Technical Pre qualification Criteria	
Sr. No	**Description**
1.	The bidder should be either OEM of network Active Components who is willing to undertake total scope of work or an authorized system integrator of the active OEM having direct purchase and support agreement with OEM for last 3 years. The system Integrator shall submit a letter of Authorization from OEM (NAC) for this specific tender. The Certificate / Authorization Letter specific to this tender must be enclosed with the Technical Bid, without which the offer shall be liable for rejection.
2.	Bidder shall be an existing network & security integrator of similar enterprise network setups for last 5 years.
3.	The bidder should have implemented similar switching and security as part of the previous tenders. At least one proof should be submitted alongwith bid.
4.	Bidder should be a highest status of partnership with OEM
5.	The Bidder should have experience in executing Enterprise Networks. The Bidder should have successfully executed Enterprise networks during the last 3 years in any one of the following: a. Three Enterprise Networks, each order value of not less than the 4 Crores on Lease Rental or 2.5 Crores on outright purchase basis, Or b. Two Enterprise Networks, each order value of not less than 5 Crores on Lease Rental / 3.5 Crores on outright purchase basis, Or c. One Enterprise Network order value of not less than 8 Crores on Lease Rental / 5 Crores on outright purchase basis. **The implementations should be of the same OEM whose product is being quoted.** (The executed work under consideration should be of total Solution and Infrastructure Setup, which consists Fiber optic cable laying, High end Chassis switches, Distribution switches etc, along with Network monitoring systems) In addition Bidder should have a minimum of 3 years of experience of Annual Maintenance/Lease rental contract for Enterprise Network in government or public sector. **Order copies of works Executed and annual AMC/Lease Rental contract should be provided by Bidder along with the Techno-commercial Bid.**
6.	The bidder should be ISO 27001 or ISO 20000 certified as per Global Standards. Proof should be submitted along with bid.
7.	Bidder shall have a 24 x 7 operational, Network Operations & Technical Assistance Center of its own. No tie-ups for NOC with third parties/ signed partners would be acceptable. **Proof should be submitted along with bid.**
8.	Bidder should have professionals with expert level certification from the OEM of the quoted products and also having experience of implementing / maintaining Enterprise Network Solution/ Data Centre certified professionals. List of certified professionals to be submitted.

Name: Company Seal

Signature: with Date:

9.	The bidder should provide all the switches, NMS, AAA server, email and web security solution and desktop video conferencing solution from a single OEM.
10.	The bidder shall provide all the passive cabling components from single OEM
11.	The Bidder should be able to provide the support for quoted network actives technology and the equipment for a minimum period of 8 years. Bidder shall give commitment letter in this regard.
12.	All Software Updates of active components shall be provided during the entire 5 year lease period at no extra cost. Bidder shall give commitment letter in this regard.
13.	Bidder should have PF no./ESI no./Medical policy for executing the contract.
14.	OEM shall have Technical Assistance Center (TAC) operating in India.
15.	Bidder and OEM should have sound financial position in the market, should be earning profit since last three years and should not be involved in any bankruptcy issues. Refer Annexure-IV Form-D.
16.	Bidder should not be black listed by any Government/Government agency/PSU/Financial institution in India till the time of submission of Bid. Bidder should give undertaking in the prescribed format. Refer Annexure-IV Form-H.

SCOPE, TERMS & CONDITIONS

1 General

1.1 The term vendor shall apply to successful tenderer. The vendor is the lessor and BHEL, Ranipet (A Govt. of India Undertaking) is the lessee.

1.2 The vendor shall supply, install, commission and maintain on a turn-key basis, the equipment, detailed in the lease orders hereinafter referred as "Lease Orders" placed by BHEL on the vendor from time to time which will fulfill the functional requirements as defined in scope of supply.

2 Lease / Prices

2.1 The lease period shall be 5 years after the successful commissioning and acceptance of the complete system.

2.2 Lease payment will be paid on quarterly basis, at the end of each quarter. Deduction of downtime if any shall be made from quarterly lease rental value. Refer Clause 9 of this annexure.

2.3 The payment of lease charges will be made on quarterly basis after completion of each quarter and submission of invoices(s) in triplicate. Payment will be released within 45 days of submission of verified invoices.

2.4 **Loading factor for non-acceptance of BHEL Payment Terms**: Offer with deviations to BHEL Payment Terms will be loaded at the Base Rate of SBI + 2% for the period of relaxation sought by bidder for deviated amount for the purpose of evaluating the lowest bidder. Offers with advance payment or payment less than 30 days of submission of verified invoices will be rejected. In no case BHEL shall accept liability towards any interest payments.

2.5 Prices shall remain firm without any variation during contract period. No interest whatsoever shall be payable by BHEL on any amount due to the vendor.

2.6 Lease charges are inclusive of regular hardware maintenance support, all taxes and duties.

2.7 The vendor shall be responsible for payment of excise duty, custom duty, all other state/central/local govt. taxes, freight and insurance up to equipment-installation-sites in BHEL Ranipet and during the lease period.

2.8 The Bank guarantee shall be paid along with the acceptance of order. The Bank guarantee shall be equivalent to 10% of the total quarterly lease rental for all the equipment valid for the complete lease period. Refer Form –J of Annexure-IV

2.9 **Loading factor for non-acceptance of Performance Bank Guarantee** valid for the complete lease period or acceptance of Performance Bank Guarantee with lesser percentage or lesser period than specified: Will attract disqualification of the offer.

2.10 The Bank Guarantee (PBG) shall be released only on expiry of the claim period, provided there has been no claim by BHEL on the Supplier.

2.11 The insurance coverage should be comprehensive with provisions for theft, fire, floods, riots etc. The responsibility for the insurance will rest with the vendor. Evidence of insurance policy shall be submitted to BHEL.

2.12 In case of any taxes which are reimbursable to BHEL in form of Cenvat etc. will be considered for payment.

2.13 BHEL may go in for additional quantity of equipment/software. The vendor shall extend the same rates for 12 months from the date of PO for the additional equipment / software to be installed

at BHEL Ranipet. Any requirement after 12 months from the PO date will be subject to mutual consent.

