



**NATIONAL INSTITUTE OF TECHNOLOGY
ROURKELA 769008 (ORISSA)**

No. NITR/CC/HOD/2009/M/1327

Dated: 2nd September, 2009

Proposals (technical and financial) are invited from reputed firms for supply and installation of network equipment against replacement of old equipment. The old equipment consists of Avaya switches. The scope of work also covers facility management support at NIT, Rourkela for managing the switches and hardware supplied under this tender. The specification of switches to be supplied (L2 and L3 switches), model number, number of switches connected and number of switches to be replaced are listed under heading of “Buyback of Avaya switches”. Details of scope of work, qualification and facility management conditions are also mentioned below under heading of “Facility Management Services”. Sealed proposal should reach the undersigned by **23rd September 2009**. The representatives of the firms should be present during the technical presentation.

Kindly frame your proposal in two parts: technical bid and financial bid. Both should contain bid for Network Infrastructure and FMS. Both proposals should be clearly marked and individually sealed. The two sealed proposals should be sealed in a larger envelope. The outer envelope should be superscribed with “Quotation for Supply of network infrastructure against replacement of old switches at NIT, Rourkela” and address it to “Head, Computer Center, NIT Rourkela, Orissa Pin- 769 008”. The quotation can be sent to the Institute by speed post or hand delivered before the time of tender opening. Important venues and dates are mentioned at the end.

The detailed infrastructure availability, scope of work, contract conditions, payment schedule and selection procedure are mentioned below:

A) AVAILABLE INFRASTRUCTURE

Management Software

- OPUtills 5.0
- OPManager v 7.0
- EPI Center version 5.0

Network Equipments

- L-2 Switches: Avaya make switches models P332GTML-12, P133G2-24, P134G2-48, P133GT2-24, P333T, P332GML (to be replaced)
- L-2 switches from extreme: 15040 Summit 200-48 (52 nos), 13240 Summit 200-24 (9 numbers) (These will be retained).
- L-3 Switches: BD 8810 from Extreme, C460 from Avaya (to be replaced) (The C-460 must be replaced. Infrastructure should be powered by two L3

switches of similar capabilities. The existing BD8810 if used should be upgraded with modules as per details of L3 switch)

- Firewall: SG208 and SG203 from Avaya (These can be taken back).

Network cabling Infrastructure

- Around 4000 I/O in Campus
- Approx. 12 K.M of FO cabling
- Nearly 20 distribution switches and 160 edge switches.
- Two Cyberoam 1500i and Cyberoam 500i ITM for network security/ gateway.
- Internet connectivity of 24 Mbps (12 MBPS from STPI and 12 MBPS from reliance)

Support Hardware

- Nearly 5 to 10 PCs of different make to manage the network.
- 24X7 operation of the infrastructure (Helpdesk staffs recruited for proper reporting)
- Diesel Generator power backup.
- Two 12 KVA UPS, one 8KVA UPS and one 5KVA UPS for uninterrupted function of network and servers

The network hardware and software can change during the period of service

B) SCOPE OF WORK:

I) Supply of new switches against buyback of Avaya switches:

The list of existing switches (Avaya make) with their quantity, model number are listed below:-

Existing Core Switch from Extreme						Remark
BD8810 1. Two management Slot (G8x) with 8 fiber port each 2. One Ethernet slot (G48T) with 48 ports 3. One Fiber Slot (G24x) with 24 ports 4. Three PSU						Can be reused on upgrade or replaced
Existing Core Switch from Avaya						Remark
C460 1. Two management module (M460ML-SPV) 2. Two Fiber module (M4612ML-G) each 12 port 3. Two Ethernet module (M4612ML-G) each 12 port 4. Three PSU						To be replaced with new switch
Existing L2 Switches from Avaya	Existing			To be replaced		Remark
	10 ports	24 ports	48 ports	24 ports	48 ports	
P333T: 10/100 Mbps ethernet port switch with x330w-2usp card		2			1	

