, 2 internal. 1GbE Dedicated management port	
8.1	Power Supply	Should support hot plug redundant low halogen power supplies with minimum 94% efficiency	
8.11	Fans	Redundant hot-plug system fans	
8.12	Industry Standard Compliance	ACPI 6.3 Compliant PCIe 5.0 Compliant WOL Support Microsoft® Logo certifications PXE Support Energy Star SMBIOS 3.2 UEFI 2.7 Redfish API IPMI 2.0 Secure Digital 4.0 Advanced Encryption Standard (AES) Triple Data Encryption Standard (3DES) SNMP v3 TLS 1.2 DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP)	

		Active Directory v1.0 ASHRAE A3/A4	
8.13	System Security	UEFI Secure Boot and Secure Start support Tamper-free updates - components digitally signed and verified Immutable Silicon Root of Trust Ability to rollback firmware FIPS 140-2 validation Secure erase of NAND/User data Common Criteria certification TPM (Trusted Platform Module) 1.2 option Configurable for PCI DSS compliance TPM (Trusted Platform Module) 2.0 option Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser Bezel Locking Kit option Support for Commercial National Security Algorithms (CNSA) Chassis Intrusion detection option Secure Recovery - recover critical firmware to known good state on detection of compromised firmware	
8.14	Operating Systems and Virtualization Software Support	Windows Server. Red Hat Enterprise Linux (RHEL) SUSE Linux Enterprise Server (SLES) VMware ESXi. Canonical Ubuntu Oracle Linux and Oracle VM Citrix, Proxmox	
8.15	Provisioning	1. Should support tool to provision server using RESTful API to discover and deploy servers at scale 2, Provision one to many servers using own scripts to discover and deploy with Scripting Tool (STK) for Windows and Linux or Scripting Tools for Windows PowerShell	

8.16	Firmware security	1. For firmware security, system should support remote management chip creating a fingerprint in the silicon, preventing servers from booting up unless the firmware matches the fingerprint. This feature should be immutable 2. Should maintain a repository for firmware and drivers recipes to aid rollback or patching of compromised firmware. Should also store Factory Recovery recipe preloaded to rollback to factory tested secured firmware	
8.17	Embedded Remote Management and firmware security	1. System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for multifactor authentication 2. Server should have dedicated 1Gbps remote management port 3. Server should have storage space earmarked to be used as a repository for firmware, drivers and software components. The components can be organized in to install sets and can be used to rollback/patch faulty firmware 4. Server should support agentless management using the out-of-band remote management port 5. The server should support monitoring and recording changes in the server hardware and system configuration. It assists in diagnosing problems and delivering rapid resolution when system failures occur 6. Two factor Authentication 7. Local or Directory-based user accounts with Role based access control 8. Remote console sharing upto 6 users simultaneously during pre-OS and OS runtime operation, Console replay - Console Replay captures and stores for replay the console video during a server's last major fault or boot sequence. Microsoft Terminal Services Integration, 128 bit SSL encryption and Secure Shell Version 2 support.Should provide support for AES and 3DES on browser.Should provide remote firmware update functionality.Should provide support for Java free graphical remote console. 9. Should support managing multiple servers as one via Group Power Control Group Power Capping Group Firmware Update Group Configuration Group Virtual Media and Encrypted Virtual Media Group License Activation 10. Should support RESTful API integration 11. System should support embedded remote support to transmit hardware events directly to OEM or an authorized partner for automated phone home support 12. Server should have security dashboard : displaying the	

		status of important security features, the Overall Security Status for the system, and the current configuration for the Security State and Server Configuration Lock features. 13. One-button Secure Erase designed to decommission/repurpose servers 14. NVMe wear level display 15. Workload Performance Advisor - Provides server tuning recommendations to improve server performance	
8.18	Server Management	Software should support dashboard view to quickly scan the managed resources to assess the overall health of the data center. It should provide an at-a-glance visual health summary of the resources user is authorized to view.	
		The Dashboard minimum should display a health summary of the following: • Server Profiles • Server Hardware • Appliance alerts	
		The Systems Management software should provide Role-based access control	
		Zero Touch Provisioning (ZTP) using SSDP with remote access	

		Management software should support integration with popular virtualization platform management software like Vmware vCenter & vRealize Operations, and Microsoft System Center & Admin Center	
		Should help provide proactive notification of actual or impending component failure alerts on critical components like CPU, Memory and HDD.	
		Should provide an online portal that can be accessible from anywhere. The portal should provide one stop, online access to the product, support information and provide information to track warranties, support contracts and status. The Portal should also provide a personalised dashboard to monitor device heath, hardware events, contract and warranty status. Should provide a visual status of individual devices and device groups. The Portal should be available on premise (at our location - console based) or off premise (in the cloud).	
		Should help to proactively identify out-of-date BIOS, drivers, and Server Management agents and enable the remote update of system software/firmware components.	
		Should have dashboard for firmware baselines while performing minimum required firmware checks and highlighting out-of-compliance devices for updates with the selected firmware baseline	
		The Server Management Software should be of the same brand as of the server supplier.	
8.19	Cloud Enabled Monitoring and Management	1. Secure connection from customer sites to HPE cloud service 2. Unified Identity & Access Management 3. Manages and controls servers regardless of physical location 4. Subscription-based entitlement 5. Efficient Device Onboarding 6. Firmware Update Awareness with Intelligent delta-only based updates 7. Set Group firmware Baseline and Compliance monitoring and notification 8. Group based firmware management that can be scheduled or on-demand 9. Remote Site management with low bandwidth/high latency network connectivity 10. Role-based access and views for managed customer environments 11. GUI and Rest APIs for core features	
8.2	Warranty	5 Years Onsite	

S/N	Description	Parameters	Qty
9	**Network Fibre Switch (ToR-48 port) :**		1
9.1	Form Factor	1U or 2U or Chassis based, Rack mountable Ethernet switch with 1RU form	
9.2	Architecture	Non-Blocking architecture .Should support Modular Operating system.	
9.3	IPV6 Compliance	All Functionalities of Switch shall be IPV4 and IPv6 compliant and it should work on IPv6 Platform without any additional hardware/ software.	
9.4	End of sale	OEM End-of-sale declaration shall not have been released for the quoted model at the time of the bid submission.	
9.5	Latest OS version	The switch shall be supplied with the latest OS version .	
9.6	Feature Availability	All the specified features/parameters/certifications must be available on the Technical Bid opening date. Features /parameters /certifications proposed to be available in near future / on roadmap shall not be considered.	
9.7	Advance Layer 3 Support	PIM DM/SM/SSM,OSPF,BGP,MBGP,IS-IS should be supported on IPv4 and IP V6 platform,	
9.8	Data Center Features	Switch should support DCBx Data Center Bridging Exchange Protocol,Priority Flow Control (PFC),Enhanced Transmission Select ion (ETS)	
9.9	**Interface Specifications:**		
	Ports	Should support at least 48 x 1Gb/10Gb/25Gb SFP28 ports with min 8 x 40Gb/ 100Gb QSFP28 ports should be available from day 1. Stacking should be supported upto 6 or more switches.	
	SFP Transceivers	All the Transceivers/Modules used to connect the Switches should be from the same OEM/make of the switches only.switch should support 10GBASE-T models. 25G multimode transceivers should be fully loaded along with switches. Plus 2 x 40G Single mode transreceiver for uplink.	
	Port status display	Each port must have a dedicated LED for status display.	
	Telecom standard	MTCTE Certified	
9.1	**Hardware Specifications:**		
	Switching Capacity	4 Tbps or more	
	Forwarding rate and latency	1000 Mpps or more ,Average Latency: 800 ns or better	

