 Ref No. (PR No. 1000037580)   **(Rfx No. 6100001823)**

Technical specification of Stop Gap Switch

IIT Bombay is inviting proposals from potential bidders to supply stop-gap switches for the backbone of the IIT Bombay network.

This document outlines the technical specifications for the equipment, cables, and other accessories. For the commercial phase evaluation of the bid, it is mandatory for bidders to include the following points in the total bid price:

I) A comprehensive warranty for 5 years.

ii) 2 years of Annual Maintenance Contract (AMC).

The formula calculation for the total project cost will be found in the bill of materials.

1.0 Overview

The current infrastructure of the IIT Bombay network operates on a 3-tier system, comprising the Academic area, Hostel area, and Residential area.

Academic Area:

   Encompassing over 30 departments, centers, schools, and Interdisciplinary Programs.

   Includes a network supporting 30+ labs.

Hostel Area:

   Extends across 18 hostels, forming an integral part of the network.

Residential Area:

   Encompasses a total of 175 buildings, contributing to the comprehensive reach of the residential network.
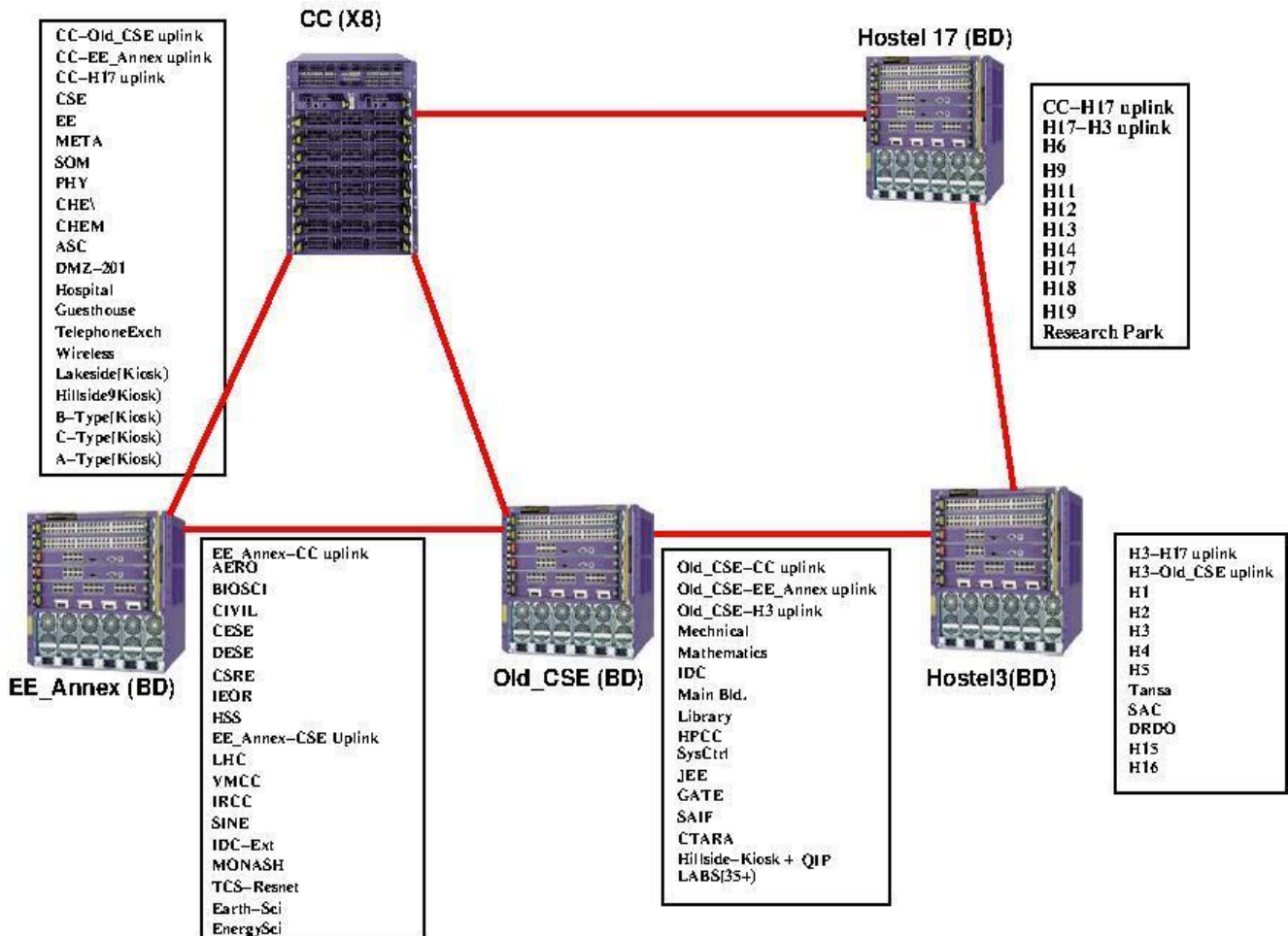
This multi-tiered structure serves the diverse needs of the institution, providing connectivity and support across academic, hostel and residential networks.
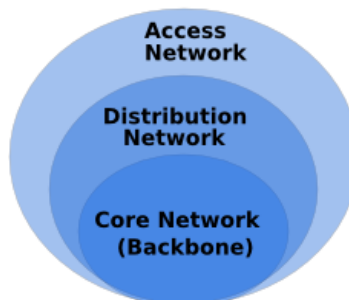
2.0 Existing Network Infrastructure