P332GML: 10 numbers of 1Gbps fiber ports switch with two uplink fiber port	2					This feature has been incorporated in the L3 switch. Hence will be taken back
P332GTML: Two numbers of 1 Gbps uplink fiber ports and 10 nos 1Gbps ethernet port switch	16			16		
P133G2: Two numbers of 1 Gbps uplink fiber ports and 24 nos 10/100Mbps ethernet port switch		10		10		
P134G2: Two numbers of 1 Gbps uplink fiber ports and 48 nos 10/100Mbps ethernet port switch			4		4	
P133GT2: Two numbers of 1Gbps uplink ethernet ports and 24nos 10/100Mbps ethernet port switch		66		21	30	One 24 port switch must be POE enabled
Extra in Hand					2	
Total	18	78	4	47	37	

II.) Facility management services:

The scope of work under this head includes following:

- Support network infrastructure, maintenance and upgrades
- Provide day-to-day troubleshooting, design, and maintenance of network.
- Must have enough experience with all facets of LAN/WAN implementation and maintenance
- Ensures global infrastructure standards and policies are implemented
- Design, implement and manage LAN Switching environments (VLANs, Spanning Tree, ACL) and resolving LAN problems
- Experience in implementing QOS and performing Traffic Engineering
- Conceiving network design based on the Institutional requirements and manage it till implementation.
- Knowledge of IP traffic flow, sniffing, capturing and monitoring of live traffic streams
- Must possess a thorough working knowledge of multi VLAN environments
- Coordination with vendors for various requirements
- Experience in network design, operational support, hands-on implementation and configuration of network infrastructure.
- Configuration & troubleshooting routers, managed switches, LANs and WANs, Routing Protocols, VLAN & Access List
- Administer Cyberoam and core switches
- NATting, Firewall management, tracking intruders, spammers and flooding machines.
- Reporting of STPI and Reliance performance and disconnection etc.
- Fault finding in network architecture.

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- Tracking spam and flooding etc in network.
- Public IP distribution and management.

Recommended Personnel Requirement for providing services:

In order to provide the above mentioned services the service provider should depute personnel at the institute. The recommended personnel requirement and their qualification for sustaining these activities are as follows:- at least 2 network administrators should be posted by the firm for network administration. Out of the two network administrators one will be senior administrator and other one will be assistant administrator. The number of administrators mentioned are as per our estimate. Firms are permitted to quote considering higher manpower requirement if they feel necessary as per the scope of work/ service.

Qualification & job responsibility for Network Administrator (one)

Qualification:

- BE/ B.Tech with 1 year experience or Diploma with minimum 8 years of experience.
- Engineers having good experience on L-2 and L-3 switch configuration and Network Management Software
- He should organize, prioritize & allocate workload for optimum efficiency and possess required managerial and leadership skills to lead the team.
- Ability to be proactive in assessing and preparing for future needs in regards to network architecture.
- Responsible for core design strategies, along with monitoring and adjusting network topology
- Ability to diagnose, troubleshoot and recommend solutions.
- Ability to determine the root cause of chronic issues
- Proficient in Configuring & Troubleshooting

Desirable:

- Certification in networking will be an added advantage.

Job Description

- Management of the total infrastructure as detailed in the document. Ensure 24X7 service/ system availability including network protection, disconnection of equipments flooding the network etc.
- Coordinate with server administrators and site engineers related to network equipment or cabling for complete network management.

Qualification & job responsibility for Network Assistant Administrator (one)

Qualification:

- BE/B.Tech or Diploma with minimum 5 years of experience
- Engineers having good knowledge on L-2 & L-3 Network Management Software

Job Description:

- Work under supervision of network administrator
- Coordinate Server Administrator, Network Administrator and Site Engineer related to fault finding, new installation of network equipments etc.
- Make call log for whenever problem found in lease line or network devices covered under AMC or warrantee.

Note:

All above professionals are expected to work at odd hours whenever the need arises in order to keep the service available uninterruptedly.

C) CONTRACT CONDITIONS:

D) Buyback of Avaya switches:

1. Bidders should quote for supply and installation of switches separately with 3 years and 5 years comprehensive onsite warranty. Comparative analysis will be based on 3 years only. The bidder should breakup this quoted value into item wise per year basis so that any number of items can be procured for future expansion if required.
2. The BD8810 from extreme can be reused or replaced and C460 from Avaya should be replaced. Both core switches must be same brand and should be configured for load sharing and failover. Each of the core switches should have at least three empty slots after following ports provided:-
 - a. 10G Fiber Ports: 16 nos (Each core switch should be populated with 8 nos. of 10G fiber ports)
 - b. LR XFP module: 16 nos (Each core switch should be populated with 8 nos. of 10G fiber ports)
 - c. 1G Fiber Ports: 24 nos (must be available with the switch to be replaced with C460)
 - d. 10/100/1000BASE-T RJ45 ports: 48 nos (must be available with the switch to be replaced with C460)
 - e. Management module: two (must be available with the switch to be replaced with C460)
 - f. Additional suitable power supply units with N+1 redundancy (must be available with the switch to be replaced with C460)
 - g. 70 nos. of LX trans-receivers should be provided along with the above switches. The trans-receivers should be of the same make as the switches provided.