	MAC Addresses	280K or more,	
	VLANs (802.1q tagged VLAN)	4000 or more	
	IPv4 Routes/Entries/Scale	250K or more	
	IPv6 Routes/Entries/Scale	100K or more	
	IP Multicast Entries (S,v,G)	90K or more	
	Memory and peripheral capacity	16GB RAM or more, 128GB SSD or more	
	Packet Buffers	32MB or more	
9.11	**Standards and Protocols**		
	L2 Loop Protection	IEEE 802.1d Spanning tree protocol	
		802.1s MSTP (Multiple instances of STP)	
		802.1w RSTP (Rapid spanning tree)	
	Link Aggregation	802.3ad Link Aggregation	
	QOS Support	At least 8 nos of 802.1p Priority Queues per port and 802.1BA	
	IP Multicast	IGMP Snooping, MLD v1/v2 support	
	Port Mirroring / Span port	Port mirroring must be available.	
9.12	**Routing Features**		
	Routing Protocols:	The switch shall have hardware based forwarding for IPv4 & IPv6.	
		Following protocols shall be supported with IPv4/IPv6: Static routing, PBR, RIPv2, OSPFv2/v3,BGP	
		The switch shall have Dual stack mode to run both IPv4 & IPv6	
		Generalized Precision Time Protocol (GPTP) , Multiple VLAN Registration Protocol (MVRP) , Multiple Stream Registration Protocol (MSRP).	
	Router redundancy	Shall support VRRP all versions , for IPV4 and IPV6.	
	Network Login	MAC and 802.1 X based Login must be available	
	Port Security	MAC Address based Lockdown and Limited Learning or equivalent	

	Access Control Lists:	L2/L3/L4 IP based, Source port, destination port, MAC based	
	AAA (authentication, authorization and accounting)	AAA using RADIUS and TACACS+ must be available	
9.13	**Management and Monitoring:**		
	Management	Following in-band management methods shall be available:	
		Secure Web based management (On https)	
		SSH based management (SSH v2).	
	Out-of-band management	Following out-of-band management methods shall be available:	
		Serial console port	
		Management ethernet port .Dedicated OOB port	
	Role based Administration	The switch shall support multiple administrator accounts. Each administrator account shall be configurable with the desired level of management privileges.	
	Remote Monitoring	Should support RMON , ITU- Y.1731,IEEE 802.1ag	
		Ability of VM-based applications to extract data without disrupting forwarding or control plane traffic.Should support integrated application hosting on the switch.	
	Network Management	The switch should support SNMP V2c and V3, XML API	
	Log Management	Syslog shall be supported with multiple syslog destinations.	
	Flow export	Shall support Netflow/IPFIX/sflow for flow exports.	
	Time synchronization	Time synchronization using Network time protocol must be available.	
	Configuration backup & restore	The switch shall have feature of backing up the configuration & restoring a backed- up configuration. Multiple Configuration files must be supported.	
	TFTP/FTP upload and download	Config/image upload and download from TFTP/FTP server shall be available.	
9.14	**Other Requirements:**		
	Interface cables and other features	Shouls be supplied with Indian power cords along with all stacking accessories from day 1.	

		switch should support VxLAN Tunneling End Point (VTEP),DCBx Data Center Bridging Exchange Protocol,Priority Flow Cont rol (PFC),Enhanced Transmission Select ion (ETS), switch should support MPLS as future scalability.	
	Power Supply & FAN	Hot -swappable modular power and fans,AC and DC power supply options should be supported on the same switch on day 1	
	Regulatory and Safety	Should support regulatory and safety standards,EMI/EMC standards and Environmental Compliance/standards.	
	Environmental conditions	The offered equipment must be able to operate in the following environmental conditions	
		¨ Operating temperature: 0°C to 45°C	
		¨ Relative Humidity: 5% to 95% Non-condensing	
	Electromagnetic interference	The Offered equipment shall have FCC certification.	
	Stacking	All the switches should be stackable with existing network switches.	
	OEM Criteria and Support	All the switches, the fiber modules should be from the same OEM. The OEM should have R&D center in India. should have India Toll free number with India TAC center to provide L1/L2,L3 support.Switch should be support seamless integration with existing Extreme switches of 7520.,X690 and X695 series.	

Additional Terms and Conditions:

MANDATORY TERMS AND CONDITIONS:

1. Regarding New Servers :- IITB already has existing Servers and the new Servers should be configurable with the existing cluster of servers.
2. Regarding New SAN Switches :- IITB already has existing SAN switches and the new SAN switches should be stackable with the existing SAN switches.
3. Regarding HBA cards :- IITB already has servers and HBA cards should be compatible with existing servers.
4. Regarding Network fiber switch :- IITB has existing fiber switches and new fiber switch should be stackable with existing fiber switches.
5. IITB already has an existing Infortrend NAS box and new HDDs (to be added) should be compatible with it.

GENERAL TERMS AND CONDITIONS:

1. Bidders are advised to read all the clauses mentioned in the tender carefully. Submitting your bid implies that you agree to act as per the terms and conditions mentioned in the tender.
2. The bidder shall bear all the costs during the preparation and submission of the proposal, site visit (if required), etc.
3. The bidders may be requested to come to IIT Bombay and present the solution proposed in their technical bids.
4. IIT Bombay may ask for clarifications, if required, on submitted information, in order to evaluate the bid. The bidder should respond to such a clarification request within 2 working days.
5. The bidder has to quote for all the items mentioned in the specification. On failing to do the same, IITB may invalidate the bid and disqualify the bidder.
6. The quoted product must be the most recent or currently supported models, and that they incorporate all recent improvements in design and materials. On failing to do the same, IITB may invalidate the bid and disqualify the bidder.
7. Due to a stringent deadline for incurring the expenditure, IIT Bombay has the right to cancel the PO or charge the penalty if the delivery, installation, and acceptance testing is not completed within the stipulated timeline. Specifically
8. Delivery should be within 8 weeks of issuing of PO.
9. Installation, commissioning, and acceptance testing should be completed within three to four weeks of the delivery.
10. At the time of installation, if it is found that some additional hardware or software items are required to meet the operational requirement of the configuration but not included in the OEM's original list of deliverables, the OEM/Vendor shall supply such items to ensure the completeness of the configuration at no additional cost.
11. Bidders should submit only the necessary documentation related to this tender with a proper index highlighting the required technical specs in the product documentation that matches the tender specs or asked by the purchaser with page numbers. Failure to do the same will invalidate the bid and result in disqualification.
12. Bidder is not allowed to outsource any work mentioned in the scope of work for this tender to any third party.
13. Along with the technical bid, the bidder has to submit the compliance sheet as per the given format and complete bill of material (BoM). Failure to do the same will invalidate the bid and result in disqualification.
14. The bidder has to submit an Undertaking as acceptance of all terms & conditions along with the technical bid on the company's letterhead as per the given format. Failure to do the same will invalidate the bid and result in disqualification.
15. The bidder has to give an undertaking of authenticity along with the technical bid on the company's letterhead as per the given format. Failure to do the same will invalidate the bid and result in disqualification.
16. IIT Bombay reserves the right to accept or reject, all the offers if a) Seller/OEM fails to comply with any material term of the contract; b) Seller/OEM fails to deliver the material(s) or any

part thereof within the stipulated delivery period and /or fails to replace/ rectify any rejected or defective material(s) promptly; c) Seller/OEM becomes bankrupt or goes into liquidation; d) Seller/OEM has misrepresented to buyer.

17. IIT Bombay also reserves the right to re-issue the tender. The bidders will not have any right to object to such re-issue of tender.