IIT Bombay has five backbone network switches and each one of the distribution switch connected with a IIT Bombay backbone network with 10Gbps up-link. IIT Bombay Core network topology is given below. Each Department Hostel network topology is similar to the three tier network.

IIT Bombay Core Network

CC (X8)

CC–Old_CSE uplink
CC–EE_Annex uplink
CC–H17 uplink
CSE
EE
META
SOM
PHY
CHE\
CHEM
ASC
DMZ–201
Hospital
Guesthouse
TelephoneExch
Wireless
Lakeside(Kiosk)
Hillside9Kiosk)
B–Type(Kiosk)
C–Type(Kiosk)
A–Type(Kiosk)

Hostel 17 (BD)

CC–H17 uplink
H17–H3 uplink
H6
H9
H11
H12
H13
H14
H17
H18
H19
Research Park

EE_Annex (BD)

EE_Annex–CC uplink
AERO
BIOSCI
CIVIL
CESE
DESE
CSRE
IEOR
HSS
EE_Annex–CSE Uplink
LHC
VMCC
IRCC
SINE
IDC–Ext
MONASH
TCS–Resnet
Earth–Sci
EnergySci

Old_CSE (BD)

Old_CSE–CC uplink
Old_CSE–EE_Annex uplink
Old_CSE–H3 uplink
Mechnical
Mathematics
IDC
Main Bld.
Library
HPCC
SysCtrl
JEE
GATE
SAIF
CTARA
Hillside–Kiosk + QIP
LABS(35+)

Hostel3(BD)

H3–H17 uplink
H3–Old_CSE uplink
H1
H2
H3
H4
H5
Tansa
SAC
DRDO
H15
H16

3.0 Goal of Proposed Network Stop Gap Switches

Upon the successful completion of the procurement of stop-gap switches, the network aims to achieve the following features:

Resilience:
1. Ensure network uptime during the failure of any existing backbone switch.

Uplink Upgrades:
1. Upgrade the uplinks of existing wing switches from 1 Gbps to be 1/10/25Gbps ready.

Backbone Enhancement:
1. Upgrade the backbone to distribution links from 10Gbps to be 40Gbps/100Gbps ready.

Security Features:
1. Implement L3-L7 security features as specified in the provided specifications.