- Each core switches should have capability to support 16K ACLs
3. Both core switches and distribution switches should have feature to support VOIP and convergent solution to be implemented later. The switch should be capable of 200 simultaneous calls on VOIP. The firm should have capability to integrate the IP network with existing Siemens/Hicom exchange for connectivity with existing telephone networks. On the VOIP network the voice data will be separately handled after the distribution switch. The edge switches need not have this capability. Vendor should provide commercial and technical quote for this convergent solution but it will be an optional component for this bidding.
 4. All switches should support 10/100/1000 Mbps
 5. All the network switches should be of the same manufacturer.
 6. Network Management Software (NMS) should be included in the offer for easy management of switches. This should provide a single point of management, monitoring and configuration for the switches. The proposed NMS should be able to manage the entire network consisting of the proposed switches and the existing

switches which will be retained (mentioned in Section A above). The existing NMS components can be re-used for this purpose, if required.

7. All the switches must be manageable through single management software
8. Detailed specification for L2 and L3 switches is attached in *Annexure-A*

II.) Facility management system

- The total cost of FMS quoted must be breakup designation-wise per year for the staffs recruited by service provider.
- The number of personnel to be posted is a suggestive minimum requirement guideline for the work based on our experience. Service providers have the liberty to depute more manpower than mentioned above.
- In order to attract quality manpower, service providers should spend at least 75% of the bill amount in the form of salary paid to the staff posted at NIT, Rourkela. Proof in this regard should be presented in form of salary statement from bank when asked for.
- The service provider must arrange training at their own cost to the deputed engineers for upgradation of technical knowledge whenever required so that they can be capable to handle the challenge due to new setup at Computer Center like addition of new network equipment or implementation of new management software etc so that network service at NIT should not be affected.
- Performance assessment report must be prepared at least once in a month taking views of Head, Computer Center and concerned authority for networking at Computer Center which is required to send to Head, Computer Center every month along with the bill for FMS. If performance assessment is not found satisfactory for three times per year then they may be replaced immediately with competent engineer by the service provider at the direction of the Institute.
- All the staffs should coordinate with all fellow staffs like staffs for server administration, software development and desktop support etc. in troubleshooting any common issue related to servers or client PCs as and when necessary.
- Monthly call execution report must be send to Head, Computer Center and concerned authority for networking at Computer Center.
- The personnel posted at the institute can avail leave as per the company rules limited to 30 days of leave per year for each person. If the period of leave is more than 7days continuous, the company must provide substitute emergency staff. Leave must be taken with approval of Head, Computer Center through concerned authority for networking at Computer Center with proof of prior approval from the service provider. Leave without prior approval or information to Head, Computer Center or concerned authority for networking at Computer Center will be treated as leave without pay for those days. The staff must be available in phone to answer any queries whenever raised during his leave period.
- Personnel should take backup of configuration, ACLs etc of the products regularly.
- Personnel should carry out the system audit and health checks on a quarterly basis and sends report to Head, Computer Center and authority for networking at Computer Center by email.
- Personnel should send traffic utilization and CPU utilization report weekly basis to Head, Computer Center and authority for networking at Computer Center by email.
- Any/all changes and/or alterations carried out by the FMS team would be only under formal instructions from NIT.

- Personnel should maintain an updated site documentation sheet including the setup deployed at site, user manuals, topology maps etc. to concerned authority for networking at Computer Center by mail whenever updated.
- Bachelor accommodation in student hostel and married accommodation in hostel will be provided to the personnel posted subjected to availability of rooms.