Bidder eligibility Criteria:

S.No.	Qualifying Criteria	Mandatory Document proof to be furnished
1.	The bidder should be an Indian Company registered under the Companies Act / Partnership/ LLP and should have presence atleast from the last 3 to 5 years in a similar line of business, i.e., installation, configuration, and commissioning of Enterprise series IT equipment. In case the Bidding Company is the result of a merger/acquisition, at least one of the merging companies should have been in operation for atleast 3 to 5 years as on the date of submission of the bid.	Copy of the Partnership deed/Bye Law/Certificate of Incorporation issued by Registrar of Companies and Memorandum & Articles of Association and full address of the registered office.
2.	The bidder should have supplied at least three orders of Enterprise storage from a reputed OEM like HPE, DELL-EMC, Hitachi, Infortrend or substantially equivalent to State/Central Government/PSUs or any listed corporate company in the last three years.	Purchase order copies along with satisfactory work completion certificate/ Final Acceptance certificate issued by Client. Relevant Purchase Orders received in the last three years.
3.	The bidder should have at least two qualified and experienced Storage Engineers/professionals on its payroll with a minimum experience of 5 years in handling storage devices from reputed brands.	Bio-data of the personnel proposed to be deployed for the project.
4.	Bidder has to be an OEM or partner authorized by OEM for this tender.	Bidders should furnish a letter of authorization (MAF) from OEM for this tender as per the given format.
5.	The Bidder should have an average annual turnover of ₹ 3 Crores and should be a positive net worth company for the last three financial years.	The Audited Financial Statements (Profit and loss statement, Balance sheet) for the last three years and CA certificate should be furnished/ uploaded.

		Solvency certificate for the value of ₹4 Crores issued by Scheduled Banks to be furnished.
6.	The bidder should be an ISO 9001 certified company at least for the last three years.	The ISO certificate should be enclosed.
7.	Bidders should have an office/branch in the MMR region.	Any government-approved proof should be provided.
8.	The bidder should not have been blacklisted by any department of IIT Bombay, or by any other IIT, or by any state or central government body or organization, or by an autonomous body governed by state or central government during the past 3 years.	Self-declaration should be given on the company's letterhead.

OEM QUALIFICATION CRITERIA:

S.No.	Qualifying Criteria	Mandatory Document proof to be furnished
1.	The OEM should be in the Gartner leader's magic quadrant for all-flash storage, at least for the last three years.	URLs of OEM and Gartner website should be provided or the OEM should submit a self-declaration with all the details mentioned on the company letterhead.
2.	The OEM of quoted products should preferably have its own corporate office or parts warehouse and service centre or RMA depot in the MMR region with fully qualified engineers.	Should submit any government authorized document which will prove this or should provide the OEM website URLs where this information is published.
3.	The OEM should be well equipped and located to honor 4 hours of response time in case of failures.	The OEM should submit a self-declaration with all the details mentioned on the company letterhead.
4.	The OEM should be well established at least from the last 20 years in enterprise series of storage devices and should have a global footprint.	Should submit any government authorized document which will prove the establishment of OEM/Brand and or copy of PO needs to be attached.
5.	The OEM should have a direct presence in India at least from the last 10 years.	Should submit any government authorized document which will prove

		the establishment of OEM/Brand and or copy of PO needs to be attached.
6.	The OEM should have at least 25 Crores average annual turnover from the last 3 consecutive years.	The Audited Financial Statements (Profit and loss statement, Balance sheet) for the last three years and CA certificate should be furnished/ uploaded OR a duly signed and stamped self-declaration on company letterhead.
7.	The OEM should have their own 24x7 technical support center in India and the technical support resources should be on direct rolls with the OEM.	Should submit any government authorized document which will prove this or should provide the OEM website URLs where this information is published or The OEM should submit a self-declaration with all the details mentioned on his letterhead.
8.	The OEM should not be from a country that shares a land border with India.	Declaration to be submitted
9.	The OEM should not have been blacklisted by any department of IIT Bombay, or by any other IIT, or by any state or central government body or organization, or by an autonomous body governed by state or central government during the past 5 years.	Self-declaration should be given on company letterhead.

TENDER EVALUATION:

The competent authority will evaluate all the proposals to determine whether these are complete in all respects as specified in the tender document. Evaluation of the proposal shall be done in two stages as:

(a) Stage - I (Technical Evaluation):

1. The competent authorities will evaluate the technical bid(s) to determine whether they are meeting the essential eligibility criteria, whether the tenderer has submitted the EMD undertaking, whether any computational errors have been made, whether all the documents have been appropriately signed & stamped, whether all the documents as mentioned / or required to be submitted with technical bid are submitted and whether a bid is complete and generally is in order. There will not be any further technical evaluation in case of incomplete bid, and the bidder will be disqualified.

2. After completing the technical evaluation of proposed switches, and references, the competent authority will qualify bidder(s) who have complied with all the tender specifications.

(b) Stage- II (Financial evaluation):

- The bidders who have cleared /qualified the technical evaluation only their commercial bid will be opened.
- The details of the commercial bid opening will be informed to the short-listed bidder(s) at a later date.
- Bidders should quote a single figure which includes all the cost of the project only in INR. The successful bidder will submit the item-wise bifurcation of the single figure quoted and an item-wise cost breakup within 24 hours from latest email communication.

EVALUATION MATRIX:

A set of attributes pertaining to the equipment have been given in the form of a compliance sheet. The purchase committee at IIT Bombay will check the quoted product is matching with the tender specifications. The evaluation will be done based on the documentation, details, and remarks given by the bidder and from the OEM website. The bidder/OEM will be disqualified if the quoted product is not complying with any of the tender specifications.

SCOPE OF WORK:

1. The selected Bidder has to supply the listed items within the stipulated time.
2. The selected Bidder has to deploy, install, configure and test the storage boxes as per specification mentioned in the tender at Computer Centre's Data Centre in accordance with the technical team of Computer Centre IITB. The scope of the work at this phase would include but not restricted to the following:
   A. Site Inspection and Bill of Material Verification.
   B. Rack Mounting and Stacking of the Server, Storage devices & Network Switches.
   C. Structured cabling of OFC, CAT6a/CAT7 and power and any other required cabling and enclosing via flexible pipes wherever necessary with design approval from Technical staff assigned by Computer Centre IIT Bombay.
   D. Labelling for each and every cable and its diagram and documentation.
   E. Storage Power on Self/Burn-In/Stress Test activity –Minimum 48 Hours
   F. Replacement of hardware if any fault is observed.
   G. License installation.
   H. Firmware upgradation.
   I. Management IP and user configuration.
   J. Explanation of the configuration, and providing howtos and best practices on various configurations.
   K. Final acceptance from the technical team of the purchaser.

3. The Bidder has to ensure that the proposed equipment/components must not be declared "End of Life" or "End of Support" for the next 6 years from the date of purchase. Suppose the supplied equipment is declared End of Support/End of Life during the warranty period of 5 years. In that case, the bidder/OEM has to replace the equipment having equivalent or higher configurations without any additional cost to the purchaser.
4. The Bidder should have a back to back contract with the OEM so that the purchaser will be able to log a call with the OEM directly for the contract period of 7 years.
5. Single Point of Contact: The selected Bidder shall appoint a single point of contact, with whom IIT Bombay will deal with any activity pertaining to the requirements of this Tender. The Bidder has to award all the necessary authority to this person at its own expense.

Payment Terms:

Servers, Storage and Switches: The payment will be made after successful installation of these equipment.

WARRANTY & SLA:

1. Each and every component of the supplied equipment, security keys, accessories, and licenses should have an on-site comprehensive 24x7x365 days warranty for 5 years with 4 hours of response time. No parts, accessories, licenses of the systems should be excluded from such warranty.
2. The said warranty will begin from the date of acceptance and sign-off from the technical team of IIT Bombay.
3. The bidder will be fully responsible for getting support from OEM in respect of each and every Hardware part, Software, Licenses, and technical support for the equipment mentioned in this tender. In case the bidder fails to provide the support, OEM has to provide technical support for the period mentioned in the contract. The bidder has to attach a confirmation letter from the OEM.
4. The said warranty should not be considered violated if the IIT Bombay buys any other compatible supplemental hardware from a third party and installs it in the machines with an intimation to the Bidder.
5. Mean time between failures (MTBF): If during the warranty period, any storage fails four or more occasions and caused downtime in a period of less than three months or six times in a period of less than twelve months, it shall be replaced by equivalent or better configured and robust new storage device by the Bidder/OEM at no additional cost to the IIT Bombay.
6. The Bidder will depute an experienced engineer as and when required to visit the site and assist the staff during the initial configuration and/or during the failure and ensure the system's proper functioning.
7. The Root Cause Analysis (RCA) faced for any issues related to the system should be provided by the OEM within 3 Business Days.
8. If any component supplied by the Bidder/OEM is inoperative, which renders the entire system useless, then it will be treated as system downtime.
9. Any hardware issues should be resolved/rectified within 24 hours. It is the responsibility of Bidder

to coordinate with the OEM to provide a replacement.