2. Incorporate advanced L2 security features such as MAC to IP address binding, Time-based ACL in the access switches, Storm Control, DDOS protection, IPv6 security measures, and SDN-based Fabric.

IPv6 Readiness:

1. Enable IPv6 readiness across all hostel networks.

SDN Integration:

2. Implement SDN-based fabric readiness for all hostel networks.

3. Network Management:
   a. Ensure comprehensive network manageability through standardized protocols and compatible commercial network management software.
   b. Include network traffic in-depth analysis for effective monitoring and control.

These goals collectively contribute to fortifying the network infrastructure, ensuring scalability, security, and future readiness, with a specific emphasis on critical L2 security features.

The total bill of quantities for these active network components is given in ***Annexure-II***

4.0 Qualification Criteria for Bidder and OEM

The bidder/OEM's qualification will be determined based on their ability to execute this project and provide continuous support.

The Bidder/OEM should submit the tender documents with the indexing as mentioned in the criteria shown below with the proof of supporting documents. The sequence with page numbers and bookmarking should be clearly specified. In addition to the supporting documents, an undertaking for the fulfillment of each eligibility criteria should be submitted.

The Bidder and OEM should satisfy the following criteria.

Sr. No.	Eligibility Criteria	Compliance (Yes / No)	Submit the Proof Documents
1	OEM must be in the core business of networking equipment (L2 and L3 Switches) and must have a presence for a minimum of 3 years in India.		
2	The bidder should be an authorized representative of the OEM. The bidder shall furnish the manufacturer's authorization (MAF) letter from the respective OEMs, specific to this tender mentioning the tender number for which bid the authorization is being provided.		
3	OEM should have 24x7x365 fully functional service and support center's in India. that can guarantee during the warranty and AMC period that any replacement if required can be done within 24 hours/Next business day. Provide the relevant documents.		
4	Bidder should be an OEM-certified network switches solution supplier and integrator.		

5	The OEM/ bidder should have an annual turnover of at least INR 1 crore from system integration involving Supply, Installation, Testing, Commissioning, and Maintenance of IT infrastructure i.e. Network Business in each of the last three financial years		
6	The OEM/ bidder must have experience in Supply, Installation, Maintenance of Installation of LAN Networking solutions at any Government / Semi-Govt. / Government Undertaking / PSU / Institution / Educational Institutes of Higher Learning during previous 3 years ending last day of month previous to the month of publication of this tender, as under: I. At least one project with a value of Rs. 1 crores OR II. At least two projects with a value of Rs. 50 Lakhs each OR III. At least three projects with a value of Rs. 35 Lakhs crores each.		
7	The Bidder should have at least 10 network-certified engineers on their payroll for a minimum period of one year as on the date of submission of the bid. The bidder should provide the technical staff certificates, roll list, and resume of their employees in the excel sheet format with relevant documents as proof. Further, these resources should have prior experience in the implementation/maintenance of projects like Campus-wide LAN, management, designing, and commissioning of such projects.		
8	Bidders should have implemented at least one project at a single customer location in India, consisting of a minimum of 100 access (L2) Switches and 25 distribution (L3) switches during the last 5 years. The proof for this should be duly supported by the relevant purchase order copies/customer agreements if any. The bidder shall furnish attested true copies of all these documents and customers' contact details.		
9	The bidder should be a solution supplier and integrator of an authorized OEM.		
10	The bidders should demonstrate all the specified features in the switches as the technical evaluation process as part of PoC whenever it is required.		
11	An undertaking (self-certified) is to be submitted by the bidder that neither the OEM nor the bidder should have been blacklisted for security or for any other reason by any state or central government in India or by any public sector unit in India to date.		
12	The proposed OEM product shall not be declared the end of support and end of life for the next 7 years from the date of submission of the bid.		
13	All network switching components (distribution switches(L3), transceivers (SX, LX, LR Modules), Stacking cables and Network Management Software (NMS), etc.)		

