

6.2.2.73 GTP of Spine and Core Switch

(To be filled up and signed by the Manufacturer & Tenderer, otherwise the offer will not be acceptable)

Spine and Core Switch		
S/N	Detailed Technical Specifications	Bidder Response
1	General Requirement	
1.1	Quality: ISO 9001/9002 for manufacturer, FCC Class A/B for quality assurance	
1.2	Brand: To be mentioned by bidder	
1.3	Model: To be mentioned by bidder	
1.4	Quantity:	
1.5	Country of Origin: To be mentioned by the bidder	
1.6	Proposed OEM should be positioned as "Leader" in Gartner's Magic Quadrant in Wired and Wireless LAN Access Infrastructure for last 3 years	
1.7	Proposed OEM should be positioned as "Leader" in Gartner's Magic Quadrant in Data Center and Cloud Networking in latest reports.	
2	System Architecture and High Availability	
2.1	The Switch should support non-blocking Layer 2 switching and Layer 3 routing	
2.2	The switch shall not have any single point of failure for critical components (power supplies, fans, etc.) must support 1+1 / N+1 redundancy.	
3	Hardware and Interface Requirement	
3.1	Switch should have 32 x 40/100G QSFP28 Ports loaded with required optics	
3.2	Switch should have 16GB DRAM ,64GB internal Flash/Storage & intelligent buffer management with a minimum buffer of 32MB.	
3.3	Switch should support minimum 6.4 Tbps of switching capacity & 2 Bpps Forwarding Throughput.	
3.4	Switch should support minimum 1 microsecond or less of latency for high-speed switching.	
4	Layer2 Features	
4.1	Switch should support minimum 256,000 no. of MAC addresses	
4.2	Switch should support 32 Nos. of ports or more per LAG and support 64 number of Link Aggregation Group , IEEE 802.1D, 802.1W, 802.1S , SVI/RVI	
4.3	Support for broadcast, multicast and unknown unicast storm control to prevent degradation of switch performance from storm due to network attacks and vulnerabilities	
4.4	The Switch should support Multihoming technologies ESI-LAG/MC-LAG/MLAG	
5	Layer3 Features	
5.1	The switch should support 512,000 IPv4 routes and 256,000 IPv6 routes entries in the routing table including 64,000 multicast routes	
5.2	Switch should support static routing, OSPF , IS-IS ,BGP & MBGP for IPv4 and IPv6	
5.3	Switch should support multicast traffic reachability using PIM-SM and SSM	
6	Virtualization Features	
6.1	The switch shall support network virtualization using overlay technologies such as VXLAN with integrated VXLAN and EVPN capabilities to enable Spine-Leaf architectures.	
7	Availability	
7.1	Switch should provide gateway level of redundancy in IPv4 and IPv6 using VRRP & BFD For Fast Failure Detection	
8	Quality of Service	
8.1	Switch system should support 802.1P classification and marking of packet using CoS &	

	DSCP	
8.2	The switch shall support multiple queuing and scheduling mechanisms including Strict Priority (SP) Queuing , Weighted Random Early Detection (WRED)	
8.3	Support for Data Center Bridging features: IEEE 802.1Qbb PFC, IEEE 802.1Qaz ETS, DCBX, and Explicit Congestion Notification (ECN).	
9	Security	
9.1	Switch should support control plane i.e. processor and memory Protection from unnecessary or DoS traffic by control plane protection policy	
9.2	Switch should support TACACS+, RADIUS & Role-Based Access Control (RBAC) to enforce granular access rights for administrators and operators.	
10	Manageability	
10.1	Switch should support RMON,Telnet, SSHv2 , NTP ,Configuration Rollback, Ping and traceroute	
11	Certification	
11.1	The Switch should be IPv6 Certified (IPv6 Logo ready or USGv6)	
11.2	The Switch should be EAL3/NDPP/ NDcPP certified under Common Criteria.	
11.3	All the components should be from same OEM and all required license should be perpetual in nature.	
12	License	
12.1	The license period shall have at least 03 years and will be calculated from the first day of system handover.	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Signature

Name and Designation of Manufacturer

Duly authorised to sign the Tender for and on behalf of the Tenderer



6.2.2.75 GTP of SDN Controller

(To be filled up and signed by the Manufacturer & Tenderer, otherwise the offer will not be acceptable)