2.14 The benefit of depreciation under IT act and other related statuary provisions for the equipment supplied by the vendor under this contract will be claimed by BHEL after capitalisation of goods in its books. The vendor will furnish all relevant documents to enable BHEL to claim benefit of depreciation.

2.15 The Lease Charges are calculated quarterly. BHEL agrees that vendor may assign the Lease Charges in favor of third party ("Assignee") and consents (subject to prior approval from BHEL) to such assignment of the Lease Charges by the vendor to the Assignee. BHEL agrees that the vendor may disclose any information or documents that it may consider necessary to help the vendor exercise these rights subject to NDA (Non Disclosure Agreement) clauses.

2.16 Pursuant to the assignment of the Lease Charges by the Vendor to the Assignee, all amounts payable to the vendor under this agreement by BHEL shall be payable by BHEL to the Assignee. Responsibilities and obligations of BHEL and the vendor under this Agreement shall remain unchanged, notwithstanding the assignment of Lease Charges in favor of the Assignee.

3 Delivery

3.1 The vendor shall deliver the equipment within 10 weeks of the placement of order and install the active components within 14 weeks of the placement of order and commission the whole network within 16 weeks of the placement of the order.

3.2 BHEL reserves the right to ask for a delayed delivery of a part of network equipment.

3.3 Hardware/software configuration shall be deemed as incomplete or undelivered, if any component of hardware or software within the configuration or main documentation related thereto is not delivered and if delivered is not operational or not acceptable after testing/examination.

3.4 **Liquidated Damage (LD)**:
In case the delivery, installation and successful commissioning schedule for the Equipment is not adhered to, penalty at the rate of 0.5% of the amount equivalent to four quarterly rentals of the goods in arrears per week (subject to a maximum of 10%) shall be levied by BHEL on the vendor. However, in the event that the delay occurs on account of fault of BHEL including on account of failure of BHEL to ensure site preparation, the obligation of BHEL to pay Lease Charges shall be deemed to have begun on the date it would have otherwise begun if the commissioning schedule was adhered to.

3.5 This penalty will be deducted from the first quarter rental charges, in case the penalty amount to be deducted is more than the first quarter rental charges, the same will be adjusted from the consecutive quarter.

3.6 **Loading Factor for non-acceptance of Penalty Clause**: Will attract maximum 10% loading on the offer and accordingly proportionate percentage will be loaded for accepting lesser percentage of penalty clause. Example: If the Supplier has accepted for maximum 2% penalty clause, then balance 8% will be loaded for evaluating lowest bidder.

3.7 If equipment is not delivered and commissioned to the satisfaction of BHEL as per schedule, BHEL shall have the discretion to enter into a contract/lease with another vendor at the risk and cost of the vendor with notice.

3.8 **Risk Purchase**

Alternatively, BHEL at the option will be entitled the contract and to purchase elsewhere at the risk and cost of the seller either the whole of the goods or any part which the supplier has failed to deliver or dispatch within the time stipulated as aforesaid or if the same were not available, the best and the nearest available substitute therefor. The supplier shall be liable for any loss which the purchaser may sustain by reason of such risk purchases in addition to penalty at the rate mentioned in Clause 3.4 above.

Similarly, the 'Risk Purchase' option shall be exercised by BHEL for spares and services in case of excessive downtime or poor maintenance support. Such expenses will be deducted from any payment due to the Bidder from BHEL. Bidder is responsible for the integration/maintenance of the equipment purchased under 'Risk Purchase' clause.

4 Scope of Work

Migration of existing 1Gbps campus to network to high speed 10Gbps backbone network on 5 year lease rental basis consisting of following:

4.1 Supply, installation, testing, commissioning and maintenance of networking/security equipment/desktop video conference/software/passives as per specified configuration including Inter VLAN routing, Multitrunk linking, network segregation, firewall configuration, separate security zones etc.

4.2 Supply, installation, testing and commissioning of Computer Systems along with system software for infrastructure management, like network & security management.

4.3 LAN/WAN IP schemes proposal & configuration.

4.4 Integration of existing infrastructure (routers/firewall etc) with the new setup.

4.5 Supply, installation, testing, commissioning and maintenance of UPS at various locations. All UPS batteries to be changed after 2.5 years and also as and when they fail. All the UPS batteries shall be replaced in the last quarter of the lease contract. Electrical work along with the required cables and accessories to connect the UPS with the switches is in vendors scope.

4.6 Supply and installation of racks for mounting of network equipment & Computer Systems including dressing of cables in the racks using cable managers with Velcro.

4.7 Supply, laying, termination, testing and maintenance of F/O cable, UTP cable.

4.8 Replacing the existing Cat 5E cables to Cat 6 cables.

4.9 Repairing/replacing any fiber/UTP during full lease period, cut due to any reason whatsoever, will be done by the vendor. BHEL shall not bear any cost for the same.

4.10 Supply and installation of all passive components including I/O, Back boxes, Light Interconnect Units (LIUs), Patch panels, Patch cords, connectors etc required to complete the work on structured cabling concept.

4.11 Supply of all cable laying accessories including GI/MS conduits, PVC pipes/channels, supporting structures, clamps, identification tags, ferules, cable route markers etc required for laying of cables. The vendor shall include in his scope, any digging work required for laying of cables.

4.12 Minor civil works such as chipping / cutting of floors for making grooves, making holes/opening through walls, ceiling or floors, drilling of holes through steel structures and frames, grouting of frames, hooks on walls/ceiling etc. required for execution of work. After erection, surface shall be made good by plastering / painting to their original shape and finish. Road cutting, if any, shall also be resurfaced and brought to their original shape and finish.

4.13 Civil works required for OFC laying across National Highways and Railway track should be included in vendors scope.

4.14 Dismantling of existing networking equipment after successful testing & commissioning of the proposed network. The existing networking equipment shall be bought back by vendor.

4.15 Training on Network administration at OEM/OEM certified centre premises as well as on site, as per mutually agreed training plan.

