Technical Specifications for Supply, Installation and Maintenance of Building Network Infrastructure and providing IT Facility Management Services at Administrative Building, Alkapuri, Baroda, Gujarat.

RFP No: BCC:IT:PROC:109:61   **Dated: 9th August 2017**

Sr. No.	Required Minimum Specifications "Annexure 16 A - Core Switch" Make & Model: _____	Bidder's compliance (Yes / No)	Bidder's remarks
Solution Requirement			
1	The Switch should support non-blocking Layer 2 switching and Layer 3 routing		
2	The switch should not have any single point of failure like power supplies and fans etc should have 1:1/N+1 level of redundancy		
3	Switch support in-line hot insertion and removal of different parts like modules/power supplies/fan tray etc should not require switch reboot and disrupt the functionality of the system		
4	Switch should support the complete STACK of IP V4 and IP V6 services. Switch must have IPv6 phase 2 ready logo certification.		
5	The Switch and different modules used should function in line rate and should not have any port with oversubscription ratio applied		
Hardware and Interface Requirement			
1	Switch should have the following interfaces: a. 48 x 1G/10G Multi Mode Fiber Interface b. 6 x 40/100GbE QSFP ports		
2	Switch should have console port		
3	Switch should have management interface for Out of Band Management		
4	Switch should be rack mountable and support side rails if required		
5	Switch should have adequate power supply for the complete system usage with all slots populated and used and provide N+1 redundant		
6	Switch should have hardware health monitoring capabilities and should provide different parameters through SNMP		
7	Switch should support VLAN tagging (IEEE 802.1q)		
8	Switch should support IEEE Link Aggregation and Ethernet Bonding functionality to group multiple ports for redundancy		
9	Switch should support Configuration roll-back and check point		
10	Switch should support for different logical interface types like loopback, VLAN, SVI, Port Channel, multi chassis port channel/LAG etc		
Performance Requirement			
1	The switch should support 12,000 IPv4 and IPv6 routes entries in the routing table including multicast routes		

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2	Switch should support Graceful Restart for OSPF, BGP etc.		
3	Switch should support minimum 1000 VRF instances		
4	The switch should support hardware based loadbalancing at wire speed using LACP and multi chassis etherchannel/LAG		
5	Switch should support minimum 1.4 Tbps of switching capacity (or as per specifications of the switch if quantity of switches are more, but should be non blocking capacity) including the services: a. Switching b. IP Routing (Static/Dynamic) c. IP Forwarding d. Policy Based Routing e. QoS f. ACL and Other IP Services g. IP V.6 host and IP V.6 routing		
Advance Features			
1	Switch should support Network Virtualisation using Virtual Over Lay Network using VXLAN (RFC 7348)/NVGRE as per RFC 2890		
2	Switch should support VXLAN (RFC7348) and EVPN or equivalent for supporting Spine - Leaf architecture to optimise the east - west traffic flow inside the data center		
3	Switch should support OpenFlow/Open Day light/Open Stack controller		
4	Switch should support Data Center Bridging		
Layer 2 Features			
1	Spanning Tree Protocol (IEEE 8201.D, 802.1W, 802.1S		
2	Switch should support VLAN Trunking (802.1q) and should support 4096 VLAN		
3	Switch should support basic Multicast IGMP v1, v2, v3		
4	Switch should support minimum 96,000 no. of MAC addresses		
5	Switch should support 8 Nos. of link or more per Port channel (using LACP) and support 48 port channels or more per switch		
6	Switch should support Industry Standard Port/Link Aggregation for All Ports across any module or any port.		
7	Switch should support multi chassis Link Aggregation for All Ports across any module or any port of the switch and Link aggregation should support 802.3ad LACP protocol for communication with downlink/uplink any third party switch or server		
8	Switch should support Jumbo Frames up to 9K Bytes on 1G/10G Ports		
9	Support for broadcast, multicast and unknown unicast storm control to prevent degradation of switch		