D) PAYMENT SCHEDULE:

- On delivery and after successful completion of installation and configuration of network equipments with existing infrastructure, 100% of part-I (Supply and Installation of switches) payment will be made. If required, NIT can open LC for procurement of the switches against foreign exchange.
- Payment on part-II (FMS) shall be released on satisfactory performance basis. The bill can be raised for payment on beginning of each month in advance. The payment will be made by 15th of the month.

E) THE SELECTION PROCEDURE:

The selection of the service provider shall be made by a process of combined quality and cost using the following procedure.

- Bidders are requested to bid separately for above two items (supply and installation of switches and FMS) each having separate technical and financial bid.

Technical Bid:

Supply and Installation of switches:

It should contain a) the credential of the firm b) network equipments with specification etc.

FMS:

It should contain proposed administrative, personnel structure, qualification and expertise for key personnel either existing or to be recruited.

Financial Bid:

Supply and Installation of switches:

It should contain buy back offer from Avaya switches with separately with 3 years and 5 years comprehensive onsite warranty. **Comparative analysis will be based on 3 years only.** The bidder should breakup this quoted value into item wise per year basis so that any number of items can be procured for future expansion if required.

FMS:

It should contain the total cost of **FMS per year.** The quoted value should be breakup into designation-wise per year for the staffs recruited by service provider so that number of staffs can be extended if required in future.

- Separate prices are to be quoted for the scope of work under part-I (Supply and Installation of switches) & part-II (FMS). Selection will be made on the basis of total score (part-I & part-II), for which order will be placed together to one party.

- The techno-commercial proposal will be examined by committee appointed by Director. The firms are invited to make a presentation/ interview on the day of tender open. They must bring one of the senior level personnel to the institute for discussion.
- The technical bid and financial bid for supply and installation of switches and FMS will be evaluated separately. The total weightage will be 100 marks. Out of which, marks assigned for supply and installation of switches is 70 marks (30 technical + 40 financial) and FMS is 30 marks (20 technical + 10 financial).
- The committee will assign scores to each firm out of above mentioned full score (30 for supply and installation of switches and 20 marks for FMS) based on technical evaluation. Technical marks for firms will be announced to the bidders before the financial bids are opened. Financial bids of firms which will be judged to be poor in performance in technical evaluation (less than 60%) will not be opened. Firms whose financial bids are considered unworkable in view of prevailing market condition will be rejected.
- The financial bids of the remaining firms will be rated according to the following formula:-

$$\begin{array}{l} \text{Supply and installation of switches:} \\ \text{Points} = \frac{40 \times \text{lowest bid value}}{\text{Quoted bid value}} \end{array}$$

$$\begin{array}{l} \text{FMS:} \\ \text{Points} = \frac{10 \times \text{lowest bid value}}{\text{Quoted bid value}} \end{array}$$

- Both technical and financial points for “supply and installation of switches” and FMS will be added together. The Firm securing highest point will be awarded the contract.

For further information regarding this document following persons may be contacted:

For additional queries please contact:

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Important dates and Venues:

Last date for receipt of tender	23 rd September 2009 (03.00 P.M.)
Venue for submission of tender in case of hand delivery:	Computer Centre
Date and time for Technical bid evaluation	23 rd September 2009 (03.00 P.M.)
Date for tender opening	23 rd September 2009 (03.00 P.M.)
Venue for opening and evaluation of bids	Computer Center
Financial evaluation of bids	23 rd September 2009 (05.00 P.M.)

Firms are strongly advised to be present during the tender opening and finalization. They are also advised to come with one of the proposed systems administrators for the purpose.