4.16 Supply of all relevant documents/drawings/test certificates and manuals (Hardcopy as well as on CD).

4.17 Acceptance Testing based on agreed ATP document.

4.18 Comprehensive maintenance of entire network equipment/passive including existing network passives which shall become the part of new network for entire 5 year lease period.

4.19 Revamping of Data centre which includes supply and installation of the following

- Precision AC
- UPS
- Electrical distribution
- Civil and interior work
- Genset
- Rodent Repellent System
- Fire Detection System
- High Sensitivity Smoke Detectivity System

4.20 BHEL's involvement during each stage of implementation shall be ensured by the vendor.

4.21 Wherever possible, existing passive components such as fiber and copper can be reused.

4.22 Vendor should demonstrate the 10G network functioning as a system.

5 Installation

5.1 The vendor shall nominate a Project Manager who on behalf of the vendor shall coordinate and be responsible for all the activities related to execution of the order for establishing the network at BHEL. He shall act as an interface between the vendor and BHEL. The project manager shall:

- Carry out detailed site inspection
- Prepare Bill of Material for structured cabling system location wise.
- Suggest additional site preparation requirement to BHEL not a part of the order.
- Submit a complete layout plan for networking equipment and cabling system.
- Submit the detailed project schedule in consultation with BHEL.
- Monitor the progress vis-à-vis the project schedule.
- Coordinate for all required help and inputs necessary for the execution of the contract.
- Maintain logbook of the cabling work carried out.
- Submit a detailed drawing of cable layout, position of nodes, switches etc.
- Finalise the training requirement with the BHEL.
- Finalise the acceptance test procedure with the BHEL.

5.2 Any equipment, fitting, material, software or supplies which may not be specifically mentioned in the specifications but which are necessary for carrying out the contract works within the scope of the tender are to be provided for and rendered to by the vendor. Such items not quoted by the vendor, if found necessary during execution of the contract, shall have to be supplied at no extra charge by the vendor.

5.3 The vendor shall provide the following certificates along with the equipment at the time of supply:

- Certificate of newness of the equipment
- Test Certificate of the equipment/fiber/UTP
- Performance warranty certificate (at least 15 years) of the structured cabling from OEM
- The cabling system installed by the vendor shall meet the specifications as prescribed in ANSI/EIA/TIA, ISO 11081 standards and to that effect shall submit a certificate after the completion of the work that the work has been done as per standards.

5.4 The vendor shall ensure that the structured cabling system work is carried out by an experienced, registered and certified contractor of the proposed system. The technical support staff engaged by the contractor shall be experienced and approved by the structured cabling system solution provider.

5.5 The vendor shall supply at least one licensed set of manuals for each equipment/software at no extra cost.

5.6 Migration from the current network setup to new network setup should be done such that the entire Network downtime should be less than 12 hours, where segmented downtime also should be minimal and without affecting the operation and business continuity. The migration can be planned in phased manner to achieve the minimal downtime and business continuity. Migration process will include, but not limited to, migrating the network connectivity of users/desktop/links/servers/routers from the existing switches to the new core/distribution/access switches as per the design

6 Acceptance Test Procedure

6.1 The vendor shall submit project completion report to BHEL once the network is established so that acceptance test can be carried out. All manuals, accessories etc. will be handed over by vendor to BHEL.

6.2 The vendor shall submit the acceptance test document to BHEL during the design phase itself and this document will include all the tests to be carried out on each hardware / software installed

6.3 The vendor shall submit the detailed documentation of network including cabling layout, equipment location and bill of material etc. prior to start of the acceptance test. The vendor shall give all documents in computer format.

6.4 The acceptance test which involves running standard vendor tests and/or BHEL tests and the operations of the complete network will be for 10 days after completion of installation. This will also include the testing of all the software quoted by the vendor.

6.5 All the software offered, shall be loaded completely and made functional in all respects before the start of the acceptance test by the vendor. Vendor shall demonstrate all the features of the equipment/software and show that equipment/software are performing as per specified configuration.

6.6 If any equipment fails during the acceptance test for three times, it will be replaced by the vendor and the acceptance test on the replaced equipment shall be performed afresh.

7 Training

Training of BHEL personnel shall be part of the contract.

During installation at BHEL, the associated BHEL engineers shall be guided on the configuration being made and usage.
Advanced level training shall be provided by OEM / authorized training partner at OEM Place /OEM certified training centre. BHEL will nominate engineers. Training shall be in two batches. Each batch shall get training for minimum 10 (ten) working days. Training shall be focused on fundamentals of networking/security in general and supplied equipment in particular. It should be based on standard certification programmes of OEM's equipment.

The training should include the following areas:

7.1 Introduction to Networking Technologies

Course Objectives – After the course the participant should be able to**:**

7.1.1 Classify devices and functions, OSI model, purpose, use, structure, and definitions of the layers of the OSI model
7.1.2 Construct a point-to-point Ethernet LAN
7.1.3 Show the sequence of steps used by IP Protocol operations to determine addresses
7.1.4 Match issues related to increasing traffic on an Ethernet LAN to typical LAN environment
7.1.5 Solve Ethernet networking issues using switched LAN technology
7.1.6 Construct a topology and network addressing scheme
7.1.7 Define the fundamental technologies involved in a WAN environment
7.1.8 Match the types of WAN media to their appropriate characteristics

7.2 Interconnecting Network Devices

Course Objectives – After the course the participant should be able to:

7.2.1 Configure a switch for basic operations
7.2.2 Expand the switched network from a small LAN to a medium-sized LAN with multiple switches, supporting VLANs, trunking, and spanning tree.
7.2.3 Configure and troubleshoot Virtual LANs (VLANs)
7.2.4 Configure and troubleshoot Routing Protocols like (RIP), Open Shortest Path First (OSPF) etc.
7.2.5 Configure IP access lists, on router, Manage IP Traffic with Access Lists
7.2.6 Identify and implement the appropriate WAN technology based on network requirements
7.2.7 Describe when to use NAT or PAT on a medium-sized network, and configure NAT or PAT on routers.