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	performance from storm due to network attacks and vulnerabilities		
10	Switch should support Link Layer Discovery Protocol as per IEEE 802.1AB for finding media level failures		
Layer 3 Features			
1	Switch should support all physical ports to use either in Layer2 or Layer 3 mode and also should support layer 3 VLAN Interface and Loopback port Interface		
2	Switch should support basic routing feature i.e. IP Classless, default routing and Inter VLAN routing		
3	Switch should support static and dynamic routing using: a. Static routing b. OSPF V.2 using MD5 Authentication c. ISIS using MD5 Authentication d. BGP V.4 using MD5 Authentication e. Should support route redistribution between these protocols f. Should be compliant to RFC 4760 Multiprotocol Extensions for BGP-4 (Desirable)		
4	Switch should support multi instance MPLS routing using VRF, VRF Edge routing and should support VRF Route leaking functionality		
5	Switch should be capable to work as DHCP server and relay		
6	Switch should provide mutlicast traffic rechable using: a. PIM-SM b. PIM-SSM c. Bi-Directional PIM d. Support RFC 3618 Multicast Source Discovery Protocol (MSDP) e. IGMP V.1, V.2 and V.3		
Availability			
1	Switch should have provisioning for connecting to 1:1/N+1 power supply for usage and redundancy		
2	Switch should provide gateway level of redundancy in Ip V.4 and IP V.6 using VRRP		
3	Switch should support for BFD For Fast Failure Detection as per RFC 5880		
Quality of Service			
1	Switch system should support 802.1P classification and marking of packet using: a. CoS (Class of Service) b. DSCP (Differentiated Services Code Point) c. Source physical interfaces d. Source/destination IP subnet e. Protocol types (IP/TCP/UDP) f. Source/destination TCP/UDP ports		

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2	Switch should support methods for identifying different types of traffic for better management and resilience		
3	Switch should support for different type of QoS features for ream time traffic differential treatment using: a. Weighted Random Early Detection b. Strict Priority Queuing		
4	Switch should support to trust the QoS marking/priority settings of the end points as per the defined policy		
5	Switch should support Flow control of Ethernet ports to control traffic rates during congestion by allowing congested nodes to pause link operation at the other end for receiving traffic as per IEEE 802.3x		
Security			
1	Switch should support for deploying different security for each logical and physical interface using Port Based access control lists of Layer-2 to Layer-4 in IP V.4 and IP V.6 and logging for fault finding and audit trail		
2	Switch should support control plane i.e. processor and memory Protection from unnecessary or DoS traffic by control plane protection policy		
3	Switch should support for stringent security policies based on time of day of Layer-2 to Layer-4		
4	Switch should support for external database for AAA using: a. TACACS+ b. RADIUS		
5	Switch should support to restrict end hosts in the network. Secures the access to an access or trunk port based on MAC address. It limits the number of learned MAC addresses to deny MAC address flooding		
6	Switch should support DHCP Snooping		
7	Switch should support Dynamic ARP Inspection to ensure host integrity by preventing malicious users from exploiting the insecure nature of the ARP protocol		
8	Switch should support IP Source Guard to prevents a malicious hosts from spoofing or taking over another host's IP address by creating a binding table between the client's IP and MAC address, port, and VLAN		
9	Switch should support to prevent edge devices in the network not administrator's controled from becoming Spanning Tree Protocol root nodes		
10	Switch should support unicast and/or multicast blocking on a switch port to suppress the flooding of frames destined for an unknown unicast or multicast MAC address out of that port		
11	Switch should support Spanning tree BPDU protection		
12	Switch should support for MOTD banner or equivalent displayed on all connected terminals at login and security		

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	discrimination messages can be flashed as per banks ISD rules		
Manageability			
1	Switch should support for embedded RMON/RMON-II for central NMS management and monitoring		
2	Switch should support for sending logs to multiple centralised syslog server for monitoring and audit trail		
3	Switch should provide remote login for administration using: a. Telnet b. SSH V.2		
4	Switch should support for capturing packets for identifying application performance using local and remote port mirroring for packet captures		
5	Switch should support for management and monitoring status using different type of Industry standard NMS using: a. SNMP V1 and V.2 b. SNMP V.3 with encryption c. Filtration of SNMP using Access list d. SNMP MIB support for QoS		
6	Switch should support for basic administrative tools like: a. Ping b. Traceroute		
7	Switch should support central time server synchronization using Network Time Protocol NTP V.4		
8	Switch should support for providing granular MIB support for different statistics of the physical and logical interfaces		
9	Switch should support for predefined and custmised execution of script for device mange for automatic and scheduled system status update for monitoring and management		
10	Switch should provide different privilege for login in to the system for monitoring and management		
11	Switch should support Real time Packet Capture using Wireshark in real time for traffic analysis and fault finding		
IPv6 features			
1	Switch should support for IP V.6 connectivity and routing required for network reachability using different routing protocols such: a. OSPF V.3 b. BGP with IP V.6 c. IP V.6 Policy based routing d. IP V.6 Dual Stack etc e. IP V.6 Static Route f. IP V.6 Default route g. Should support route redistribution between these		