	from the same OEM.		
14	The offered products distribution switches(L3) solution against the supply order shall be of the latest version, the latest product, and should be under support for the next 7 years. However, if any product, which is declared an end of life by the OEM during the supply period of material (During the Contract period), the bidder should supply a replaced model or next higher model/version with the same specification of higher specification of the product.		
15	The support facilities should be fully owned by the bidder / OEM and managed by their permanent employees (company payroll) and not through franchisee(s).		
16	The bidder should have local support in Maharashtra.		
17	Bidder/OEM Should have India toll free customer support.		
18	Technical Assistance Centre (TAC) and research and development (R&D) should be based in India.		
19	The bidder should have valid documentary proof of GST registration number.		
20	The bidder should have a positive net worth during the last three financial years.		
21	It is mandatory to enclose all the supporting documents.		
22	OEM should be in the Gartner's Leaders quadrant for consecutive 3 years at least.		

5.0 Scope of Work and Terms & Conditions

The bidders who have the capability to provide a TOTAL TURNKEY solution which includes

1. The bidders shall supply, including transportation to the site, install, configure and demonstrate all the specified features in the switches as a total turnkey solution.
2. The bidders shall provide all the documentation including Architecture, Design, Deployment diagrams, test plans, operating and service manuals and test reports of the deployed LAN switches, both in hard and electronic copy versions.
3. The bidders should provide all documents/manuals useful for daily administration.
4. The bidder shall bear all costs during the preparation and submission of the proposal, site visit (if required) etc.
5. The bidder must provide verifiable eligibility criteria documents to support their claims.
6. No new information will be accepted from the bidder after the submission of the bids. However, IIT Bombay may ask for clarifications if required, on submitted information to evaluate the bid. The bidder should respond to such clarification requests within the specified time defined by IIT Bombay during that phase.
7. Due to an extremely strict deadline for incurring the expenditure, IIT Bombay has the right to cancel the PO if the delivery, installation and acceptance testing is not completed within the stipulated timeline. Specifically

    7.1 Amend as: Delivery should be within 8-12 weeks of issuing of PO.

    7.2 Installation, commissioning, and acceptance testing should complete within 4 weeks of delivery.
8. The bidder shall provide a comprehensive warranty for the first 5 years and AMC for the subsequent 2 years. The payment for AMC will be paid half-yearly, subject to satisfactory performance to be certified by Indentor
9. The warranty period is to be counted from the date when the installation is completed and the acceptance certificate has been issued by IIT Bombay.
10. The installation will be executed by certified and trained engineers from Bidder/OEM for the complete LAN solution followed by well documented, comprehensive user training.
11. Any item not specifically mentioned in the technical specification solution and bill materials but is required for successful implementation of the total overall solution (in the solution proposed by Bidder/OEM) must be brought to our notice and Bidder/OEM should include all the necessary components in the bid without any cost of product and licensing to the IIT Bombay.
12. At the time of installation, if it is found that some additional hardware or software items are required to meet the operational requirement of the configuration, but not included in the OEM's original list of deliverables, the Bidder/OEM shall supply such items to ensure the completeness of the configuration at no extra cost and within the stipulated time.
13. The entire installation should be done at the proposed site only. Requests for remote access for installation/fine-tuning will not be entertained during the installation period.
14. The covering letter and all the proforma should be submitted on the company letterhead of the bidder, along with the technical proposal.
15. Bidders should quote for the products and models specified in the Technical Specification Table with service level agreement as mentioned in the document elsewhere. If the specific model is not available, the bidder can quote for a product with higher specification and capability and compatibility. Bidders cannot quote for products with inferior specifications.

16. Bidders have to be awarded by OEM as one of their certified partners and bidders also have to produce such certificates.

17. The bidder should attach a compliance sheet with each of the specifications, and configuration manuals and reference documents with proof of compliance.

18. We reserve the right to reject the quotation of any bidder who violates these conditions and reserve the right to cancel the tender at any time.