7.3 Implementing Multilayer Switched Networks

Course Objectives – After the course the participant should be able to:

7.3.1 Deploy the required products and services that enable connectivity and traffic transport, given a network design that includes multilayer switching over various Ethernet technologies
7.3.2 Implement the necessary services at each layer of the network to all users to obtain services in a working multilayer switched network
7.3.3 Control network traffic by implementing network policies on a multilayer switched network
7.3.4 Restore proper network operations through the use of devices and external management tools for multilayer switched network

7.3.5 Explain how service providers implement transparent LAN services and Ethernet over Multiprotocol Label Switching (MPLS) technology to deliver connectivity to the enterprise site
7.3.6 Configure VLANs/VTP, Implementing Inter-VLAN routing
7.3.7 Implement Spanning-Tree Protocol
7.3.8 Improve Availability on Multilayer Switched Networks
7.3.9 Implement QoS in Multilayer Switched Networks
7.3.10 Optimize and Secure Multilayer Switched Networks

7.4 Internetwork Troubleshooting

Course Objectives – After the course the Trainee should be able to:

7.4.1 Interconnect end systems using Routers and switches, administrate access to the network, and access to commands and applications that are used to discover baseline configuration information, trainees will establish a baseline, so that the topology and configuration is diagrammed and tabulated.
7.4.2 Use the principles of a layered model troubleshooting approach, trainees will determine and document a troubleshooting strategy so that internetwork problems can be detected and corrected consistently.
7.4.3 Use of commands and applications to resolve optimization and failure problems at the physical or data link layer, so that the framed data moves from one end of a data link to another at the expected data error rate determined in the network baseline
7.4.4 Use of commands and applications to resolve optimization and failure problems at the network layer, so that trainees can verify connectivity at Layer 3 and establish the routing tables show reachability to all expected network devices specified in the baseline, and traffic is flowing over the correct path detailed in the baseline.
7.4.5 Establish a Baseline
7.4.6 Determine an Effective Troubleshooting Strategy
7.4.7 Resolve Problems at the Physical, Data Link, network, transport & application layers.

7.5 Wireless LAN Fundamentals

Course Objectives - After completing this course the trainee should be able to:

7.5.1 Describe radio frequencies used in WLAN applications
7.5.2 Identify antenna concepts and interpret regulatory compliance
7.5.3 Identify components, topologies, and the use of channels for WLANs
7.5.4 Describe detailed technical features, functions, and benefits of the WLAN APs and Controllers
7.5.5 Configure the core access point and bridge
7.5.6 Secure a WLAN using various security methods
7.5.7 Implement a WLAN management solution

7.6 Security & Monitoring

Course Objectives – After completion of this course, the trainee should be able to:

7.6.1 Configure and test access rules on supplied firewall module

7.6.2 Configure and test NAT/PAT
7.6.3 Should be able to configure and use various features of Network Analysis Module
7.6.4 Should be able to view/analyse various reports generated on NAM.
7.6.5 Use Correlation engine to monitor security and host application devices.
7.6.6 Know correlation engine architecture and how it process events.
7.6.7 Use correlation engine to run / create / customize reports
7.6.8 Use correlation engine to investigate an incident and mitigate the security threats.
7.6.9 Should be able to configure common elements of NAC appliance.
7.6.10 Should be able implement NAC in new network.
7.6.11 Should be able to monitor and perform common administrative tasks in NAC appliance.

7.7 Network Management Solution

Additional comprehensive training of two days on NMS will be offered by the OEM certified trainer to BHEL engineers at BHEL Ranipet premises after installation of equipment. The training shall cover the installation & configuration of NMS, device configuration, VLAN management, network analysis, report generation and troubleshooting of network. Training shall cover all features of the NMS software.

7.8 Structure Cabling Solution

Cabling training could be from vendor or OEM.
Course Objectives – After completion of project the the trainee should be able to
7.8.1 Explain the basic connectivity of copper with drawing mentioning the types of Facplate, I/O color and Patch cord measurement used in the entire project .
7.8.2 Detailed numbering scheme, labeling format used for identification of network ports.
7.8.3 Explain the rack population of each block with ports utilized in each switch and uplink port number from core switch.
7.8.4 Provide the drawings of wall mount/floor mount rack location in each block.
7.8.5 Provide the test reports of UTP and show the results are inline with TIA/EIA standards.
7.8.6 Provide the list of materials used and balance available in stores for BHEL future expansion.
7.8.7 Basic hands on training on I/O re-termination and use of lan-tester for rectifying UTP ports.

7.9 OFC Solution

7.9.1 Explain the detailed connectivity of OFC with drawings on complete project.
7.9.2 Provide the drawings of fiber connectivity in terms of SM and MM paths and number of runs in active and redundant routes.
7.9.3 Should provide the details if LIU interface type and ports utilized for one time patching and free ports available for future patching.
7.9.4 Provide the numbering scheme used for cable identification on LIU and Patch cords.

8 Warranty, Maintenance & Support

8.1. The vendor should be able to provide the support for quoted network actives technology and the equipment for a minimum period of 8 years. Vendor shall give commitment letter in this regard.

Vendor shall warrant that spare parts of the equipment shall be available for minimum period of 8 years after completion of the acceptance test.

8.2. The vendor shall maintain the network and datacenter after completion of 5 year lease period, if BHEL desires so, on the same scope, terms & conditions as during the lease period. The Annual Maintenance Charges subsequent to the lease rental period shall be quoted as a percentage of total purchase value of each item for a period of five years.

8.3. The vendor shall keep the sufficient spares to keep the network downtime and datacenter downtime at minimum.

8.4. The vendor shall provide comprehensive maintenance support on 24x7 hours basis by seven OEM certified and trained resident engineers posted at BHEL Ranipet without payment of extra charges for maintenance and upkeep of network and maintaining Datacenter. Out of Seven engineers, five engineers shall be engineering degree holder with minimum two year experience in network maintenance and should hold OEM (network) certifications also. Other two engineers shall be diploma in electrical engineering with minimum two year experience in data center maintenance. The resident engineers:

8.4.1. Shall observe BHEL working hours and BHEL holidays. BHEL working hours are 8AM to 4:30PM, 6 days a week. However at least one engineer shall always be available 24x7 hours on call basis in case of exigency. Out of these seven engineers, one engineer should come in general shift (8:00 AM to 4:30 PM) and other six engineers should come in three shifts(First shift 6:00 AM to 2:00 PM, second shift 2:00 PM to 10:00 PM, third shift is 10:00 PM to 6:00 AM)

8.4.2. Shall change the resident engineers only after seeking permission from BHEL and arranging for proper substitute.

8.4.3. Shall ensure network connectivity up to the desktop level and monitoring Datacenter.

8.4.4. Shall have their own vehicles for movements and shall have mobile phones accessible from BHEL landline/mobile phones.