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	protocols		
2	Switch should support multicast routing in IP V.6 network using PIMv2 Sparse Mode		
3	Switch should support for QoS in IP V.6 network connectivity		
4	Switch should support for monitoring and management using different versions of SNMP in IP V.6 environment such as: a. SNMPv1, SNMPv2c, SNMPv3 b. SNMP over IP V.6 with encryption support for SNMP Version 3		
5	Switch should support syslog for sending system log messages to centralized log server in IP V.6 environment		
6	Switch should support NTP to provide an accurate and consistenttimestamp over IPv6 to synchronize log collection and events		
7	Switch should support for IP V.6 different types of tools for administration and management such as: a. Ping b. Traceroute c. VTY d. SSH e. TFTP f. DNS lookup		

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Sr. No.	Required Minimum Specifications "Annexure 16 B - Access Chassis based Switch" Make & Model: _____	Bidder's compliance (Yes / No)	Bidder's remarks
1	Should have Minimum expandability of 10 slot / modular Chassis based switch with in-built RPS		
2	Layer 3 switch with Backplane / Switch of atleast 460 Gbps and forwarding rate of 210 Mpps		
3	Layer 3 granular quality of service (QoS) features		
4	Should support 10 Gigabit port on fiber		
5	Should be capable of providing Port level redundancy		
6	Uplink should also be running on 10 Gigabit with fiber with 4 ports to connect to Core Switch		
7	Shared memory architecture		
8	19" rack mountable		
9	Full duplex operation		
10	Support for secured Web-Based Management		
11	Support for Enhanced STP functions		
12	Support for Gigabit interfaces – SX, LX, ZX, 1000BaseT		
13	High MTBF Support		
14	Operating LED Signal		
15	External PCMCIA Flash for storing OS & configuration files for High availability Design		
16	Temperature Alarm and Power Monitoring		
17	The Switches must be able to generate Syslog Messages with timestamp and Severity codes, which can be exported to a Syslog Server.		
18	The Switches must be able to Build up its own inventory (like Device Name, Chassis Type, Memory, Flash, Software ver. Etc)		
19	Switch should support 48 Ports (10/100/1000 Mbps) Line card		
	Layer 2 Features		
1	L2 Switching Support		
2	L2 Multi-Homing Support		
3	L2 Multicast Support – IGMP Snooping		
4	Multi-Link Trunking (GigaEtherchannel , Fast Etherchannel)		
5	Multiple Spanning tree Domain (802.1s), IEEE 802.1w rapid spanning tree and IEEE 802.3ad		
6	Multi Instance Spanning Tree support for Load sharing on redundant links and fast convergence time		
7	Spanning-Tree Protocol (IEEE 802.1D) per bridge group		
8	STP Fast Calculation		
9	Multicast must be supported in hardware so that performance is not affected by multiple multicast		

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	instances.		
10	Spanning-Tree Protocol (IEEE 802.1D) per bridge group		
11	STP Fast Calculation such as port-fast, uplink fast and backbone fast		
12	Support to achieve trunking between switches automatically		
13	To support atleast 500 VLANs/switch		
14	To support atleast 32K MAC addresses / switch		
15	To support bundling of multiple physical ports into a single logical channel, to offer aggregate bandwidth		
16	Wire speed performance Layer 2 Switching with 48 Gbps of Switching Fabric		
	Layer 3 Features		
1	Support for high-performance routing with support for RIPv1, RIPv2, OSPF		
2	Support for IP		
3	Support for VRRP or equivalent		
4	Layer 3 Multihoming		
5	Secondary Addressing		
6	Classless Interdomain routing		
7	Support for DHCP Interface Tracker		
8	Rip,OSPF,BGP Authentication support		
9	Route Redistribution from OSPF-RIP		
10	IPv4 Total Routes should be 256,000		
11	To support a minimum of 4000 ACL entries		
12	Wire speed performance Layer 3 Switching with 48 Gbps of Switching Fabric		
	Other Features		
1	Support for ACLs based on source and destination Media Access Control (MAC) addresses, IP addresses, or Transmission Control Protocol (TCP)/User Datagram Protocol (UDP) ports		
2	Support for ease of configuration of VLANs across switches (Virtual Trunking Protocol or equivalent)		
3	Support for auto-configuring trunks between switches (Dynamic Trunking Protocol or GUI, etc.)		
4	IEEE 802.1Q VLAN Support – Port based VLANs		
5	Support for Routed VLAN, Port based and QoS based ACLs		
6	Support for Multicast routing protocols (PIM) and Internet Group Management Protocol (IGMP) snooping in hardware, IP Multicast Support: IGMP snooping, supporting IGMP v1, v2 and v3		
7	Support for Distance Vector Multicast Routing Protocol (DVMRP) tunneling for interconnecting two multicast-enabled networks across non multicast networks		