SDN Controller		
S/N	Detailed Technical Specifications	Bidder Response
1	General Requirement	
2	Quality: ISO 9001/9002 for manufacturer, FCC Class A/B for quality assurance	
3	Brand: To be mentioned by bidder	
4	Model: To be mentioned by bidder	
5	Quantity:	
6	Country of Origin: To be mentioned by the bidder	
7	Proposed OEM should be positioned as "Leader" in Gartner's Magic Quadrant in Wired and Wireless LAN Access Infrastructure for last 3 years	
8	Proposed OEM should be positioned as "Leader" in Gartner's Magic Quadrant in Data Center and Cloud Networking in latest reports.	
9	The overall System network design & operations must be based on Open Standards' implementation for Networking, with the minimum of eBGP underlay, eBGP/MP-BGP/EVPN overlay and VXLAN H/W VTEP where required.	
10	The overall System must not be based on Proprietary & Closed (ie. Vendor-specific) Technology implementations for Networking.	
11	The overall System must provide the capability to build both simple and complex analytics, against the context of the reference design and network topology.	
12	The System must be agent-based, with the capability to install on-box in GuestShell or UserSpace of Fabric switches, or off-box.	
13	Interaction between the Central Server and the switching fabric must be held on the management plane only.	
14	The system must provide open APIs to enable an automated system wide build of the DC	
15	The interaction must not be held on the Control Plane or Data Plane of the Fabric.	
16	The deployed network must be able to operate and run without interruption, in case the Central Server is not present for any reason. There must not be any relationship between the Central Server and the operational running of the Fabric.	
17	The System must provide Spine & Leaf Fabric design capability.	
18	The System must provide a web-based UI to design, build and deploy Spine & Leaf Fabric.	
19	The System must provide hardware and software abstraction layer, so that Fabric Design is agnostic to switching HW or NOS selection.	
20	The System must provide Design Calculators to compute the required number of ports between the leaf (Top of Rack) and spine switches.	
21	The System must generate configuration files which can be easily viewed via the web front-end, for both the full running configuration and any pre-staged configuration.	
22	For a fixed Fabric Design, the configuration files must reflect the precise running-config to be deployed on target NOS Fabric switches.	
23	The System must provide the capability to create a graphical representation of all Network and Compute Elements in the design.	

24	The System must provide an open API that enables the networking Fabric to be built to the very same level as the UI.	
25	The System must not be constructed of separate sub-systems stitched together by one overarching UI, which independently serve design, build, deploy and operations' capabilities.	
26	The System must provide the capability to build and extend the Fabric design quickly and easily, by utilising addressing pools i.e. ASNs, IPv4, IPv6 VNIs.	
27	The System must provide the capability to build a complete network representation in which logical layers can be applied, with a minimum of all addressing information (IP / ASNs / VNIs), VRFs and the overlay.	
28	The System must provide continuous, closed-loop validation of the desired Fabric state (as declared in design, build or deploy phase) against the actual operational state of the physical network, and alert when the two states do not match.	
29	The System must be able to interface through open APIs with external ticketing systems or centralised alerting NMS systems as used in a NOC.	
30	The System must provide the capability to build complex analytics out of telemetry collected from the Fabric switches - analytics with context.	
31	The System must integrate with 3rd-party systems through open APIs for additional reporting, with the minimum of time series databases and graphing applications.	
32	License: The license period shall have at least 03 years and will be calculated from the first day of system handover.	

[The Tenderer should complete all the columns as required]

Signature:

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6.2.2.76 GTP of Leaf Switch

(To be filled up and signed by the Manufacturer & Tenderer, otherwise the offer will not be acceptable)

