48 Port Level Two (Core) 10 Gigabit Layer 3 Ethernet Switch Specification – Qty 3 (Three)

1. **Architecture**

- The switch should have at least 48 SFP+ ports with each port should be of 10G-wire speed performance in non-blocking mode (fully populated from day 1).
- At least 2 nos. of uplink port of 40 Gbps (full populated with QSPF / QSFP+ from day 1).
- RoHS compliant hot pluggable SFP+ and QSPF / QSFP+ transceivers (multimode LC)
- Out-of-band interface for management
- Redundant hot swappable power supply (fully populated on the box) 1U/2U 19" Rack mountable
- Switch should support stacking or equivalent and their respective bandwidth should be 320 Gbps (full duplex) or above
- The switch should have minimum 4 GB DRAM and 512 MB Flash or more
- Switch should support 2000 VLAN IDs or more
- Switch should support jumbo frame size of 9216 bytes
- Switch should support VRF-lite
- Switch should support 960 Gbps or above switching capacity excluding stacking bandwidth
- Switch should have switching throughput of minimum 950 million pps (for 64Byte packets)
- MAC Address table size of 30,000 entries
- Support minimum 7.5k ACL/policy entries
- Switch should at least support 10000 routing entries for ipv4 and ipv6
- Switch should support active-active switch clustering or equivalent of 2 core switches to function as a single core and / or provide sub-second resiliency and failover
- The Switch should support MLAG or equivalent and VRRP or equivalent

2. **Quality of Service (QoS)**

- The switch should support IEEE 802.1p precedence, IP, and DSCP or Type of Service (ToS) precedence
- The Switch should be capable of Queuing, Policing, Shaping and marking Traffic based on Class of Service (CoS) or DSCP
- IPV6 QoS support
- At least eight egress queues per port to enable differentiated management of different traffic types across the stack for traffic

3. **Manageability**

- The switch should provide complete control of the switch with CLI and GUI. GUI should be browser independent (at least Firefox, Chrome and IE)
- The switch should support Ingress and egress port monitoring
- The switch should support Traceroute, ping and telnet
- The switch should support Multiple configuration files
- The switch should support sFlow (RFC 3176) or equivalent
- The switch should support SNMP v1, v2c and v3
- The switch should support Remote configuration and management
- The switch should support ISSU (In-Service Software Upgrade)

- The switch should support Network Time Protocol (NTP)
- TFTP (Trivial File transfer protocol) or any equivalent method for easy firmware upgrades and backup on the network
- Should be able to manage and monitor all stacked switches through a single management console.
- DNS client, DHCP client and DHCP relay agent
- Switch should provide restore option to restore to previous saved configuration
- The switch should support Graceful restart
- Switch should support role based access control
- Syslog support for logging
- The bidder should provide the Network Management Software for managing switch

4. **Switch Layer 3 Features**

- The switch should support Virtual Router Redundancy Protocol (VRRP) or equivalent for ipv4 and ipv6
- The switch should support Policy-based routing for IPv4 and IPv6
- The switch should support Equal-Cost Multipath (ECMP)
- Static and Dynamic routing protocols such as RIPv2, RIPng, OSPF, BGP etc. for IPv4 and IPv6
- Support for Dual stack and 6in4 tunnelling methods for IPv6 transition
- IP Multicast and PIM, PIM Sparse Mode and preferably PIM dense Mode & Source-Specific Multicast for Clients
- Switch should support Internet Group Management Protocol (IGMP) v1, v2, v3 snooping and multicast listener discovery (MLD) v1 and v2 snooping
- The switch should support Detection of Unidirectional Links
- The switch should support Dynamic Host Configuration Protocol (DHCP) relay
- Switch should support jumbo frames on all supported interface modes
- IPv4 and IPv6 ACLs
- Fully compatible with IPv6 from day 1

5. **Switch Layer 2 Features**

- The switch should support MAC-based VLAN
- The switch should support Address Resolution Protocol (ARP) and static ARPs entry
- The switch should support IEEE 802.3x Flow Control
- The switch should support IEEE 802.3ad Link Aggregation (number of ports/protocol supported)
- The switch should support STP (IEEE 802.1D), Rapid STP (RSTP, IEEE 802.1w), and Multiple STP (MSTP, IEEE 802.1s)
- The switch should provide support for atleast 2000 VLANs based on port, MAC address, IPv4 subnet, protocol, and guest VLAN
- Should support private VLAN or equivalent
- The switch should provide support for IGMP Snooping and filtering and MLD snooping
- The switch should provide full DHCP Snooping support for DHCP Snooping Option 82, DHCP Relay Option 82, DHCP Snooping Trust, and DHCP Snooping Item Backup
- Should support for Link Layer Discovery Protocol (LLDP)
- Traffic Mirroring based on PORT/VLAN to a local or Remote Switch
- 802.1 q VLAN encapsulation