19. An undertaking of acceptance of the above terms & conditions should be given by the Bidder on their letterhead.

20. OEM must have support Centre's in India.

21. Any complaint / Breakdown call reported should be attended on the same day within 2 hours by the local resident engineers or city allocated engineer of the Bidder. The resolution of critical calls will be resolved within 8 hours while non-critical issues will be resolved within the next day.

22. Warranty: Each product deployed in the network shall be with a comprehensive on-site OEM warranty (including labours and spares) for the 5 Years starting from the date of Acceptance of the project implementation. IITB as well as the selected bidder should be able to log a call with the OEM as per the support contract offered. The service agreement contract copy from the OEM should be submitted to IITB within the 3 months after the award of the contract.

23. Delivery and Installation Schedule.

   a) The time duration for the complete roll-out of the proposed solution is up to 18 weeks from the date of the formal purchase order. After issuing the purchase order, failing which the penalty clauses mentioned in the PO will be levied.

   b) For the Site Not Ready (SNR) case, the bidder is required to submit a certificate signed by Network Project Coordinator to IITB. However, regarding the readiness of the site, the decision of the Project Coordinator will be final. No penalty will be imposed for Site Not Ready (SNR) cases.

Annexure I: Detailed Specifications of Distribution switch (Layer 3) and also used for PoC:

Sr.No	Item	Specification	Compliance (yes/ No	Remark
1.	Type	a. Layer 3		
2.	48 Port version all fiber ports	a. 48 ports 1G/10G/25G each with 1G/10G/25G SFP Fiber ports should support both SM/MMF. b. The 4 uplink ports of 40G/100G Ethernet over fiber (LR SFP) should support both SM/MMF. c. Packet Forwarding Rate:1000 Mpps. d. Switching capacity 3.2Tbps. e. The switch should support a fully non-blocking operation with wire-speed switching architecture. f. 16K ipv4 Routes, 6K ipv6 routes. g. 50K ARP records, 250 VRF. h. 16GB RAM, 16 GB Flash. i. Packet Buffer 32MB.		
3.	Layer 3 Support	a. RIP v1 & v2, OSPF, OSPFv3 VRRP, BGP, BGP4, VRF, IPV6, OpenFlow/ Sflow / NetFlow. b. Policy-based routing from day 1. c. BFD (Bidirectional Forwarding Detection), route distribution, unicast reverse path forwarding. d. IPv4/IPv6 neighbour discovery, source guard. e. 6 in 4 tunnels (ipv6 to ipv4 tunnel).		
4.	Multicast	a. IGMP v1/v2/v3, IGMP filtering/ IGMP snooping. b. Multicast VLAN Registration or equivalent. c. Amend as: Multicast VLAN Registration or PIM-SM or equivalent. d. PIM, PIM-SM, PIM-SSM (Protocol Independent Multicast) e. MLD snooping. f. The switch should support priority queuing and support 8 hardware QoS queues per port. g. The switch should support DSCP.		
5.	Layer 2 Security	a. Rate limiting/Shaping based on Port, IP address and MAC address. b. Port-based ACL. c. MAC to IP address binding, Port to MAC address binding.		