Leaf Switch		
S/N	Detailed Technical Specifications	Bidder Response
1	General Requirement	
1.1	Quality: ISO 9001/9002 for manufacturer, FCC Class A/B for quality assurance	
1.2	Brand: To be mentioned by bidder	
1.3	Model: To be mentioned by bidder	
1.4	Quantity:	
1.5	Country of Origin: To be mentioned by bidder	
1.6	Proposed OEM should be positioned as "Leader" in Gartner's Magic Quadrant in Wired and Wireless LAN Access Infrastructure for last 3 years	
1.7	Proposed OEM should be positioned as "Leader" in Gartner's Magic Quadrant in Data Center and Cloud Networking in latest reports.	
2	System Architecture and High Availability	
2.1	The Switch should support non-blocking Layer 2 switching and Layer 3 routing	
2.2	The switch shall not have any single point of failure for critical components (power supplies, fans, etc.) must support 1+1 / N+1 redundancy.	
3	Hardware and Interface Requirement	
3.1	Switch should have the 48 x 1/10G/25G SFP fiber ports and should have 8 x 40G/100G QSFP28 ports	
3.2	Switch should have 16GB DRAM ,32GB internal Flash/Storage & intelligent buffer management with a minimum buffer of 32MB.	
3.3	Switch should support minimum 6.4 Tbps of switching capacity & 2 Bpps Forwarding Throughput.	
3.4	Switch should support minimum 1 microsecond or less of latency for high-speed switching.	
4	Layer2 Features	
4.1	Switch should support minimum 256,000 no. of MAC addresses	
4.2	Switch should support 32 Nos. of ports or more per LAG and support 64 number of Link Aggregation Group , IEEE 8021.D, 802.1W, 802.1S , SVI/RVI	
4.3	Support for broadcast, multicast and unknown unicast storm control to prevent degradation of switch performance from storm due to network attacks and vulnerabilities	
4.4	The Switch should support Multihoming ESI-LAG/MC-LAG/MLAG	
5	Layer3 Features	
5.1	The switch should support 512,000 IPv4 unicast routes and 256,000 IPv6 unicast routes entries in the routing table including 64,000 multicast routes	
5.2	Switch should support static routing, OSPF , IS-IS ,BGP & MBGP for IPv4 and IPv6	
5.3	Switch should support multicast traffic reachability using PIM-SM and SSM	
6	Virtualization Features	
6.1	The switch shall support network virtualization using overlay technologies such as VXLAN with integrated VXLAN and EVPN capabilities to enable Spine-Leaf architectures.	
7	Availability	
7.1	Switch should provide gateway level of redundancy in IPv4 and IPv6 using VRRP & BFD For Fast Failure Detection	
8	Quality of Service	

8.1	Switch system should support 802.1P classification and marking of packet using CoS & DSCP	
8.2	The switch shall support multiple queuing and scheduling mechanisms including Strict Priority (SP) Queuing , Weighted Random Early Detection (WRED)	
8.3	Support for Data Center Bridging features: IEEE 802.1Qbb PFC, IEEE 802.1Qaz ETS, DCBX, and Explicit Congestion Notification (ECN).	
9	Security	
9.1	Switch should support control plane i.e. processor and memory Protection from unnecessary or DoS traffic by control plane protection policy	
9.2	Switch should support TACACS+, RADIUS & Role-Based Access Control (RBAC) to enforce granular access rights for administrators and operators.	
10	Manageability	
10.1	Switch should support RMON,Telnet, SSHv2 , NTP ,Configuration Rollback, Ping and traceroute	
11	Certification	
11.1	The Switch should be IPv6 Certified (IPv6 Logo ready or USGv6)	
11.2	The Switch should be EAL3/NDPP/ NDcPP certified under Common Criteria.	
11.3	All the components should be from same OEM and all required license should be perpetual in nature.	
12	License	
12.1	The license period shall have at least 03 years and will be calculated from the first day of system handover.	

[The Tenderer should complete all the columns as required]

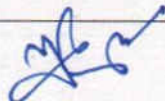
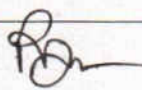
Signature:

Name & Designation of tenderer

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6.2.2.77 GTP of IPN Switch

(To be filled up and signed by the Manufacturer & Tenderer, otherwise the offer will not be acceptable)

IPN Switch		
S/N	Detailed Technical Specifications	Bidder Response
1	General Requirement	
1.1	Quality: ISO 9001/9002 for manufacturer, FCC Class A/B for quality assurance	
1.2	Brand: To be mentioned by bidder	
1.3	Model: To be mentioned by bidder	
1.4	Quantity:	
1.5	Country of Origin: To be mentioned by the bidder	
1.6	Proposed OEM should be positioned as "Leader" in Gartner's Magic Quadrant in Wired and Wireless LAN Access Infrastructure for last 3 years	
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3	Hardware and Interface Requirement	
3.1	Switch should have the 48 x 1/10G/25G SFP fiber ports and should have 8 x 40G/100G QSFP28 ports	
3.2	Switch should have 16GB DRAM , 32GB internal Flash/Storage & intelligent buffer management with a minimum buffer of 32MB.	
3.3	Switch should support minimum 6.4 Tbps of switching capacity & 2 Bpps Forwarding Throughput.	
3.4	Switch should support minimum 1 microsecond or less of latency for high-speed switching.	
4	Layer2 Features	
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4.4	The Switch should support Multihoming ESI-LAG/MC-LAG/MLAG	
5	Layer3 Features	
5.1	The switch should support 512,000 IPv4 unicast routes and 256,000 IPv6 unicast routes entries in the routing table including 64,000 multicast routes	
5.2	Switch should support static routing, OSPF , IS-IS ,BGP & MBGP for IPv4 and IPv6	
5.3	Switch should support multicast traffic reachability using PIM-SM and SSM	
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8.3	Support for Data Center Bridging features: IEEE 802.1Qbb PFC, IEEE 802.1Qaz ETS, DCBX, and Explicit Congestion Notification (ECN).	
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9.1	Switch should support control plane i.e. processor and memory Protection from unnecessary or DoS traffic by control plane protection policy	
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10	Manageability	
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11	Certification	
11.1	The Switch should be IPv6 Certified (IPv6 Logo ready or USGv6)	
11.2	The Switch should be EAL3/NDPP/ NDcPP certified under Common Criteria.	
11.3	All the components should be from same OEM and all required license should be perpetual in nature.	
12	License	
12.1	The license period shall have at least 03 years and will be calculated from the first day of system handover.	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