Durga Prasad Mohapatra
Head, Computer Centre
NIT, Rourkela

Tender document approved

Director,
NIT, Rourkela
Date: 20th August, 2009

1. Specifications of Core Switch (1 no.)

Performance

- 700Gbps switching fabric minimum.
- Minimum of 5 usable slots for payload modules with 3 empty slots after providing required number of ports as given in this section below. Each slot should be capable of providing 40 GBPS unidirectional bandwidth minimum
- Should have processing engine redundancy & Power supply redundancy.
- The processing redundancy can be 1:1 or on load-sharing basis. In the event of failure of primary/secondary engine in load sharing operation, the available engine should take up minimum 50% of the load. With 1:1 redundancy configuration in event of failure of primary engine the secondary should take the full load with in sub-seconds.
- The power supply redundancy should be at least 1:1, 2:1 or 3:2.
- Architecture should be distributed switching from day 1
- Switch should be non blocking.
- Full-Duplex Operation on Ethernet and gigabit Ethernet ports.
- Multiple Load Sharing Trunks.
- Hot-Swapping: Multiple Fans in single Tray, payload Modules, Power Supply modules.
- Temperature Alarm and Power Monitoring.
- Layer 2 hardware forwarding support at 400 Mpps (minimum) .
- Layer 3 hardware-based IP Forwarding routing support at 400 Mpps(minimum).
- No performance penalty with advanced Layer 3/4 services enabled.
- Support for at-least 32,000 Media Access Control (MAC) addresses.
- Hardware-based multicast management.
- The switch should have IPV6 support in hardware with the performance of up to 200 Mpps (minimum), IPv6 should be available from day one.
- Support for minimum 16K Hardware-based ACLs system wide.
- The offered switch should be provided with 24 nos. of 1000BaseX ports
- Switch should support 10-Gigabit connectivity. 8 nos. of 10-Gigabit ports need to be provided with 8 nos. of 10GBaseX ports out of which 4 ports need to be populated with LR XENPAK/XFP/SFP+ transreceivers. Both the L3 switches should have these capabilities.
- Switch to be populated with 48nos of 10/ 100/ 1000BaseT ports
- The supplier will configure the switch in connection with the existing core switch for satisfactory operation of the network in load sharing manner.
- The switch should have facility for controlling the number of broadcast, multicast and unicast packets at each port.
- Support for VoIP.

Layer 1 Feature

- Support for 100BASE-FX, 10/100/1000BASE-T, 1000BASE-SX,-LX and long haul (-LX/ LH, -ZX) full duplex and 10G

Layer 2 Features

- Layer 2 hardware forwarding rate of 400 Mpps (minimum).
- Layer 2 switch ports and VLAN trunks.
- IEEE 802.1Q VLAN encapsulation.
- Support for 4000 configurable VLANs per switch.
- Per-VLAN spanning tree (PVST).
- Support for IEEE 802.1d STP and IEEE 802.1w RSTP.
- IGMP snooping v1 and v2.
- Support for IEEE 802.1ad link aggregation protocol.
- Should support MAC address tracking and notification mechanism of MAC address addition or deletion through Syslog and snmp.
- Must support Layer 2 traceroute and fault diagnosis tools.

Layer 3 Features

- Hardware-based IP Forwarding routing support at 400 Mpps(minimum).
- Static IP routing.
- Support for Open Shortest Path First [OSPF], Routing Information Protocol [RIP], RIP2), BOOTP.
- IGMP v1, v2, and v3.
- IGMP filtering on access and trunk ports.
- IP multicast routing protocols: PIM-SM and PIM-SSM
- Full Internet Control Message Protocol (ICMP) support.

Sophisticated QoS and Traffic Management

- Per-port QoS configuration.
- Support for eight queues per port in hardware.
- Strict priority queuing.
- IP differentiated service code point (DSCP) and IP Precedence.
- Classification and marking based on IP type of service (ToS) or DSCP.
- Classification and marking based on full Layer 3/4 headers (IP only).
- Input and output policing based on Layer 3/4 headers (IP only).
- Support for 1000 aggregate traffic rate limiting policers.

Comprehensive Management

- Single console port and single IP address to manage all features of the system.
- Support for easy back up and update of software.
- Manageable through network management software on a per-port and per-switch basis providing a common management interface for routers and switches.
- SNMP v1, v2, and v3 instrumentation, delivering comprehensive in-band management .
- Command-line interface (CLI)-based management console to provide detailed out-of-band management.

- Remote Monitoring (RMON) software agent to support four RMON groups (history, statistics, alarms, and events) for enhanced traffic management, monitoring, and analysis.
- Traffic mirroring Analysis support, including ingress port and egress port with remote mirroring.

Advanced Security

- RADIUS, which enable centralized control of the switch and restrict unauthorized
- users from altering the configuration.
- Standard and extended ACLs on all ports.
- 802.1x user authentication.
- Standard and Extended Access control list for packet filtering based on L2,L3,L4 and Vlan parameters
- Should support Time Based ACL
- Dynamic Host Configuration Protocol (DHCP) support.
- Automatic CPU rate limiters for DoS protection.
- Support for IEEE 802.1x for end point security.