10. Along with the technical bid, the OEM should submit a letter of commitment for **5 years (60 months of warranty)** from the installation date, with respect to Hardware, Software, and Firmware support. The bid will be rejected if not accompanied by the letter from the OEM.
11. In case of merger/sale of business by the OEM, the above-said warranty, and SLA will be applicable to the new OEM. If the new OEM does not honor the said warranty, and SLA, the IIT Bombay reserves the right to debar the bidder or the OEM (whosoever participate in the tender) and reserve the right to take proper legal action. The OEM has to accept this clause in the commitment letter. Failure of the same may result in disqualification of the bid.

PENALTY:

1. Delivery of all equipment should be within 8 weeks from the date of Purchase Order. In the event of any or all equipment(s) not being delivered, installed, tested, and commissioned within a period of 10 weeks from the date of Purchase Order, a penalty of 0.5 percent of the total cost of equipment for each week of the delay will be charged to the bidder. The maximum penalty will be 10%. This amount of penalty so calculated shall be deducted at the time of making final payment after successful installation and commissioning of hardware.
2. Penalty during the warranty period period:
   The PBG being submitted will be forfeited against the penalty and the bidder will be debarred for the period as per procurement rule.
3. The IIT Bombay reserves the right to publish the information about the unsatisfactory service by the bidder/OEM and action taken by the institute on their website and in the national newspaper (s).

Annexure

(To be given on the company's letterhead)

Date:

To, Dy. Registrar (MM)
IIT Bombay,
Powai, Mumbai – 400076.

Sub: Undertaking of Authenticity for Hardware and/or Software
Supplies Tender Reference No.: _____

Dear Sir,

With reference to the equipment being quoted to you vide our Quotation No: _____ dated _____, we hereby confirm that all the components, parts, assembly, software, etc. used in the equipment to be supplied shall be original new components/parts/assembly/software and of the most recent or current supported models, and that they incorporate all recent improvements in design and materials, only from respective OEMs of the products and that no refurbished / duplicate / second-hand components /parts/assembly/software shall be supplied or shall be used.

1. We also undertake to produce a certificate from the Original Equipment Manufacturers (if required by you) to support the above statement at the time of delivery/installation.

2. We also confirm that in respect of licensed operating systems and other software utilities to be supplied, the same will be procured from authorized sources and provided with an Authorized License Certificate
3. In case of default and the purchaser finds that the above conditions are not complied with, we agree to take back the equipment supplied and return the money paid by you, in full within seven days of intimation of the same by the purchaser, without demur or any reference to a third party and without prejudice to any remedies the purchaser may deem fit.
4. In case of default and we are unable to comply with the above at the time of delivery or during installation, for the IT Hardware / Software already billed, we agree to take back the equipment without demur if already supplied and return the money if any paid to us by you in this regard.
5. We also take full responsibility for both parts & Service SLA as per the content even if there is any defect by our authorized Service Centre / Reseller / SI.

Dated this ..... day of 202…

_____

(Signature) (Name) (In the capacity of)

Duly authorised to sign Bid for and on behalf of _____

Annexure

COMPLIANCE SHEET

S/N	Description	Parameters	Bidder Compliance/ Remark
1	**Application Server**		
1.1	Chassis	2U Rack Mountable	
1.2	CPU	Two numbers of 4th Generation Intel® Xeon® Scalable Processor with 16 Core each and server must support 16/28/32/36/40/44/48/52/56/60 Cores.	
1.3	Chipset	Intel® C741 Chipset	
1.4	Memory	32DIMM slots. 32GB*4 DIMMS or 64GB *2 scalable upto 8.0 TB using DDR5 Registered Smart Memory DIMM (RDIMM) operating at 4800 MT/s	
1.5	Bus Slots	Server should support upto eight PCI-Express 5.0 x16 slots. Additional two x8 or higher PCIe 5.0 slots	
1.6	HDD Bays / BOOT optimized storage	Upto 30 SFF SAS/SATA/SSD/NVMe 1.92TB * 2 NCMe SSD Drives	
1.7	Controller	On-board Embedded x 16 RAID controller which supports for raid 0, 1, 5, 6, 10, 50, 60 from day one with min. 24Gbps port speed and 8GB cache with support for Secure encryption/data at rest Encryption. Also, the controller must support Mixed Mode which combines RAID and HBA mode operation simultaneously and support 6G SATA, 12G/24G SAS, Gen 3/Gen4 16G NVMe. The disk must be directly visible to OS if not included in RAID. RAID controller should support standard drivers coming in Debian, Centos/RHEL, Proxmox.	
1.8	Networking features	1Gb 4-port OCP3 network adapter & 10GB 2 Port OCP3 Base network adapter & 2Port 16Gbps FC Card & 25G Multimode 4 port card with multimode modules must be configured Server should support below networking cards for future requirement 1. 1Gb 4-port network adaptors - 2. 10Gb 2-port Ethernet - 3. 10GBaseT 2-port Ethernet adaptor 4. 10/25Gb 2-port SFP28 Ethernet adaptor 5. 10/25Gb 4-port SFP28 Ethernet adaptor 6. 100Gb 2-port QSFP28 Ethernet 7. 100Gb 1-port QSFP56 Ethernet 8. 100Gb 2-port QSFP56 Ethernet 9. 200Gb QSFP56 Ethernet 10. Pensando Distributed Services Platform DSC-25 Enterprise 10/25Gb 2-port SFP28 Card	

		Infiniband Options: 100Gb or 200Gb Single or Dual port Adapter	
1.9	Interfaces	USB 3.0 support with Up to 5 total: 1 front, 2 rear, 2 internal. 1GbE Dedicated management port	
1.1	Power Supply	Should support hot plug redundant low halogen power supplies with minimum 94% efficiency	
1.11	Fans	Redundant hot-plug system fans	
1.12	Industry Standard Compliance	ACPI 6.3 Compliant PCIe 5.0 Compliant WOL Support Microsoft® Logo certifications PXE Support Energy Star SMBIOS 3.2 UEFI 2.7 Redfish API IPMI 2.0 Secure Digital 4.0 Advanced Encryption Standard (AES) Triple Data Encryption Standard (3DES) SNMP v3 TLS 1.2 DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP) Active Directory v1.0 ASHRAE A3/A4	

1.13	System Security	UEFI Secure Boot and Secure Start support Tamper-free updates - components digitally signed and verified Immutable Silicon Root of Trust Ability to rollback firmware FIPS 140-2 validation Secure erase of NAND/User data Common Criteria certification TPM (Trusted Platform Module) 1.2 option Configurable for PCI DSS compliance TPM (Trusted Platform Module) 2.0 option Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser Bezel Locking Kit option Support for Commercial National Security Algorithms (CNSA) Chassis Intrusion detection option Secure Recovery - recover critical firmware to known good state on detection of compromised firmware	
1.14	Operating Systems and Virtualization Software Support	Windows Server. Red Hat Enterprise Linux (RHEL) SUSE Linux Enterprise Server (SLES) VMware ESXi. Canonical Ubuntu Oracle Linux and Oracle VM Citrix, Proxmox	
1.15	Provisioning	1. Should support tool to provision server using RESTful API to discover and deploy servers at scale 2, Provision one to many servers using own scripts to discover and deploy with Scripting Tool (STK) for Windows and Linux or Scripting Tools for Windows PowerShell	
1.16	Firmware security	1. For firmware security, system should support remote management chip creating a fingerprint in the silicon, preventing servers from booting up unless the firmware matches the fingerprint. This feature should be immutable 2. Should maintain repository for firmware and drivers recipes to aid rollback or patching of compromised firmware. Should also store Factory Recovery recipe preloaded to rollback to factory tested secured firmware	