[Handwritten signatures and marks]

6.2.2.78 GTP of SAN Storage

(To be filled up and signed by the Manufacturer & Tenderer, otherwise the offer will not be acceptable)

SAN Storage			
SL	Item Name	Descriptions	Bidder Response
1	Brand	Same as the Server OEM.	
2	Model	To be mentioned by the bidder	
3	Country of Origin	To be mentioned by the bidder	
4	Data Storage Type	Proposed Array should be Enterprise Grade- All-NVMe Storage model. Offered storage system must be in the leader's quadrant of Gartner Magic Quadrant report on Primary/Enterprise Storage Platform released in 2024 and 2025.	
5	Native Ransomware Detection and Data Recovery	Offered storage must have the below feature set for Ransomware Detection and Data Recovery- i) Realtime in-line write data scanning ii) AI anomaly detection through Multiple independent detection algorithms that will decreases the possibility of misses and false positive iii) AI anomaly detection must Evolves over time (AI-based learning and tuning) iv) When a ransomware attack is detected, alerts will be displayed in on-prem management GUI and in the logs v) WORM capabilities for easier data recovery vi) Must support in air-gapped installations (no internet access required) vii) Impact on storage performance is negligible (< 5%)	
6	Data Availability and All Flash	1. Offered storage shall be an array which can provide enterprise class resiliency & 100% data availability guaranteed architecture along with all NVMe controllers. 2. 100% data availability guaranty shall be clearly mentioned on vendor web site for the offered model. If vendors are not supporting 100% data availability as per their web site, then vendor shall quote additional two Controller (Total Four) and 100% additional capacity as cold spare along with array for mitigating the failure situations. 3. Offered storage array shall have capability for supporting front-end connectivity with NVMe over fabric using standard fiber channel switches of 16, 32, 64Gbps. 4. Offered storage must support native NVMe/FC, NVMe/TCP, iSCSI, NFS and FC protocol.	
7	Operating System & Clustering Support	The storage array should support industry-leading Operating System platforms & clustering including: Windows Server 2019 / 2022, VMware ESXi 7/8, AIX, HP_UX, Solaris, Ubuntu, SUSE, Red Hat Linux, Red Hat Virtualization, and Oracle Linux etc.	
8	Capacity & Scalability	1. Offered Storage array should support all NVMe protocol enabled SSD inside the storage array and should be scalable to at-least 24 NVMe drives within the controller enclosure. 2. Offered Storage array should be supplied minimum with 90TB usable Capacity using Minimum 10x 15.36TB self-encrypted drives and shall be	

		configured in RAID6. Vendor shall not use more than 10D+2P while sizing the array. 3. Offered storage configuration must deliver minimum 80,000 Mixed IOPS at 80:20 read/write ration at 8k random IO Block with less than 1ms latency. 4. Offered storage must support up to 2PB raw capacity for future capacity upgrade without adding additional controllers.	
9	Storage Encryption	1. Vendor shall offer only the encrypted drives with appropriate encryption licenses. Vendor shall not offer any controller based or Software based encryption. 2. The offered Storage array shall support at-least external key managers from Utimaco and Gemalto. Vendor shall also offer internal Key manager engine for key management.	
10	No. of Controllers	Offered storage shall tolerate any 1-controller failure without any interruption of storage services from day1.	
11	Memory and CPU Processing Power	1. Offered Storage array should have at-least 512GB memory across controllers. 2. offered array should have a capability of Write-Through cache and does not require write cache mirroring. 3. Offered storage shall be based upon latest generation Intel or AMD CPUs. 4. Offered storage system shall be offered with minimum 2 controllers.	
12	Architecture & Processing Power	1. Offered storage array shall be true Active-Active so that every logical disk is striped across all offered drives and all drives shall be able to contribute the IOs to both controllers simultaneously. 2. Offered storage array shall have native virtualization support so that RAID can be carved out from a logical space instead of dedicating separate physical disks for each application.	
13	No Single point of Failure	Offered Storage Array shall be configured in a No Single Point of configuration including Array Controller card, Cache memory, FAN, Power supply etc.	
14	Site Assessment	1. Vendor shall do comprehensive Cloud based assessment, at-least for VMware environment on a quarterly basis and shall factor the required services for it. 2. Assessment shall provide the detailed analysis of VMware Hosts – CPU & Memory utilization, Storage analysis and relevant findings of contention, Culprit and Victim VMs in the environment attached to offered storage. Offered assessment shall do complete analysis of licensing as well.	
15	Host Ports and Back-end Ports	1. Offered Storage array shall have minimum 8x 32Gbps FC port and 8x 10/25Gbps SFP28 ports with 4x 10G SFP28 SR, and 4x 10G Base-T transceivers. 2. Offered storage shall support both iSCSI as well as NVMe/TCP and NFS protocol.	
16	Global Hot Spare	1.Offered Storage Array shall support distributed Global hot Spare for offered Disk drives.	