8.4.5. Accommodation, boarding, transport and other logistics for these engineers are vendor's scope.

8.5. Comprehensive maintenance shall include the following :

8.5.1. Replacement of faulty equipment

8.5.2. Installation charges

8.5.3. Site inspection charges

8.5.4. Cost of Maintenance Engineers

8.5.5. Lease tax/right to use tax / any other statutory levies including service tax.

8.5.6. Keeping sufficient spares to maintain the specified uptime.

8.5.7. Shifting and installation of equipment from one location to another within BHEL campus without any extra cost to BHEL.

8.6. The vendor should fulfill all statutory and safety requirements for personnel engaged while executing the contract. If BHEL has to incur any expenditure due to non-compliance of the applicable statutory provisions, the same will be compensated by the Bidder

9. Downtime Penalty

9.1. The vendor shall maintain the overall uptime of network to minimum 99% during the lease period.

9.2. A deduction from the overall quarterly rental shall be made at the rate of 1% for each 1% fall of uptime from 99%, e.g. if the uptime is 98%, one percent of quarterly rental for the particular quarter shall be deducted. The calculation for uptime shall be made on monthly basis for network. The downtime calculation shall be based on 24x7 hours.

9.3. There shall be no downtime due to mutually agreed scheduled maintenance of equipment or due to power outage.

9.4. Downtime of network shall be the period (in hours) during which expected connectivity is not available on the network or part of network. The downtime factors for calculation of the penalty shall be as follows:

9.4.1.	Category 1	0.5
9.4.2.	Category 2	0.2
9.4.3.	Category 3	0.02

Category 1 includes core switches, server switches, firewall modules, genset, Precision AC, UPS for data centre.
Category 2 includes distribution switches, Correlation engine, email and web security solution, NMS, 5 & 10 KVA UPSs ,smoke detection system, fire detection system.
Category 3 includes access switches, 1 KVA UPSs, rodent repellent system.

9.5. Downtime calculation will be applicable for non-availability of Network services and data centre equipment arising due of malfunctioning of either switches, fiber, backbone UTP, fiber patch cords, converters, connectors etc.

9.6. If any equipment is down due to fiber/UTP cut, vendor has to repair/replace the faulty fiber/UTP within 48 hours. After 48 hours, downtime shall be assumed till fiber/UTP is repaired/replaced.

9.7. The downtime factor for the network and datacentre shall be assumed to be 1.0 only, even if it exceeds 1.0 (e.g. 6 distribution switches are down at a particular time which amounts to downtime factor to 1.2 however it shall be assumed as 1.0).

9.8. If the uptime of a particular equipment/system falls below 95% continuously for 3 months, the equipment/system shall have to be replaced with the new equipment by the vendor without any extra cost to BHEL.

9.9. Downtime shall be calculated on the basis of NMS reports/log book.

9.10. In the case of any equipment/service being down, the same may be temporarily replaced by the vendor provided there is no loss of functionality/configuration in the network. The equipment/service shall be considered up in this case and no downtime shall be counted. All efforts shall be made by the vendor to limit such temporary replacements to less than 15 days else it shall be counted as down.

9.11. Example of Downtime Calculation

If one core switch remains down for 10 hours (cumulative) in a particular month and total quarterly rental value for network is Rs. A Lakhs.
Acceptable downtime in a month (in hours) = 0.01 * 24 hours * 31 days = 7.44 hours
Downtime factor of core switch = 0.5

Downtime in Rs. Lakhs = (0.5 x A x (10-7.44))/((24x31)x3)

10. New / Better System

During the contract period of this rental agreement, if new / better computer systems are available and if desired by BHEL, the existing system shall be replaced by the vendor on mutually agreed terms and price.

11. Transfer of Ownership

The transfer of ownership of the equipment which is in efficient working condition and is also decided to be taken over by BHEL shall be automatically in favour of BHEL at the termination of the 5 year lease period on payment of token terminal payment of Rs. One only. The government taxes if any, and to the extent chargeable, shall be borne by vendor.

12. Claims

All the claims etc. lodged with the underwriters, if any, shall be dealt with by the vendor or Assignee directly.

13. Arbitration

All disputes or differences arising under, out of or in connection with this contract, shall be referred for arbitration by an arbitrator to be appointed by an officer, who is the administrative head of BAP, BHEL Ranipet. At present, the designation of administrative head is Executive Director. The award of arbitrator shall be final and binding on both parties. The arbitrator shall have power to extend time for arbitration proceedings and making of the award with the consent of the parties.

14. Jurisdiction

All disputes or differences arising out of, under or in connection with this contract shall be subject to the exclusive jurisdiction of the courts having jurisdiction over BHEL Ranipet.

15. Governing Law

This contract shall be governed in all respects by the Indian law.

16. Force Majeure

If at any time during the currency of this contract, the performance in whole or in part, by either party of any obligations under this contract shall be prevented or delayed by reason, of any war, hostilities, acts of the public enemy, civil commotion, sabotage, fires, explosions, epidemics, quarantine, restrictions or acts of GOD (herein after referred to as events), then provided notice of happening of any such events is given by either party to other within ten days from the date of occurrence thereof, neither party shall reason of such events be entitled to terminate this contract nor shall either party have any such non performance and delay is resumed as soon as practicable after such events has come to an end or ceased to exist. If the performance in whole or part of any obligation under this contract is prevented or delayed by any reason or any such event claims for extension of time shall be granted for period considered reasonable by the purchaser subject to prompt notification by the seller to the purchaser of the particulars of the events and supply to the purchaser if required of any supporting evidence. Any waiver of time in respect of partial installment shall not be deemed to be a waiver of time in respect of remaining deliveries.