1.17	Embedded Remote Management and firmware security	1. System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for multifactor authentication 2. Server should have dedicated 1Gbps remote management port 3. Server should have storage space earmarked to be used as a repository for firmware, drivers and software components. The components can be organized in to install sets and can be used to rollback/patch faulty firmware 4. Server should support agentless management using the out-of-band remote management port 5. The server should support monitoring and recording changes in the server hardware and system configuration. It assists in diagnosing problems and delivering rapid resolution when system failures occur 6. Two factor Authentication 7. Local or Directory-based user accounts with Role based access control 8. Remote console sharing upto 6 users simultaneously during pre-OS and OS runtime operation, Console replay - Console Replay captures and stores for replay the console video during a server's last major fault or boot sequence. Microsoft Terminal Services Integration, 128 bit SSL encryption and Secure Shell Version 2 support.Should provide support for AES and 3DES on browser.Should provide remote firmware update functionality.Should provide support for Java free graphical remote console. 9. Should support managing multiple servers as one via Group Power Control Group Power Capping Group Firmware Update Group Configuration Group Virtual Media and Encrypted Virtual Media Group License Activation 10. Should support RESTful API integration 11. System should support embedded remote support to transmit hardware events directly to OEM or an authorized partner for automated phone home support 12. Server should have security dashboard : displaying the status of important security features, the Overall Security Status for the system, and the current configuration for the Security State and Server Configuration Lock features. 13. One-button Secure Erase designed to decommission/repurpose servers 14. NVMe wear level display 15. Workload Performance Advisor - Provides server tuning recommendations to improve server performance	

1.18	Server Management	Software should support dashboard view to quickly scan the managed resources to assess the overall health of the data center. It should provide an at-a-glance visual health summary of the resources user is authorized to view.	
		The Dashboard minimum should display a health summary of the following: • Server Profiles • Server Hardware • Appliance alerts	
		The Systems Management software should provide Role-based access control	
		Zero Touch Provisioning (ZTP) using SSDP with remote access	
		Management software should support integration with popular virtualization platform management software like Vmware vCenter & vRealize Operations, and Microsoft System Center & Admin Center	
		Should help provide proactive notification of actual or impending component failure alerts on critical components like CPU, Memory and HDD.	
		Should provide an online portal that can be accessible from anywhere. The portal should provide one stop, online access to the product, support information and provide information to track warranties, support contracts and status. The Portal should also provide a personalised dashboard to monitor device heath, hardware events, contract and warranty status. Should provide a visual status of individual devices and device groups. The Portal should be available on premise (at our location - console based) or off premise (in the cloud).	
		Should help to proactively identify out-of-date BIOS, drivers, and Server Management agents and enable the remote update of system software/firmware components.	
		Should have dashboard for firmware baselines while performing minimum required firmware checks and highlighting out-of-compliance devices for updates with the selected firmware baseline	
		The Server Management Software should be of the same brand as the server supplier.	

1.19	Cloud Enabled Monitoring and Management	1. Secure connection from customer sites to HPE cloud service 2. Unified Identity & Access Management 3. Manages and controls servers regardless of physical location 4. Subscription-based entitlement 5. Efficient Device Onboarding 6. Firmware Update Awareness with Intelligent delta-only based updates 7. Set Group firmware Baseline and Compliance monitoring and notification 8. Group based firmware management that can be scheduled or on-demand 9. Remote Site management with low bandwidth/high latency network connectivity 10. Role-based access and views for managed customer environments 11. GUI and Rest APIs for core features	
1.2	Warranty	5 Years Onsite	

S/N	Description	Parameters	
2	**40 Bay Storage (Dual Controller Unified Storage)**		
2.1	Drive Side Connectivity	Proposed storage must have minimum 12 G SAS Drive side connectivity, 12 G SAS internal data bus, 12 G SAS expansion ports	
2.2	Chassis & Architecture	Proposed storage should have maximum 4U Rack Mount Chassis with symmetric active-active controllers, dual PSU and dual FAN module. System components like power supplies, cooling fans, controllers, host boards & storage drives should be modular in design to lower maintenance complexity.	
2.3	Controller CPU	Each controller should have 1x Intel (4 core) or higher CPU	
2.4	Controller Memory	Each controller should have at least 96GB & Expandable upto 192GB or more per controller	
2.5	NVMe Flash Cache (per Controller)	Proposed Storage should have 1x 3.84TB NVMe flash Cache per controller from day one.	
2.6	Host Ports (25G)	Each controller should have minimum 2x 25G SFP28 ports, and 25G port should be backward compatible with 10G and required cables and connectors should be supply from day one.	
2.7	Modular Card Slots	Should have 2 numbers of replaceable modular Card Slot per controller and below Cards should be supported in each slot and possible to inter change the card without the need to change or upgrade the storage controller	

2.8	Supported Interface Cards	16Gb/s FC x 4 32Gb/s FC x 2 32Gb/s FC x 4 10GbE (SFP+) x 2 25GbE (SFP28) x 2 100GbE (QSFP28) x 2 12Gb/s SAS x 2	
2.9	Front-end / Back-end Ports	Initially Quoted with at least 2x 25GbE front end (data) ports & should have at least 2x 12G SAS port or more for back end ports per controller.	
2.1	Drive Support	Support drives including SSD,SAS, SATA HDD in the same enclosure	
2.11	Supported Drive Types	2.5" SAS SSD 2.5" 12Gb/s SAS 10,000 RPM and 15,000 RPM HDD 3.5" 12Gb/s NL-SAS 7,200 RPM HDD 2.5" SATA SSD, 3.5" 6Gb/s SATA 7,200 RPM HDD	
2.12	Unified Storage Architecture & Protocols	Proposed storage should have true unified storage architecture. should support File, Block and Object storage within the same system and it should support Scale out feature with at least 4 appliances or more in single cluster (single namespace) without adding additional node, File Gateway or metadata controller for file level, cloud level access or for Scale out feature . All these protocols should be supported and licenses for full storage capacity should be quoted for the duration of the product lifecycle NFS, CIFS/SMB, AFP, FTP, SFTP, WebDAV, REST API, 1Gb/s, 10Gb/s and (RJ-45, SFP+), 10Gb/s FCoE, 8Gb/s, 16Gb/s Fibre Channel.	
2.13	File Share Access Control	Storage should be able to separate the File Level share folder control with file protocols for secure file sharing process (like share a folder on HTTP or FTP only and share another on CIFS or AFP only.	
2.14	Automated Support Request	Automated support request Proposed Storage should have option to automatically create support ticket with relevant logs with the OEM support in case of critical event.	
2.15	Storage Capacity	Storage Capacity: Should be quoted with minimum 160TB Raw with 7200RPM Enterprise class 12G SAS HDD, Individual drive capacity should not be more than 16TB. Storage should have provision to support additional 480TB storage capacity by using same individual drive capacity so there should be enough empty drive slots/bays available from day one.	
2.16	Hot Spare	Each RAID group should have at least one dedicated hot spare drives should be there from day one.	
2.17	RAID Protection (IDR)	Storage should offer IDR or similar technology for superior RAID protection and recovery compared to generic RAID which helps increase integrity and system efficiency while keeping data secure against errors and loss.	
2.18	Scalability	System should be scalable to minimum 800 drives vai expansion enclosure per appliance and per cluster at least	