2. Specifications of 24-port Gigabit Switch (16 nos.)

Switch Port densities and Performance:

- The switch should have the capability to support 24 10/100/1000 Base T ports with auto-speed and auto-polarity, and 4 ports SFP (mini-GBIC shared), with an optional slot for dual 10 Gigabit module.
- The switch should have the capability to support more than 88 Gbps of switch fabric bandwidth
- The switch should have the capability to support 65 Mpps
- The switch should support flexible 10G option with 10G SFP+ /10G XFP /10G XENPAK
- The switch should support 8000 MAC addresses
- The switch should support rate limiting and should be capable of achieving rate limiting granularity of 64kbps
- The switch should support up to 1k configurable standards based IEEE 802.1Q VLANs
- The switch should support IEEE 802.1v (VLAN classification by protocol and port),
- The switch should support Private vlan configuration on edge as well as 802.1q trunk ports.

Availability Features:

- The switch should have support for Redundant power supplies
- The switch should support standards based IEEE 802.3ad
- The switch should have support for Spanning Tree Protocol (STP) IEEE 802.1D, Rapid Spanning Tree Protocol (RSTP) IEEE 802.1w
- The switch should support multiple instances of STP domain using 802.1s as well as PVST+ interoperability.

Security Features:

- The switch should have Broadcast, Multicast and unknown Unicast storm control.
- It shall be possible to selectively enable / disable Address learning / packet flooding as per requirement on a per port basis.
- The switch should support standards based IEEE 802.1x to authenticate and protect networks at the point of entry
- The Switch should support Network Login – 802.1x, web and MAC-based mechanisms
- The Switch should Support policy based traffic redirection.
- The switch should be capable of supporting Hardware based access control lists (ACLs) linked to a class of service, perform Layer 1-4 packet-level security and control traffic flows at wire-speed
- The switch should support MAC address security to lock-out unauthorized equipment
- The switch should support hardware based sFlow sampling technology
- The switch should support port one to one and one to many mirroring.
- The switch should support selective traffic mirroring based on Access List classifier.
- The switch should support remote port mirroring.
- The switch should support line rate Access Control Lists (ACLs) based on Layer2 MAC addresses, Layer 3 IP source/destination address or Layer 4 TCP/UDP port addresses.
- The switch should support Denial of Service (DoS) protection, MD5 authentication of routing protocols.
- The switch should support RADIUS based Authentication and Accounting and TACACS+.

Scalability Features:

- The switch should support 4 hardware based Quality of Service (QoS) queues
- The switch should support Jumbo frames to efficiently utilize high performance connections
- Support IPv6 in hardware + software
- Should support ipv6 access list and ipv6 over telnet and SSH

Management Features:

- The switch should support Secure Shell (SSH2) encryption for remote telnet management connections across the network and SCP protocol.
- The switch should support snmpv1,snmpv2 ,SNMPv3 for insuring authentication and privacy for management applications
- The switch should support multiple firmware images as well as multiple configuration files.
- The switch should support configuration rollback in case of corrupted configuration.

- The switch should support inbuilt browser based bandwidth utilization and error monitoring. If a separate software is required the same it needs to be included in the quotation.
- Should support notification of Mac address addition

Protocols and Standards Support:

- The switch should have support for switching protocols like IPv4, IRDP, , BOOTP relay, DHCP client, DNS client, UDP, IP, ICMP, TCP, ARP, IEEE 802.1D, IEEE 802.1w, IEEE 802.1Q and RMON
- The switch should support Link Layer Discovery Protocol (LLDP), IEEE 802.1ab, for discovering and maintain accurate network topologies.
- The switch should have support for Quality of Service (QoS) and Policies like, IEEE 802.1p, ort , including 4 queues/port/ Diffserv
- The switch should have support for IEEE 802.1Q based VLAN tagging, IEEE 802.3ad static and dynamic configuration (LACP), IEEE 802.1v for VLAN classification by Protocol and Port, Port-based VLAN,
- The switch should have support for IGMPv1, IGMPv2, IGMPv3, IGMP snooping
- The switch should support HTML, HTTP, Telnet, SSHv2 Telnet management, Secure Copy (SCPv2), SYSLOG, SNTP.
- The switch should have support for security standards like RADIUS, TACACS+, Access profiles, port based network access, MAC address security and lockdown

3. Specifications of 24-port Layer-2 Switch (30 nos.)

Physical interfaces

- 24 ports 10/100BASE-T with auto-speed and auto-polarity
- 2 ports Gigabit Ethernet (SFP mini-GBIC, shared with 2 10/100/1000BASE-T ports)
- 1 port Serial (control port)
- 1 10/100BASE-T out-of-band management port

Performance

Minimum 8.8 Gbps switch fabric respectively.