17. Confidentiality

Bidder shall, at all times, undertake to maintain complete confidentiality of all data, information, software, drawings & documents, etc. belonging to the BHEL and also of the Systems, procedures, reports, input documents, manuals, results and any other company documents discussed and/or finalized during the course of execution of the order/contract

18. Patents and TradeMarks

Bidder shall at all times indemnify BHEL against all claims which may be made in respect of the Systems/goods/Software supplied, for infringement of any right protected by patent, registration of designs or trademarks and legality of usage of Software. In the event of any such claims being made against BHEL, BHEL will inform the Bidder who shall at his own cost either settle any such dispute or conduct any litigation that may arise there from.

19. Non Disclosure Agreement

Vendor shall sign an non disclosure agreement as per BHEL format (copy enclosed) in compliance to Information Security Management System.

20. Intellectual Property Rights

Vendor shall at all times indemnify the BHEL Ranipet against all claims which may be made in respect of the systems/goods/software supplied by the vendor, for infringement of any right protected by patent, registration of designs or trademarks and legality of use of software. In the event of any such claims being made against BHEL Ranipet, BHEL Ranipet will inform the vendor who shall at his own cost settle any such dispute or conduct any litigation that may arise there from.

21. Termination of Inquiry / Orders

a) BHEL reserves the right to cancel any inquiry before opening of the tender, without assigning any reason.
b) BHEL reserves the right to cancel any tender and refloat a fresh tender, at any time after opening of the tender, in case it finds the response to its tender as not meeting its requirement. This shall be at the sole discretion of BHEL.

22. Termination of Lease contract and Consequences

BHEL reserves the right to terminate the order/contract, upon situations arising due to non-compliance of contract Terms & Conditions or non-performance of the equipment/system below 98% continuously for more than one month, at the risk and cost of the Bidder.
On termination of the lease agreement, no lease rent shall be payable to the Bidder for the remaining period from the date of Termination.

In case of the contract termination, Bidder shall remove the equipment from BHEL premises at his own risk and cost after due permission from BHEL.

Fore-closure: In case of fore-closure of the lease agreement by the BHEL for reasons not attributable to the Bidder, pro-rata compensation will be payable. Compensation will be equivalent to the basic price component for the remaining quarters of the lease period and the ownership of the equipment shall be transferred to BHEL.

23. Acceptance of Order

Bidder shall submit Letter of acceptance for the LOI/ Order/ Contract within one week. This will be submitted along with the Bank guarantee.

24. Withdrawal from the Contract

In case the bidder withdraws the offer submitted by him/her after it is accepted by BHEL and fails to supply the goods as per the terms and conditions of the contract, or at any time repudiated the contract wholly or in part, BHEL shall be at liberty to cancel the purchase order and to recover from the bidder the extra cost and the other loss incidentals to the breach of contract on the part of the Bidder.

25. Limitation of Liability

The Vendor/Lessor's liability will be limited to the scope of this contract fully.

26. Integrity Pact

Successful bidder shall sign integrity pact with BHEL.

27. In addition to the terms and Conditions mentioned in this document, General Terms and Conditions in Annexure-IV are to be adhered to.

THIRD PARTY NON-DISCLOSURE AGREEMENT

I, _____, on behalf of the _____ (Name of Company), acknowledge that the information received or generated, directly or indirectly, while working with BHEL on contract is confidential and that the nature of the business of the BHEL is such that the following conditions are reasonable, and therefore:

I warrant and agree as follows:

I, or any other personnel employed or engaged by our company, agree not to disclose, directly or indirectly, any information related to the BHEL. Without restricting the generality of the foregoing, it is agreed that we will not disclose such information consisting but not necessarily limited to:

- Technical information: Methods, drawings, processes, formulae, compositions, systems, techniques, inventions, computer programs/data/configuration and research projects.
- Business information: Customer lists, project schedules, pricing data, estimates, financial or marketing data,

On conclusion of contract, I, or any other personnel employed or engaged by our company shall return to BHEL all documents and property of BHEL, including but not necessarily limited to: drawings, blueprints, reports, manuals, computer programs/data/configuration, and all other materials and all copies thereof relating in any way to BHEL's business, or in any way obtained by me during the course of contract. I further agree that I, or any others employed or engaged by our company shall not retain copies, notes or abstracts of the foregoing.

This obligation of confidence shall continue after the conclusion of the contract also.

I acknowledge that the aforesaid restrictions are necessary and fundamental to the business of the BHEL, and are reasonable given the nature of the business carried on by the BHEL. I agree that this agreement shall be governed by and construed in accordance with the laws of country.

I enter into this agreement totally voluntarily, with full knowledge of its meaning, and without duress.

I will abide by the ISMS manual of BHEL, Ranipet.

Dated at _____, this ____ day of _____, 20__.

Name

Company

Signature

Name: Company Seal

Signature: with Date:

TECHNICAL SPECIFICATIONS OF 10G BACKBONE LOCAL AREA NETWORK

1. INTRODUCTION

1. Bharat Heavy Electricals Limited is one of the largest engineering organizations in India. The Boiler Auxiliaries Plant (Ranipet) is one of major manufacturing unit of BHEL. Accordingly many new shops/offices are being established in BHEL Ranipet campus.
2. The existing Local Area Network (LAN) at BHEL Ranipet is a Network based on 1 Gbps Distribution switches. BHEL Ranipet requires upgrading their LAN to 10Gbps to support the following applications:

- 3D drawing application
- Finite Element Analysis
- Computation Fluid Dynamics
- Plant Design Management
- Product Life Cycle Management (Team center Engineering)
- Web server (Web sphere, Apache)
- MS office Share point (Intranet Portal, DMS)
- Citrix Xen application server for Thin clients
- Oracle database and Application server
- Mail and internet (10 Mbps)
- MPLS (2Mbps)
- Remote access Corporate R&D, Hyderabad for CFD and FEM analysis
- Corporate wide SAP
- Others

  The existing Hardware of LAN is not capable enough to provide requisite network bandwidth to take care of the above applications.