		d. MAC limiting, MAC address tracking/movement and notification. e. DHCP Snooping, DHCP relay, DHCP option 82 with Port/VLAN ID. f. DHCP Server or DHCP Server Solution for IPv4 and IPv6. g. RA Guard, DHCP Guard. h. Port-based security- 802.1x, Port-based network access control. i. BPDU Guard or equivalent. j. Per-port Unicast, broadcast, multicast storm control. k. Layer 2 traceroute. l. 1 to many port mirroring. m. MAC authentication, Web authentication. n. Role-based policy. o. IP security (ARP protection). p. SNMP, SSH, TELNET ACL to access the switch for admin and user restrictions.		
6.	L2 Protocols	a. Support for IEEE 802.1D (STP & RSTP and MSTP), IEEE 802.1Q, 802.1w, 802.1s b. Support for IEEE 802.3ad Link aggregation and load sharing. c. Support for IEEE 802.1AB LLDP. d. Port//MAC based VLAN. e. MVRP 802.1ak or equivalent.		
7.	Switch Management	a. Command Line Interface (CLI), SNMPv1, SNMPv2, SNMPv3. b. Secure Shell (SSH1& SSH2), SCP, SFTP and Telnet. c. Support for TFTP, NTP. d. Support for RMON I & II. e. RADIUS authentication enabled centralized control of switch over (ipv4 and ipv6) for AAA. f. Web-Based Management. g. The switch should support Python/TCL/ Restconf Language scripting for automation. h. Should support open API for third-party application integration. i. API support to remote configuration and scripting. j. ping, traceroute. k. The switch should support multiple firmware and configurations to restore easily from Flash.		
8.	QoS	a. ACL based on L2/L3/L4 headers. b. Rate limiting/ Shaping/ Policing/Marking.		

		c. IEEE 802.1p, DiffServ.		
9.	Hardware	a. Wire-speed ACL enforcement. b. Wire-speed Storm control. c. ASIC based hardware for high performance. d. IPV6 support. e. Out of band IP base management port. f. sflow/netflow or equivalent support. g. Firmware should be latest in nature.		
10.	Redundancy	a. Redundant power supply (220V 50 Hz). b. Hot-swappable power supply and fan tray.		
11.	SDN/ Automation	a. Software Defined Networking (SDN) based fabric network, equivalent Capability support from day 1. b. OpenFlow/RESTCONF/Netconf or equivalent protocol capability to enable Software Defined networking. c. This solution enables Virtualization and segregating, segmentation/dynamic segmentation users and services with isolation zones. d. The solution should provide automated configuration of services (VLAN, Multicast), etc. end to end with minimal human intervention. (The vendor should showcase the automation technology). e. The solution should be able to build virtualized L2 and L3 encapsulated tunnels or fabric across multiple switches. f. Should with IPv4 and IPv6. g. The Solution should support any topology regardless of the number of switches connected. h. The SDN based Fabric solution should support network automation from Day 1. i. The OEM/Bidder should provide all the requisite hardware and licenses for the SDN based Fabric from Day 1. j. The switch should support VXLAN for similar overlay technology. k. Required orchestration tools to automate SDN based fabric networks should be provided from day 1. l. The proposed solution for Software Defined Networking and analytics should be on-premise. m. The Software Defined Networking and network switches from the same OEM.		

Annexure-II: Bill of Quantities (Active Components: Must include 5year Warranty)

Sr. No.	Item	Quantity	Unit Price	Total Cost
1.	Distribution Switch L3 (as per specification 48X 1/10/25G Fiber port) with uplink with 40/100Gbps data speed support (As per technical specification) with console cables. This includes the installation, configuration and support for 5 years.	3	R1	3*R1
2.	10G SM Fiber module SFP+ (LR)	12	R2	12*R2
3.	Comprehensive AMC for items 1-3 for a period of 2 years (Four hours response time with 99% uptime commitment. This should be available on a 24x7 basis.) Please quote the percentage charge for each year. (This is R3.) See below for the definition of C1.	1	R3 (Max 10%)	2*C1*R3/100

C1 = 3*R1 + 12*R2

Total Value of Project = C = C1 + 2*C1*R3/100

6.0. Service Level Agreement and Warranty:

All the following conditions must be agreed upon.

1. Proposed Products (software, firmware, and hardware) should have a comprehensive OEM onsite warranty pack for 7 years (5 years warranty and 2 AMC) for the entire shipment starting from the date of installation.

2. IIT Bombay as well as the selected bidder should be able to log a call with the OEM as per the support contract offered.

3. The service agreement contract copy should be submitted to IIT Bombay within the 3 months after the award of the contract.

4. The defects, if any, during the guarantee/warranty period are to be rectified free of charge by arranging free replacement wherever necessary.