- Auto MDI-x and Auto Auto-negotiating on all ports to automatically select half or full-duplex transmission mode to optimize bandwidth

6. **Security**

- The switch should provide IP Layer 3 & Layer 4 filtering based on source/destination IP address/subnet and source/destination TCP/UDP port number
- The switch should support RADIUS/TACACS+
- The switch should support Secure shell
- The switch should support IEEE 802.1X
- Port security to secure the access to an access or trunk port based on MAC address and to Limit the number of learned MAC addresses to deny MAC address flooding
- DHCP snooping
- Switch must support Dynamic ARP inspection (DAI)
- The switch must support MAC address notification to allow administrators to be notified of users added to or removed from the network - SNMP MIB support
- Flexible & multiple authentication mechanism e.g. 802.1X, MAC Authentication bypass.
- Port-based ACLs for Layer 2 interfaces to allow security policies to be applied on individual switch ports
- Switch should securely encrypt all access methods (CLI, GUI or MIB) through SSHv2/SSL or SNMPv3.
- DoS protection

7. **Software Defined Networking (SDN) Capability**

- Switch should be SDN ready from day 1
- Switch hardware should support OpenFlow v1.3 or above and should support Open Daylight SDN controller southbound API from day 1
- By software upgrade, switch should support higher versions of OpenFlow in future.

8. **Packaging contents**

- 48 port 10G switch(fully populated)
- AC power cord supporting residential voltage 220-250V,frequency 50Hz with D or M types of plug
- Rack Mounting kit
- CD with User manual or links
- Console cable
- SFP+, QSFP / QSFP+ Transceivers(Multi mode LC)
- QSFP / QSFP+ cables – 4 nos. 5 mts

9. **Operating Conditions and Certifications**

- Operating temperature should be between 0°C to 45°C in fully populated state
- FCC Class A
- VCCI Class A
- EN 55022 Class A
- EN 60950 or above
- NDPP or EAL
- UL 60950

- WEEE or RoHS

10. Warranty

- All the items offered / ordered, shall carry minimum 5 (five) years on site comprehensive warranty from the date of installation & commissioning
- All bundled license should be perpetual and should be quoted on Day 1
- SFP+ module should also carry minimum 1 year warranty from the date of installation and commissioning

11. Other Requirements

- For all requirements listed above, the necessary cables, connectors, external software media, manuals or any other hardware and software must be bundled and included in the Supply.
- Vendors should submit technical document showing the compliance to all the technical specifications mentioned in the annexure-1.

Abbreviations

GE	Gigabit Ethernet
SNMP	Simple Network Management protocol
NTP	Network time protocol
DNS	Domain name server
DHCP	Dynamic host configuration protocol
VLAN	Virtual LAN
RIP	Routing information protocol
OSPF	Open shortest path first
BGP	Border Gateway protocol
VRRP	Virtual route redundancy protocol
IGMP	Internet group management protocol
MLD	Multicast listener discovery
COS	Class of service
DSCP	Differentiated services code point
SFP+	Enhanced small form-factor pluggable
QSFP	Quad Small Form-factor Pluggable
IEEE	Institute of Electrical and Electronics Engineers

NOTE:

1. Bidder need to demonstrate Open Daylight SDN controller integration with the quoted switches applicable to all L2 (POE and non-POE) and L3 switches during the technical evaluation of the bids.

2. Bidder should quote products of same OEM for L3 core switches, L2 Non POE+ and POE+ switches mentioned under.

3. Technically qualified bids will be considered for further processing of commercial bids.

4. Bidder should provide single NMS (Network management software) to manage L3 core switches, L2 POE and POE+ switches mentioned should have the perpetual license for managing at least 35 switches from Day one

5. Grand total mentioned in the commercial bid and the respective terms and conditions will be considered for finalizing the L1 bidder.

6. Bidder should not quote products, which are going to be end-of-life / end-of-support three years down the line from the date of bidding.

7. Bidder should quote per unit price and the price should be valid for at least three months.

8. Bidder should supply the above items mentioned at the same unit price if NIA place on order with-in three months from the date of Purchase order.

9. Installation, configuration and support for 30 days for network architectural changes will be responsibility of the vendor.