		3200 drives via scale-out.	
2.19	File System & Volume Size	Support inbuilt file system which can support single volume size up to 2PB. License for full capacity should be quoted upfront	
2.2	Cloud Support	Cloud - Support cloud provider: Amazon S3, Aliyun, Microsoft Azure, Openstack Swift, Google Cloud. If any additional hardware is required for cloud integration it should be quoted for the full capacity upfront	
2.21	Cloud Disaster Recovery	Cloud Disaster Recovery automatically makes the hidden snapshot to cloud, allowing administrators to use the last snapshot for roll-back.	
2.22	Deduplication / Compression	Support deduplication/compression feature before data migrate to cloud provider	
2.23	Software Features	Storage should support Automated Storage Tiering, SSD Cache, Thin Provisioning, Volume Mirror/Copy, Block level Remote replication, File level Remote Replication (Rsync), Snapshot.	
2.24	NVMe Flash Cache (RAID1)	Proposed storage should have at least 3TB NVMe Flash Cache in RAID1 for better Read/Write performance	
2.25	Power Supply	80 PLUS-certified power supplies delivering more than 80% energy efficiency	
2.26	Power Saving	Intelligent multi-level drive spin-down	
2.27	Environmental	Relative humidity: 5 to 95% non-condensing, operating and non-operating	
2.28	Warranty	Warranty 5 Years	

S/N	Description	Parameters	
3	**24 Bay Storage (Dual Controller Unified Storage)**		
3.1	Drive Side Connectivity	Proposed storage must have minimum 12G SAS Drive side connectivity, 12G SAS internal data bus, 12G SAS expansion ports	
3.2	Chassis & Architecture	Proposed storage should have symmetric active-active controllers, dual PSU and dual FAN module. System component like power supplies, cooling fans, controllers, host boards & storage drives should be modular in design to lower maintenance complexity.	
3.3	Controller CPU	Each controller should have 1x Intel (4 core) or higher CPU	
3.4	Controller Memory	Each controller should have at least 32GB & Expandable upto 192GB or more per controller	
3.5	Host Ports (25G)	Each controller should have 2 x 25G SFP28 ports,	

3.6	Modular Card Slots	Should have 2 numbers of replaceable modular Card Slot per controller and below Cards should be supported in each slot and possible to inter change the card without the need to change or upgrade the storage controller	
3.7	Supported Interface Cards	16Gb/s FC x 4 32Gb/s FC x 2 32Gb/s FC x 4 10GbE (SFP+) x 2 25GbE (SFP28) x 2 12Gb/s SAS x 2	
3.8	Front-end / Back-end Ports	Initially Quoted with at least 4x25GbE front end (data) ports with 25G SFP+ modules and cables & should have at least 4x12G SAS ports or more for back end ports.	
3.9	Drive Support	Support drives including SSD,SAS, SATA HDD in the same enclosure	
3.1	Supported Drive Types	2.5" SAS SSD 2.5" 12Gb/s SAS 10,000 RPM and 15,000 RPM HDD 3.5" 12Gb/s NL-SAS 7,200 RPM HDD 2.5" SATA SSD, 3.5" 6Gb/s SATA 7,200 RPM HDD	
3.11	Unified Storage Architecture & Protocols	Proposed storage should have true unified storage architecture. should support File, Block and Object storage within the same system and it should support Scale out feature with at least 4 appliances or more in single cluster (single namespace) without adding additional node, File Gateway or metadata controller for file level, cloud level access or for Scale out feature . All these protocols should be supported and licenses for full storage capacity should be quoted for the duration of the product lifecycle NFS, CIFS/SMB, AFP, FTP, SFTP, WebDAV, REST API, 1Gb/s, 10Gb/s and (RJ-45, SFP+), 10Gb/s FCoE, 8Gb/s, 16Gb/s Fibre Channel.	
3.12	File Share Access Control	Storage should be able to separate the File Level share folder control with file protocols for secure file sharing process (like share a folder on HTTP or FTP only and share another on CIFS or AFP only.	
3.13	Automated Support Request	Automated support request Proposed Storage should have option to automatically create support ticket with relevant logs with the OEM support in case of critical event.	
3.14	Storage Capacity	Storage Capacity: Should be quoted with minimum 160TB Raw with 7200RPM Enterprise class 12G SAS HDD, Individual drive capacity should not be more than 16TB. Storage should have provision to support additional 224TB storage capacity by using same individual drive capacity so there should be enough empty drive slots/bays available from day one.	
3.15	RAID Protection (IDR)	Storage should offer IDR or similar technology for superior RAID protection and recovery compared to generic RAID which helps increase integrity and system efficiency while keeping data secure against errors and loss.	

3.16	Scalability	System should be scalable to minimum 800 drives via expansion enclosure per appliance and per cluster at least 3200 drives via scale-out.	
3.17	File System & Volume Size	Support inbuilt file system which can support single volume size up to 2PB. License for full capacity should be quoted upfront	
3.18	Cloud Support	Cloud - Support cloud provider: Amazon S3, Aliyun, Microsoft Azure, Openstack Swift, Google Cloud. If any additional hardware is required for cloud integration it should be quoted for the full capacity upfront	
3.19	Cloud Disaster Recovery	Cloud Disaster Recovery automatically make the hidden snapshot to cloud, allow administrator to use the last snapshot for roll-back.	
3.2	Deduplication / Compression	Support deduplication/compression feature before data migrate to cloud provider	
3.21	Software Features	Storage should support Automated Storage Tiering, SSD Cache, Thin Provisioning, Volume Mirror/Copy, Block level Remote replication, File level Remote Replication (Rsync), Snapshot.	
3.22	Power Supply	80 PLUS-certified power supplies delivering more than 80% energy efficiency	
3.23	Power Saving	Intelligent multi-level drive spin-down	
3.24	Environmental	Relative humidity: 5 to 95% non-condensing, operating and non-operating	
3.25	Warranty	Warranty 5 Years Onsite	
S/N	**Description**	**Parameters**	
4	**Existing Infortrend NAS HDD Expansion**		
4.1	HDD Bays / BOOT optimized storage	10TB HDD x 6 No's	
4.2	Networking Interfaces	10G SFP28 ports x 4 Nos (Multimode) populated with SR4 Fibre Modules	
4.3	Compatibility Clause	Must be compatible with existing NAS box	
S/N	**Description**	**Parameters**	
5	**Server/Storage Interconnect Accessories**		
5.1	Power Cables	Must supply required power cords as required for connection of all hardwares to power supply.	
5.2	Fiber Cables	Must supply required Fiber Patch Cords as required for	

		connection of all hardwares including Storage servers to Fibre network switch & SAN Switch	
5.3	Patch Cords	Must supply required Patch Cords as required for connection of all hardwares management ports to Network switchs with UTP ports.	
S/N	**Description**	**Parameters**	
6	**SAN switches**		
6.1	Architecture/Scalability/Performance/Management/Availability:	Minimum Dual SAN switches shall be configured where each SAN switch shall be configured with minimum of 48 Ports scalable to 64 ports.	
		Required scalability shall not be achieved by cascading the number of switches and shall be offered within the common chassis only	
		Should deliver 32 Gbit/Sec Non-blocking architecture with 1:1 performance for up to 64 ports in a energy-efficient fashion	
		Should protect existing device investments with auto-sensing 8, 16, and 32 Gbit/sec capabilities.	
		The switch shall support different port types such as E_Port, D_Port, AE_Port, F_Port & EX_Port	
		The switch should be rack mountable	
		Should provide enterprise-class availability features such as redundant and hot pluggable components like power supply and FAN	
		The switch shall provide Aggregate bandwidth of 2Tbps end to end.	
		Offered switch shall not have latency more than 700 ns for locally switched ports.	
		Offered switch shall support at-least 15000 frame buffer with dynamic buffer sharing capability across ports.	
		Switch shall have support for web based management and should also support CLI.	
		The switch should have USB port for firmware download, support save, and configuration upload/download.	
		Offered SAN switches shall be highly efficient in power consumption. Bidder shall ensure that each offered SAN switch shall consume less than 250 Watt of power.	