3. The existing LAN has outdated switches and need to upgrade to the latest technology switches which can provide fault free Data switching network.
4. The proposed data communication network shall be based on two Core Switches. It is proposed to install the central network equipment including one Core Switch at the primary data Centre in the IC block, and the Second core switch in the secondary Data Centre in the Telephone Exchange which is adjacent to Administration Block

5. The proposed Data communication network shall be having connectivity of 10Gbps between the Core switch and the Distribution switch and between Core switch and Server Farm switches. The Core Switch and Edge Switches of latest generation shall be used along with fiber optic cable backbone at 1 Gbps.
6. Since old switches have become obsolete, we have planned for replacement of old switches. Also since number of PCs is increasing across the plant, it has been decided to augment around 1500 more network points in five years, which shall increase the number of network points to about 3000. Network has to be designed in such a manner to provide fail-safe operation of ERP infrastructure. Also multimedia applications can be run on desktop level.

2. CONCEPTUAL VIEW

At BHEL Ranipet, the business server farm/Data center is mainly located at Information Technology Center (INFORMATICS CENTRE) and PCs, thin clients, workstations are spread across the plant. A near disaster recovery site is located in TELEPHONE EXCHANGE department located near Administrative Building. This site will host main business servers so in case of disaster at main site (INFORMATICS CENTRE), business processes can be run from this DR site. The LAN infrastructure shall have capacity to interconnect around 3000 nodes. Backbone speed shall be 10Gbps and 1Gbps shall be available at desktop level. The requirement is to seamlessly interconnect business server farms, workstations, thin clients, PCs and CNC machines etc. The network should provide the following features:

- Fail-Safe Operation through DR site
- Network traffic monitoring & Control
- Seamless desktop to backbone connectivity
- Comprehensive Network integrated services
- Campus wide network security
- VLAN, network segregation, network management, multimedia services
- Near 0% network downtime

The proposed infrastructure shall be on 10 Gbps backbone in the core and Gigabit Ethernet at desktop level.

The networking solution shall be based on three tier architecture as described below:

Core Layer – Two Core switches shall be placed at these locations:

1. Informatics Center Data Center

2. Telephone Exchange Building (DR Site)

These switches shall be connected with each other with 10G speed.

Distribution Layer – L3 Distribution switches shall be placed in various departments/blocks. These distribution switches shall be connected to core switches with 10 Gbps connectivity. This type of arrangement has been planned to provide redundant path to all distribution switches. All distribution switches shall be connected to core switches through optical fiber. Optical fiber shall be Single mode or Multimode, Armoured or Unarmoured based on distance and speed requirement. Distribution Switch should be capable to provide 10Gbps to some access switches and 1 Gbps connectivity to some Access switches in their respective departments/block through UTP cable or optic fiber cables depending upon the distance between the distribution and access switches.

Access Layer – Access switches shall be placed at various locations across the plant/offices and shall connect to distribution switches with either 1 Gbps or 10Gbps speed. Connectivity shall be through UTP or Optical Fiber based on distance. No media converter shall be used in whole implementation and wherever fiber connectivity is required, it shall terminate directly at switch having fiber transceivers. All UTP ports on access switches shall be 10/100/1000 Mbps. Desktops shall be connected to network through access switches.

If Copper uplinks are used from access to distribution, the links should be such that each switch should have 1Gbps connectivity. All the physical copper links from an access to distribution should form an ether channel between access and distribution for maximum availability of bandwidth.

Vendors are requested to refer to the distribution network diagrams for clarity on type and bandwidth of links between distribution and access locations.