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8	Support for industry standard Differentiated Services Code Point field (DSCP) and/or the 802.1p Class of Service (CoS) field.		
9	Classification and reclassification based on source/destination IP address, source/destination Media Access Control (MAC) address or the Layer 4 TCP/UDP ports.		
10	Ability to classify, reclassify, police, and mark the incoming packets before the packet is placed in the shared buffer.		
11	Scheduling using Weighted Round Robin (WRR)		
12	Congestion control via Weighted Random Early Detection (WRED).		
13	Support for rate-limiting via Committed Access Rate (CAR) with a granularity of increments of 64 Kbps		
14	Policy-based Routing Filters		
15	Should Support Multicast routing protocol like Pim sparse/dense/sparse-dense/bidirectional PIM		
16	In Service Software Upgrade Capability (ISSU)		
17	Web Cache Redirect Protocol/WCCP v1 & v2 or equivalent protocol.		
	Policy Based Quality of Services (PB-QoS)		
1	Policy Based QoS Support		
2	Per Port Priority Based QoS		
3	802.1p Support		
4	Priority Queues		
5	Bandwidth Engineering & Management – Per Port Minimum, Rate Limiting, excess bursting, shaping		
6	Support for L3/L4 filtering capabilities for inter VLAN traffic		
7	High Priority Transmit Queuing/strict queues.		
8	QoS-based forwarding based on IP precedence		
9	Strict Priority Queuing Support		
10	Port and Priority Rate Limiting		
11	Policing		
12	Weighted Random Early Detect Support		
13	Support for a minimum of 200 policies on ingress and 200 policies on egress		
	Redundancy		
1	Redundant Power Supply Unit		
2	Link Aggregation		
3	Non Stop Forwarding (NSF)		
4	Stateful Switch Over (SSO)		
5	Spanning Tree (802.1d) with support for spanning tree per VLAN		

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6	Redundant Switch Fabric			
7	Redundant Control Plane			
8	Should support redundancy protocols like HSRP, GLBP			
	Security Features			
1	Layer 3 /4 Access Control Lists (ACLs) standard and extended			
2	Security (User Access): Internal DB/External RADIUS /TACACS+			
3	Configuration Change Tracking			
4	System Event Logging			
5	Syslog			
6	Support for 802.1X Authentication			
7	MAC lockdown for port security			
8	Apply L3-L4 ACL to Intra-VLAN Traffic			
9	Port Based ACLs			
10	Apply L2 VACL to Intra-VLAN Traffic			
11	Port Security			
12	Hardware based broadcast control			
	IEEE Standard Compliance:			
1	802.1Q VLAN tagging			
2	802.1p Priority			
3	802.1D Spanning Tree			
4	802.3u Fast Ethernet			
5	802.3x Flow Control			
6	802.3z Gigabit Ethernet.			
7	802.3ab 1000Base-T (Gigabit Ethernet over Copper)			
8	Should also support Fiber Modules			