		Switch shall support POST and online/offline diagnostics, including RAStrace logging, environmental monitoring, non-disruptive daemon restart, FCping and Pathinfo (FC traceroute), port mirroring (SPAN port).	
6.2	Intelligent Networking:	Offered SAN switch shall support services such as Quality of Service (QoS) to help optimize application performance in consolidated, virtual environments. It should be possible to define high, medium and low priority QOS zones to expidite high-priority traffic	
		The switch shall be able to support ISL trunk up to 256 Gbit/sec between a pair of switches for optimal bandwidth utilization and load balancing.	
		SAN switch shall support to restrict data flow from less critical hosts at preset bandwidths.	
		It should be possible to isolate the high bandwidth data flows traffic to specific ISLs by using simple zoning	
		The Switch should be configured with the Zoning and shall support ISL Trunking features when cascading more than 2 numbers of SAN switches into a single fabric.	
		Offered SAN switches shall support to measure the top bandwidth-consuming traffic in real time for a specific port or a fabric which should detail the physical or virtual device.	
6.3	Warranty	5 Years Onsite Warranty	

S/N	Description	Parameters	
7	**HBA (Host Bus Adapters) cards for existing servers and storages**		
7.1	Type	Fibre Channel Host Bus Adapter (HBA), PCIe plug-in card	
7.2	Ports	Minimum 2 (dual-port) Fibre Channel ports per card	
7.3	Port Speed	32 Gb Fibre Channel per port, with auto-negotiation/backward compatibility to 16 Gb and 8 Gb	
7.4	Host Interface	PCI Express (PCIe) Gen 4.0, x8 lane width	
7.5	Form Factor	Low-profile plug-in card; should include both low-profile and full-height brackets	
7.6	Transceivers	Should be supplied with SFP+ transceivers (Short Wave, multi-mode LC) for both ports, included from day one	
7.7	Performance	Minimum 2 million IOPS and aggregate throughput of at least 12,800 Mbps (12.8 Gbps) across both ports	
7.8	Compatibility	Should Support existing Storage	

S/N	Description	Parameters	
8	**PBS Application Server (Proxmox Backup server)**		
8.1	Chassis	2U Rack Mountable	
8.2	CPU	Two numbers of 4th Generation Intel® Xeon® Scalable Processor with 16 Core each and server must support 16/28/32/36/40/44/48/52/56/60 Cores.	
8.3	Chipset	Intel® C741 Chipset	
8.4	Memory	32DIMM slots. 32GB*4 DIMMS or 64GB *2 scalable upto 8.0 TB using DDR5 Registered Smart Memory DIMM (RDIMM) operating at 4800 MT/s	
8.5	Bus Slots	Server should support upto eight PCI-Express 5.0 x16 slots. Additional two x8 or higher PCIe 5.0 slots	
8.6	HDD Bays / BOOT optimized storage	Upto 30 SFF SAS/SATA/SSD/NVMe 1.92TB * 2 NCMe SSD Drives	
8.7	Controller	On-board Embedded x 16 RAID controller which supports for raid 0, 1, 5, 6, 10, 50, 60 from day one with min. 24Gbps port speed and 8GB cache with support for Secure encryption/data at rest Encryption. Also, the controller must support Mixed Mode which combines RAID and HBA mode operation simultaneously and support 6G SATA, 12G/24G SAS, Gen 3/Gen4 16G NVMe. The disk must be directly visible to OS if not included in RAID. RAID controller should support standard drivers coming in Debian, Centos/RHEL, Proxmox.	
8.8	Networking features	1Gb 4-port OCP3 network adapter & 10GB 2 Port OCP3 Base network adapter & 2Port 16Gbps FC Card & 25G Multimode 4 port card with multimode modules must be configured Server should support below networking cards for future requirement 1. 1Gb 4-port network adaptors - 2. 10Gb 2-port Ethernet - 3. 10GBaseT 2-port Ethernet adaptor 4. 10/25Gb 2-port SFP28 Ethernet adaptor 5. 10/25Gb 4-port SFP28 Ethernet adaptor 6. 100Gb 2-port QSFP28 Ethernet 7. 100Gb 1-port QSFP56 Ethernet 8. 100Gb 2-port QSFP56 Ethernet 9. 200Gb QSFP56 Ethernet 10. Pensando Distributed Services Platform DSC-25 Enterprise 10/25Gb 2-port SFP28 Card Infiniband Options: 100Gb or 200Gb Single or Dual port Adapter	

8.9	Interfaces	USB 3.0 support with Up to 5 total: 1 front, 2 rear, 2 internal. 1GbE Dedicated management port	
8.1	Power Supply	Should support hot plug redundant low halogen power supplies with minimum 94% efficiency	
8.11	Fans	Redundant hot-plug system fans	
8.12	Industry Standard Compliance	ACPI 6.3 Compliant PCIe 5.0 Compliant WOL Support Microsoft® Logo certifications PXE Support Energy Star SMBIOS 3.2 UEFI 2.7 Redfish API IPMI 2.0 Secure Digital 4.0 Advanced Encryption Standard (AES) Triple Data Encryption Standard (3DES) SNMP v3 TLS 1.2 DMTF Systems Management Architecture for Server Hardware Command Line Protocol (SMASH CLP) Active Directory v1.0 ASHRAE A3/A4	
8.13	System Security	UEFI Secure Boot and Secure Start support Tamper-free updates - components digitally signed and verified Immutable Silicon Root of Trust Ability to rollback firmware FIPS 140-2 validation Secure erase of NAND/User data Common Criteria certification TPM (Trusted Platform Module) 1.2 option Configurable for PCI DSS compliance TPM (Trusted Platform Module) 2.0 option Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser Bezel Locking Kit option Support for Commercial National Security Algorithms (CNSA) Chassis Intrusion detection option Secure Recovery - recover critical firmware to known good state on detection of compromised firmware	
8.14	Operating Systems and Virtualization Software Support	Windows Server. Red Hat Enterprise Linux (RHEL) SUSE Linux Enterprise Server (SLES) VMware ESXi. Canonical Ubuntu Oracle Linux and Oracle VM Citrix, Proxmox	

8.15	Provisioning	1. Should support tool to provision server using RESTful API to discover and deploy servers at scale 2, Provision one to many servers using own scripts to discover and deploy with Scripting Tool (STK) for Windows and Linux or Scripting Tools for Windows PowerShell	
8.16	Firmware security	1. For firmware security, system should support remote management chip creating a fingerprint in the silicon, preventing servers from booting up unless the firmware matches the fingerprint. This feature should be immutable 2. Should maintain repository for firmware and drivers recipes to aid rollback or patching of compromised firmware. Should also store Factory Recovery recipe preloaded to rollback to factory tested secured firmware	
8.17	Embedded Remote Management and firmware security	1. System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for multifactor authentication 2. Server should have dedicated 1Gbps remote management port 3. Server should have storage space earmarked to be used as a repository for firmware, drivers and software components. The components can be organized in to install sets and can be used to rollback/patch faulty firmware 4. Server should support agentless management using the out-of-band remote management port 5. The server should support monitoring and recording changes in the server hardware and system configuration. It assists in diagnosing problems and delivering rapid resolution when system failures occur 6. Two factor Authentication 7. Local or Directory-based user accounts with Role based access control 8. Remote console sharing upto 6 users simultaneously during pre-OS and OS runtime operation, Console replay - Console Replay captures and stores for replay the console video during a server's last major fault or boot sequence. Microsoft Terminal Services Integration, 128 bit SSL encryption and Secure Shell Version 2 support.Should provide support for AES and 3DES on browser.Should provide remote firmware update functionality.Should provide support for Java free graphical remote console. 9. Should support managing multiple servers as one via Group Power Control Group Power Capping Group Firmware Update Group Configuration Group Virtual Media and Encrypted Virtual Media Group License Activation 10. Should support RESTful API integration	

		11. System should support embedded remote support to transmit hardware events directly to OEM or an authorized partner for automated phone home support 12. Server should have security dashboard : displaying the status of important security features, the Overall Security Status for the system, and the current configuration for the Security State and Server Configuration Lock features. 13. One-button Secure Erase designed to decommission/repurpose servers 14. NVMe wear level display 15. Workload Performance Advisor - Provides server tuning recommendations to improve server performance	
8.18	Server Management	Software should support dashboard view to quickly scan the managed resources to assess the overall health of the data center. It should provide an at-a-glance visual health summary of the resources user is authorized to view.	
		The Dashboard minimum should display a health summary of the following: • Server Profiles • Server Hardware • Appliance alerts	
		The Systems Management software should provide Role-based access control	
		Zero Touch Provisioning (ZTP) using SSDP with remote access	