5. During the warranty period, OEM/bidder will have to undertake comprehensive maintenance of the entire hardware components, equipment, software support supplied by the vendor at the place of installation of the equipment (each six-month time span).

6. A letter of commitment for five years from the date of installation, concerning Hardware Software, and Firmware support from OEM should be enclosed in the bid cover. Offers will be rejected if they are not accompanied by a letter from the OEM.

7. Technical support from Bidder/OEM should be provided for system administration/ maintenance of the switching solution during the entire warranty period.

8. OEM/Bidder should protect any data during any upgrades of hardware/ firmware/ OS.

9. The OEM/Bidder must submit the name of the service engineers employed by them who are competent to serve the switching installation, along with their contact details in India, working knowledge of basic networking switching, routing and SDN setup (viz. installation, Configuration, Licensing, ACL Policy and Management, etc.) to IIT Bombay CC Network Team.

10. An inventory of common parts that require replacement shall be made available to IIT Bombay a prior on-site.

11. This comprehensive onsite warranty includes but is not limited to software releases, up-gradation and bug fixes.

12. The OEM to be quoted by the bidder must have local Technical Assistance Centre (TAC) support in India through a toll-free number and Returned Materials Authorization (RMA) depot in India. Where customers can directly log a complaint against any failure.

13. Delivery and Installation Schedule.

    a) The time duration for the complete roll-out of the proposed solution is
       up to 18 weeks from the date of the formal purchase order

    b) For the Site Not Ready (SNR) case, the bidder is required to submit a certificate signed by the Network Project Coordinator to IITB. However, regarding the readiness of the site, the decision of the Project Coordinator will be final. No penalty will be imposed for Site Not Ready (SNR) cases.

14. It is reiterated that the AMC will be paid at the start of the 6th and 7th years.

15. Documentation to be provided (After installation)

    15.a.   Network survey for proposed locations of IIT Bombay campus.

    15.b.   Step by step installation guide and configuration of switching solution fro start

15.c.   Network L2 and L3 Switches configuration and integration with IIT Bombay existing setup.

15.d.   Basic troubleshooting and Hands-on L2 security features like MAC to IP address binding and Time-based ACL in the access switches, Storm Control, DDOS, IPV6, SDN based Fabric, and network management with the network traffic in-depth   analysis, etc features are critical for this network.

15.e.   Any other document/manual useful for daily administration.

15.f.   The technically qualified bidder should provide hands-on training of detailed configuration and debugging methodology to the CC network Team. It may be on-premises or in OEM/Bidder location, without charge.

Annexure III: Performance Statement proforma (for a period of last three years)

Name of the firm: _____

Order Placed by (full name and address of the purchaser)	Order number and date	Description and quality of the ordered equipment	Value of order	Date of completion of delivery as per contract	Date of actual completion of delivery	Reason of late delivery if any	Has the equipment been installed properly? (submit a certificate from the purchaser)	Contact person along with contact details

Annexure IV: Certificate of Completed Work from Past Customers

(Furnish this information for each work from the CUSTOMERS referred in the few previous Form for whom the work was executed)

1. Name of work / Project and Location
2. Agreement/Purchase Order Number
3. Estimated Cost
4. Tendered Cost
5. Date of Start
6. Date of Completion
    6.a. Stipulated date of completion
    6.b. The actual date of completion
7. Amount of compensation levied for delayed completion if any.
8. Performance on HPL Benchmark using CPU cores of HPC system (in TFlop/s)
9. Performance report:

    a. Quality of Work: Excellent/ Very good/ Good/ Fair

    b. Resourcefulness: Excellent/ Very good/ Good/ Fair

    c. Responsiveness: Excellent/ Very good/ Good/ Fair

    d. Accessibility to management when needed: Excellent/ Very good/ Good/ Fair

10. Name of Institute/ Chief Project Manager or Equivalent
11. Contact Details
12. Would you award work again to this supplier   Yes/ No

Date:

Place:

Signature (with Seal)