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Sr No	Required Minimum Specifications "Annexure 16 C - Firewall" Make & Model: _____	Bidder's compliance (Yes / No)	Bidder's remarks
Hardware Architecture			
1	The appliance based security platform should be capable of providing firewall, application visibility, and IPS functionality in a single appliance		
2	The appliance should support atleast 8 x 1 Gigabit Ethernet ports.		
3	The appliance hardware should be a multicore CPU architecture with a hardened operating system to support higher memory		
Performance & Scalability			
1	Should support atleast 250 Mbps of NGFW performance throughput (includes FW, Application Visibility & IPS)		
2	NG Firewall should support atleast 1,00,000 concurrent sessions		
3	NG Firewall should support atleast 7,000 connections per second with Application visibility		
4	NG Firewall should support atleast 30 VLANs		
NGFW Firewall Features			
1	Solution must be capable of passively gathering information about network hosts and their activities, such as operating system, services, open ports, client applications, and vulnerabilities, to assist with multiple activities, such as intrusion event data correlation, elimination of false positives, and policy compliance.		
2	Firewall should support creating access-rules with IPv4 & IPv6 objects.		
3	Firewall should support operating in routed & transparent mode		
4	Should support Static, RIP, OSPF, OSPFv3 and BGP		
5	Firewall should support manual NAT and Auto-NAT, static nat, dynamic nat, dynamic pat		
6	Firewall should support Nat66 (IPv6-to-IPv6), Nat 64 (IPv6-to-IPv4) & Nat46 (IPv4-to-IPv6) functionality		
7	Should support security policies based on security group names in source or destination fields or both		
8	Should be capable of dynamically tuning IDS/IPS sensors (e.g., selecting rules, configuring policies, updating policies, etc.) with minimal human intervention.		
9	Should be capable of automatically providing the appropriate inspections and protections for traffic sent over non-standard communications ports.		
10	Should be able to link Active Directory and/or LDAP usernames to IP addresses related to suspected security events.		
11	Should be capable of detecting and blocking IPv6 attacks.		

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12	Solution should support full-featured NBA capability to detect threats emerging from inside the network. This includes the ability to establish "normal" traffic baselines through flow analysis techniques (e.g., NetFlow) and the ability to detect deviations from normal baselines.		
13	The solution must provide IP reputation feed that comprised of several regularly updated collections of poor repuration of IP addresses determined by the proposed security vendor		
14	Should must support URL and DNS threat inetllifence feeds to protect against threats		
15	Should support Reputation- and category-based URL filtering offering comprehensive alerting and control over suspect web traffic and enforces policies on more than 280 million of URLs in more than 78 categories.		
16	Should support safe search and YouTube EDU enforcement		
17	Solution must be capable of passively gathering details unique to mobile devices traffic to identify a wide variety of mobile operating systems, mobile applications and associated mobile device hardware.		
18	Should support more than 3,000 application layer and risk-based controls that can invoke tailored intrusion prevention system (IPS) threat detection policies to optimize security effectiveness.		
19	NGFW OEM must have its own threat intelligence analysis center and should use the global footprint of security deployments for more comprehensive network protection.		
20	The detection engine should support capability of detecting and preventing a wide variety of threats (e.g., malware, network probes/reconnaissance, VoIP attacks, buffer overflows, P2P attacks, etc.).		
21	Should be able to identify attacks based on Geo-location and define policy to block on the basis of Geo-location		
22	The detection engine should support the capability of detecting variants of known threats, as well as new threats		
23	The detection engine must incorporate multiple approaches for detecting threats, including at a minimum exploit-based signatures, vulnerability-based rules, protocol anomaly detection, and behavioral anomaly detection techniques. Identify and explain each type of detection mechanism supported.		
24	Should support Open based Applicaion ID for access to community resources and ability to easily customize security to address new and specific threats and applications quickly		

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	Management		
1	The management platform must be accessible via a web-based interface and ideally with no need for additional client software		
2	The management platform must provide a highly customizable dashboard.		
3	The management platform must be capable of role-based administration, enabling different sets of views and configuration capabilities for different administrators subsequent to their authentication.		
4	Should support REST API for monitoring and config programmability		
5	The management platform must provide multiple report output types or formats, such as PDF, HTML, and CSV.		
6	The management platform must support multiple mechanisms for issuing alerts (e.g., SNMP, e-mail, SYSLOG).		
7	The management platform must provide robust reporting capabilities, including a selection of pre-defined reports and the ability for complete customization and generation of new reports.		
8	The management platform should support risk reports like advanced malware, attacks and network		
9	The management platform must include an integration mechanism, preferably in the form of open APIs and/or standard interfaces, to enable events and log data to be shared with external network and security management applications, such as Security Information and Event Managers (SIEMs), and log management tools.		

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Sr No	Required Minimum Specifications "Annexure 16 D – SFP Module"	Bidder's compliance (Yes / No)	Bidder's remarks
1	**SFP Module - 10 G Fiber Multimode (Qty – 64)** (The proposed model of SFP module should be of same OEM of Access Switch / Core Switch) **Make & Model:** _____		
2	**QSFP to QSFP active optical cables 10M (Qty – 2)** (The proposed model of DAC Cable should be of same OEM of Core Switch) **Make & Model:** _____		
3	**SFP Module - 1G Copper (Qty – 10)** (The proposed model of SFP module should be of same OEM of Access Switch / Core Switch) **Make & Model:** _____		