		Management software should support integration with popular virtualization platform management software like Vmware vCenter & vRealize Operations, and Microsoft System Center & Admin Center	
		Should help provide proactive notification of actual or impending component failure alerts on critical components like CPU, Memory and HDD.	
		Should provide an online portal that can be accesible from anywhere. The portal should provide one stop, online access to the product, support information and provide information to track warranties, support contrats and status. The Portal should also provide a personalised dashboard to monitor device heath, hardware events, contract and warranty status. Should provide a visual status of individual devices and device groups. The Portal should be available on premise (at our location - console based) or off premise (in the cloud).	
		Should help to proactively identify out-of-date BIOS, drivers, and Server Management agents and enable the remote update of system software/firmware components.	
		Should have dashboard for firmware baselines while performing minimum required firmware checks and highlighting out-of-compliance devices for updates with the selected firmware baseline	
		The Server Management Software should be of the same brand as of the server supplier.	
8.19	Cloud Enabled Monitoring and Management	1. Secure connection from customer sites to HPE cloud service 2. Unified Identity & Access Management 3. Manages and controls servers regardless of physical location 4. Subscription-based entitlement 5. Efficient Device Onboarding 6. Firmware Update Awareness with Intelligent delta-only based updates 7. Set Group firmware Baseline and Compliance monitoring and notification 8. Group based firmware management that can be scheduled or on-demand 9. Remote Site management with low bandwidth/high latency network connectivity 10. Role-based access and views for managed customer environments 11. GUI and Rest APIs for core features	
8.2	Warranty	5 Years Onsite	

S/N	Description	Parameters	
9	**Network Fibre Switch (ToR-48 port) :**		
9.1	Form Factor	1U or 2U or Chassis based, Rack mountable Ethernet switch with 1RU form	
9.2	Architecture	Non-Blocking architecture .Should support Modular Operating system.	
9.3	IPV6 Compliance	All Functionalities of Switch shall be IPV4 and IPv6 compliant and it should work on IPv6 Platform without any additional hardware/ software.	
9.4	End of sale	OEM End-of-sale declaration shall not have been released for the quoted model at the time of the bid submission.	
9.5	Latest OS version	The switch shall be supplied with the latest OS version .	
9.6	Feature Availability	All the specified features/parameters/certifications must be available on the Technical Bid opening date. Features /parameters /certifications proposed to be available in near future / on roadmap shall not be considered.	
9.7	Advance Layer 3 Support	PIM DM/SM/SSM,OSPF,BGP,MBGP,IS-IS should be supported on IPv4 and IP V6 platform,	
9.8	Data Center Features	Switch should support DCBx Data Center Bridging Exchange Protocol,Priority Flow Control (PFC),Enhanced Transmission Select ion (ETS)	
9.9	**Interface Specifications:**		
	Ports	Should support at least 48 x 1Gb/10Gb/25Gb SFP28 ports with min 8 x 40Gb/ 100Gb QSFP28 ports should be available from day 1. Stacking should be supported upto 6 or more switches.	
	SFP Transceivers	All the Transceivers/Modules used to connect the Switches should be from the same OEM/make of the switches only.switch should support 10GBASE-T models. 25G multimode transceivers should fully loaded along with switches. Plus 2 x 40G Single mode transreceiver for uplink.	
	Port status display	Each port must have a dedicated LED for status display.	
	Telecom standard	MTCTE Certified	
9.1	**Hardware Specifications:**		
	Switching Capacity	4 Tbps or more	
	Forwarding rate and latency	1000 Mpps or more ,Average Latency: 800 ns or better	
	MAC Addresses	280K or more,	
	VLANs (802.1q tagged	4000 or more	

	VLAN)		
	IPv4 Routes/Entries/Scale	250K or more	
	IPv6 Routes/Entries/Scale	100K or more	
	IP Multicast Entries (S,v,G)	90K or more	
	Memory and peripheral capacity	16GB RAM or more, 128GB SSD or more	
	Packet Buffers	32MB or more	
9.11	**Standards and Protocols**		
	L2 Loop Protection	IEEE 802.1d Spanning tree protocol	
		802.1s MSTP (Multiple instances of STP)	
		802.1w RSTP (Rapid spanning tree)	
	Link Aggregation	802.3ad Link Aggregation	
	QOS Support	At least 8 nos of 802.1p Priority Queues per port and 802.1BA	
	IP Multicast	IGMP Snooping, MLD v1/v2 support	
	Port Mirroring / Span port	Port mirroring must be available.	
9.12	**Routing Features**		
	Routing Protocols:	The switch shall have hardware based forwarding for IPv4 & IPv6.	
		Following protocols shall be supported with IPv4/IPv6: Static routing, PBR, RIPv2, OSPFv2/v3,BGP	
		The switch shall have Dual stack mode to run both IPv4 & IPv6	
		Generalized Precision Time Protocol (GPTP) , Multiple VLAN Registration Protocol (MVRP) , Multiple Stream Registration Protocol (MSRP).	
	Router redundancy	Shall support VRRP all versions , for IPV4 and IPV6.	
	Network Login	MAC and 802.1 X based Login must be available	
	Port Security	MAC Address based Lockdown and Limited Learning or equivalent	
	Access Control Lists:	L2/L3/L4 IP based, Source port, destination port, MAC based	

	AAA (authentication, authorization and accounting)	AAA using RADIUS and TACACS+ must be available	
9.13	**Management and Monitoring:**		
	Management	Following in-band management methods shall be available:	
		Secure Web based management (On https)	
		SSH based management (SSH v2).	
	Out-of-band management	Following out-of-band management methods shall be available:	
		Serial console port	
		Management ethernet port .Dedicated OOB port	
	Role based Administration	The switch shall support multiple administrator accounts. Each administrator account shall be configurable with the desired level of management privileges.	
	Remote Monitoring	Should support RMON , ITU- Y.1731,IEEE 802.1ag	
		Ability of VM-based applications to extract data without disrupting forwarding or control plane traffic.Should support integrated application hosting on the switch.	
	Network Management	The switch should support SNMP V2c and V3, XML API	
	Log Management	Syslog shall be supported with multiple syslog destinations.	
	Flow export	Shall support Netflow/IPFIX/sflow for flow exports.	
	Time synchronization	Time synchronization using Network time protocol must be available.	
	Configuration backup & restore	The switch shall have feature of backing up the configuration & restoring a backed- up configuration. Multiple Configuration files must be supported.	
	TFTP/FTP upload and download	Config/image upload and download from TFTP/FTP server shall be available.	
9.14	**Other Requirements:**		
	Interface cables and other features	Should be supplied with Indian power cords along with all stacking accessories from day 1.	
		switch should support VxLAN Tunneling End Point (VTEP),DCBx Data Center Bridging Exchange Protocol,Priority Flow Cont rol (PFC),Enhanced	

		Transmission Select ion (ETS), switch should support MPLS as future scalability.	
	Power Supply & FAN	Hot -swappable modular power and fans,AC and DC power supply options should be supported on the same switch on day 1	
	Regulatory and Safety	Should support regulatory and safety standards,EMI/EMC standards and Environmental Compliance/standards.	
	Environmental conditions	The offered equipment must be able to operate in the following environmental conditions	
		Operating temperature: 0°C to 45°C	
		Relative Humidity: 5% to 95% Non-condensing	
	Electromagnetic interference	The Offered equipment shall have FCC certification.	
	Stacking	All the switches should be stackable with existing network switches.	
	OEM Criteria and Support	All the switches, the fiber modules should be from the same OEM. The OEM should have R&D center in India. should have India Toll free number with India TAC center to provide L1/L2,L3 support.Switch should be support seamless integration with existing Extreme switches of 7520.,X690 and X695 series.	