Minimum 6.5 Mpps frame forwarding rate respectively.

Layer 2 and Protocol support

- Must support Link Layer Discovery Protocol (LLDP), IEEE 802.1ab for discovering and maintain accurate network topologies.
- Must Support 4000 IEEE 802.1Q based VLAN IDs with minimum 1000 configurable VLANs
- IEEE 802.1v for VLAN classification by Protocol and Port, IEEE 802.1Q, IEEE 802.1ad Virtual MANs
- IEEE 802.3ad static and dynamic Link aggregation (LACP), up to 8 members per trunk

- Must support for general routing and switching protocols : IPv6 support, BOOTP/DHCP, DNS, UDP, IP, ICMP, TCP, ARP, , IEEE 802.1D, IEEE 802.1w, IEEE 802.1Q, Per-VLAN spanning tree, Port Aggregation, Port Mirroring , Denial of service Protection."
- "IGMPv1, IGMPv2, IGMP V3 and IGMP V1/V2/V3 Snooping, static IGMP membership, Multicast VLAN registration

Quality of Service and Security

- Support for Quality of Service (QoS) and Policies like, IEEE 802.1p
- Support for 4 hardware queues
- 9216 Bytes Maximum Packet Size (Jumbo frame support)
- Support for port based security to prevent unauthorized stations from accessing the switch by restricting the number of MAC addresses allowed to access the port as well as by statically configuring the MAC address.
- Multi User authentication on Port for Network login i.e multiple supplicant support
- Rate Limiting Granularity: 64Kbps
- Must support for security standards like RADIUS, TACACS+, Access profiles, port based network access, MAC address security and lockdown/limit, IP Source lockdown
- IP Security – RFC 3046 DHCP Option 82 with port and VLAN ID
- IP Security – Trusted DHCP Server
- Layer 2/3/4 Access Control Lists (ACLs) based on MAC, IPv4 and IPv6 address or TCP/UDP port.
- Should support MAC address tracking and notification mechanism of mac address addition or deletion through Syslog and snmp.
- Must support Layer 2 traceroute and fault diagnosis tools.

Management

- Web based management based, Command Line Interface (CLI), telnet, SSH2, SCP2, TFTP, RMON1 and 2, SNMPv1, SNMPv2, SNMPv3 ,sFlow or equivalent
- Multiple Images, Multiple Configs
- Comprehensive end-to-end management through a SNMP based Network Management system.

4. Specifications of 24-port Layer-2 Power over Ethernet (PoE) Switch (1 no.)

Physical interfaces

- 24 ports 10/100BASE-T with auto-speed and auto-polarity
- Should support 802.3af Power over Ethernet on all 24 ports of 10/100Base-T
- 2 ports Gigabit Ethernet (SFP mini-GBIC, shared with 2 10/100/1000BASE-T ports)
- 1 port Serial (control port)
- 1 10/100BASE-T out-of-band management port

Performance

Minimum 8.8 Gbps switch fabric respectively.

Minimum 6.5 Mpps frame forwarding rate respectively.

Layer 2 and Protocol support

- Must support Link Layer Discovery Protocol (LLDP), IEEE 802.1ab for discovering and maintain accurate network topologies.
- Must Support 4000 IEEE 802.1Q based VLAN IDs with 1000 configurable VLANs
- IEEE 802.1v for VLAN classification by Protocol and Port, IEEE 802.1Q, IEEE 802.1ad Virtual MANs
- IEEE 802.3ad static and dynamic Link aggregation (LACP), up to 8 members per trunk
- Must support for general routing and switching protocols : IPv6 support, BOOTP/DHCP, DNS, UDP, IP, ICMP, TCP, ARP, , IEEE 802.1D, IEEE 802.1w, IEEE 802.1Q, Per-VLAN spanning tree, Port Aggregation, Port Mirroring, Denial of service Protection.
- "IGMPv1, IGMPv2, IGMP V3 and IGMP V1/V2/V3 Snooping, static IGMP membership, Multicast VLAN registration