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		2. Global hot spare shall be configured as per industry practice.	
17	Quality of service	1. Offered storage array shall support quality of service for critical applications so that appropriate and required response time can be defined for application logical units at storage. It shall be possible to define different service / response time for different application logical units. 2. Quality of service engine shall allow to define minimum and maximum cap for required IOPS / bandwidth for a given logical unit of application running at storage array. 3. It shall be possible to change the quality-of-service Response time (In both milliseconds as well as Sub-milliseconds), IOPS, bandwidth specification at real time.	
18	Capacity efficiency	1. Offered storage array shall support inline data efficiency engine (Supporting Thin Zero detect and re-claim, De-duplication and Compression) and shall be enabled by default. 2. Vendor shall have flexibility to enable / disable the data efficiency engine at the time of Volume creation. 3. Storage subsystem shall be supplied with Thin Provisioning, Thin Re-claim, Snapshot, remote replication, De-duplication, Compression, Performance Monitoring, and Quality of service on day 1 for the supplied capacity of the array.	
19	Firmware Upgrade	Offered storage shall support online non-disruptive firmware upgrade for both Controller and disk drives without any reboot of controller.	
20	Integration - Container	Offered Storage array shall be integrated with Red-hat OpenShift, Kubernetes and other industry K8 based container platform through CSI driver set. Vendor shall support at-least following functionalities through their CSI / CSP integration: a. Shall support both Static and Dynamic provisioning b. Shall be able to expand, re-size the persistent volumes given to stateful set applications. c. Shall be able to create and delete the snapshots. d. Shall support CSI Raw block volume as well as CSI Volume cloning. e. Support for both Fiber channel as well as iSCSI.	
21	Snapshot / Point in time copy & No. of Volumes	1. The storage array should have support for controller-based snapshots (At-least 1024 copies for a given volume). 2. Offered Storage array shall support more than 16000 base volumes on the storage array without snapshot and clone.	
22	Remote Replication	1. The storage array should support hardware-based data replication at the array controller level across all models of the offered family. 2. Offered Storage array shall support both Synchronous and Asynchronous replication across 2 storage arrays natively without using any third party or software-based solution. 3. Offered storage array shall have capability to create the application	

		consistency group for replication operations. Shall have flexibility to have more than 256 volumes per consistency group.	
		4. Offered storage subsystem shall support incremental replication after resumption from Link Failure situation or during failback operations.	
23	Active / Active Stretch Clustering	1. Offered Storage array shall have capability to provide true Active / Active Replication and Stretch clustering at metro distances for Zero RPO and RTO so that a given volume pair between primary and DR location can have concurrent access to both read and write operations simultaneously. 2. Active / Active replication shall be supported for all well-known OS like VMware, Redhat, Windows etc.	
24	Multi-tenancy	Offered storage array shall be true multi-tenant and shall support at-least 128 Tenant per storage array. Every tenant shall be treated as a separate logical storage array with its own user control access.	
25	Installation services, manage & control	Implementation shall be done by OEM Engineer only. OEM remote/onsite installation and startup service should be provided. Shall be offered with OEM professional service for replication job as well.	
26	Warranty & services	• 3 Years collaborative warranty with 24x7 mission critical one-point support from OEM. • 4-hour standard response. • OEM must maintain in-country local part depot center; authorization letter must be submitted. • OEM manufacturer authorization letter must be submitted.	
27	License	The license period shall have at least 03 years and will be calculated from the first day of system handover.	

[The Tenderer should complete all the columns as required]

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