Quality of Service and Security

- Support for Quality of Service (QoS) and Policies like, IEEE 802.1p
- Support for 4 hardware queues
- 9216 Bytes Maximum Packet Size (Jumbo frame support)
- Support for port based security to prevent unauthorized stations from accessing the witch by restricting the number of MAC addresses allowed to access the port as well as by statically configuring the MAC address.
- Multi User authentication on Port for Network login i.e multiple supplicant support
- Rate Limiting Granularity: 64Kbps
- Must support for security standards like RADIUS, TACACS+, Access profiles, port based network access, MAC address security and lockdown/limit, IP Source lockdown
- IP Security – RFC 3046 DHCP Option 82 with port and VLAN ID
- IP Security – Trusted DHCP Server
- Layer 2/3/4 Access Control Lists (ACLs) based on MAC, IPv4 and IPv6 address or TCP/UDP port.
- Should support MAC address tracking and notification mechanism of mac address addition or deletion through Syslog and snmp.
- Must support Layer 2 traceroute and fault diagnosis tools.

Management

- Web based management based, Command Line Interface (CLI), telnet, SSH2,SCP2, TFTP, RMON1 and 2, SNMPv1, SNMPv2, SNMPv3 ,sFlow
- Multiple Images, Multiple Configs
- Comprehensive end-to-end management through a SNMP based Network Management system.

5. Specifications of 48-port Layer-2 Switch (37 nos.)

Physical interfaces

- 48 ports 10/100BASE-T with auto-speed and auto-polarity
- 2 ports Gigabit Ethernet (SFP mini-GBIC, shared with 2 10/100/1000BASE-T ports)
- 1 port Serial (control port)
- 1 10/100BASE-T out-of-band management port

Performance

Minimum 13.6 Gbps switch fabric respectively.

Minimum 10.1 Mpps frame forwarding rate respectively.

Layer 2 and Protocol support

- Must support Link Layer Discovery Protocol (LLDP), IEEE 802.1ab for discovering and maintain accurate network topologies.
- Must Support 4000 IEEE 802.1Q based VLANs with minimum 1000 configurable VLANs
- IEEE 802.1v for VLAN classification by Protocol and Port, IEEE 802.1Q, IEEE 802.1ad Virtual MANs
- IEEE 802.3ad static and dynamic Link aggregation (LACP), up to 8 members per trunk
- Must support for general routing and switching protocols : IPv6 support, BOOTP/DHCP, DNS, UDP, IP, ICMP, TCP, ARP, , IEEE 802.1D, IEEE 802.1w, IEEE 802.1Q, Per-VLAN spanning tree, Port Aggregation, Port Mirroring, Denial of service Protection.
- "IGMPv1, IGMPv2, IGMP V3 and IGMP V1/V2/V3 Snooping, static IGMP membership, Multicast VLAN registration
- Should support MAC address tracking and notification mechanism of MAC address addition or deletion through Syslog and snmp.
- Must support Layer 2 traceroute and fault diagnosis tools.

Quality of Service and Security

- Support for Quality of Service (QoS) and Policies like, IEEE 802.1p
- Support for 4 hardware queues
- 9216 Bytes Maximum Packet Size (Jumbo frame support)
- Support for port based security to prevent unauthorized stations from accessing the witch by restricting the number of MAC addresses allowed to access the port as well as by statically configuring the MAC address.
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- Rate Limiting Granularity: 64Kbps
- Must support for security standards like RADIUS, TACACS+, Access profiles, port based network access, MAC address security and lockdown/limit, IP Source lockdown
- IP Security – RFC 3046 DHCP Option 82 with port and VLAN ID

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- IP Security – Trusted DHCP Server
- Layer 2/3/4 Access Control Lists (ACLs) based on MAC, IPv4 and IPv6 address or TCP/UDP port.

Management

- Web based management based, Command Line Interface (CLI), telnet, SSH2,SCP2, TFTP, RMON1 and 2, SNMPv1, SNMPv2, SNMPv3 ,sFlow or equivalent
- Multiple Images, Multiple Configs
- Comprehensive end-to-end management through a SNMP based Network Management system.