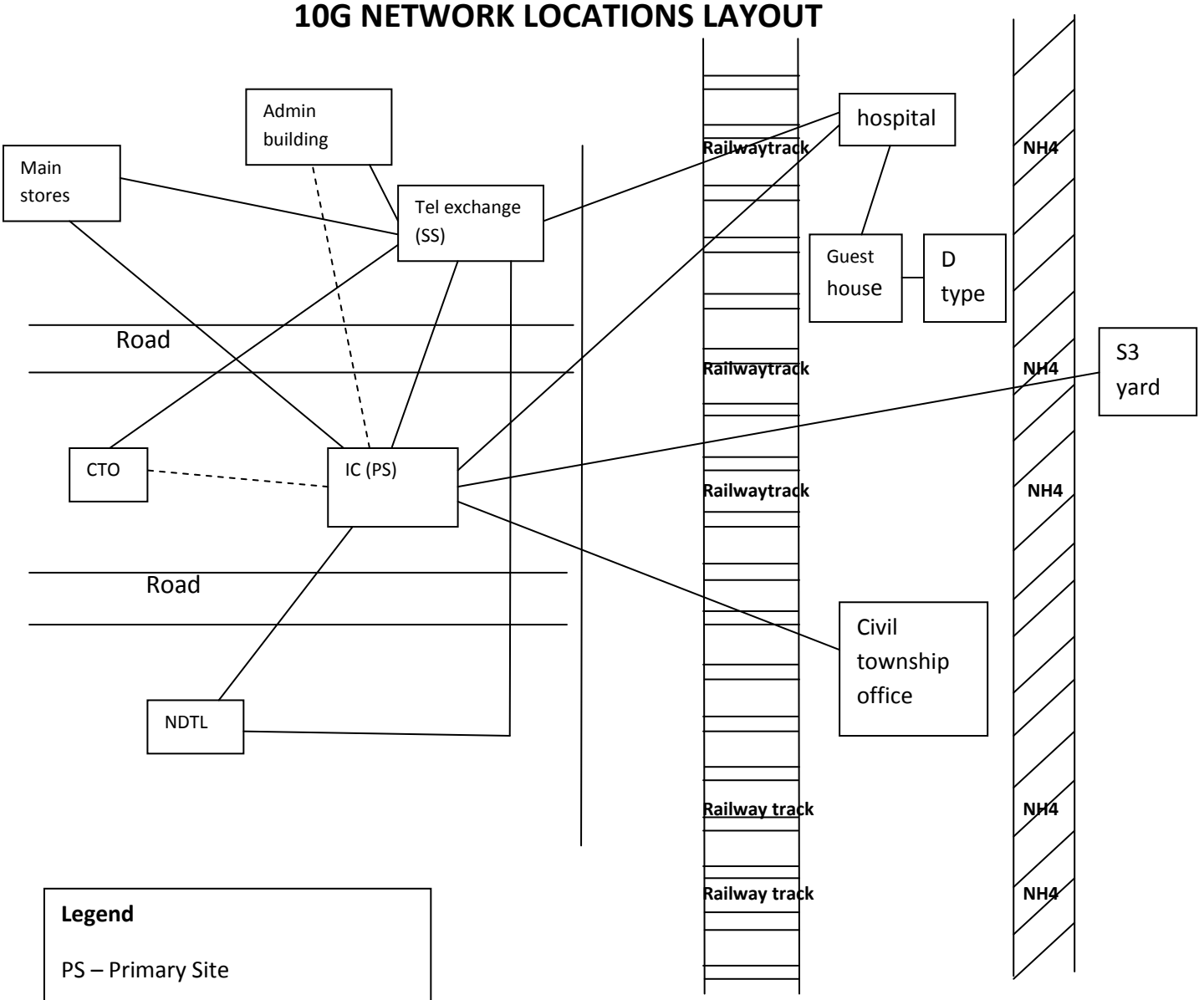
Bandwidth Requirement

1. All the access ports should be 10/100/1000 mbps.

2. The Bandwidth between Core Section and Distribution should be 20Gbps. This bandwidth should be the active functional Bandwidth at any given point of time. The load balancing over multiple links to achieve this bandwidth should be per packet based load balancing.

3. The Bandwidth between Core Segment and any Server Farm Switch should be 20 Gbps. This bandwidth should be the active functional bandwidth at any given point of time. The load balancing over multiple link to achieve this bandwidth should be per packet based load balancing.

10G NETWORK LOCATIONS LAYOUT



Legend

PS – Primary Site

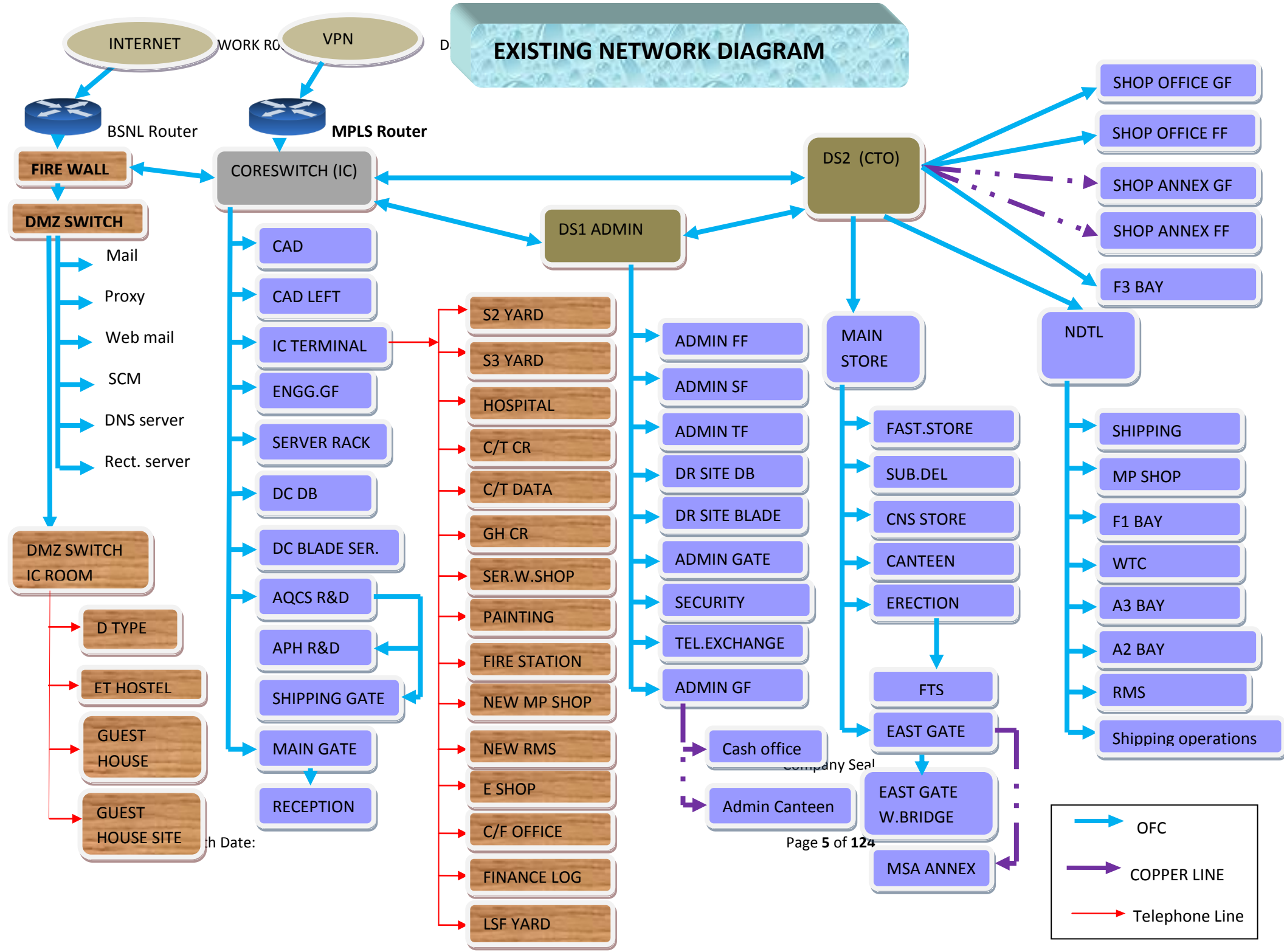
SS – Secondary Site

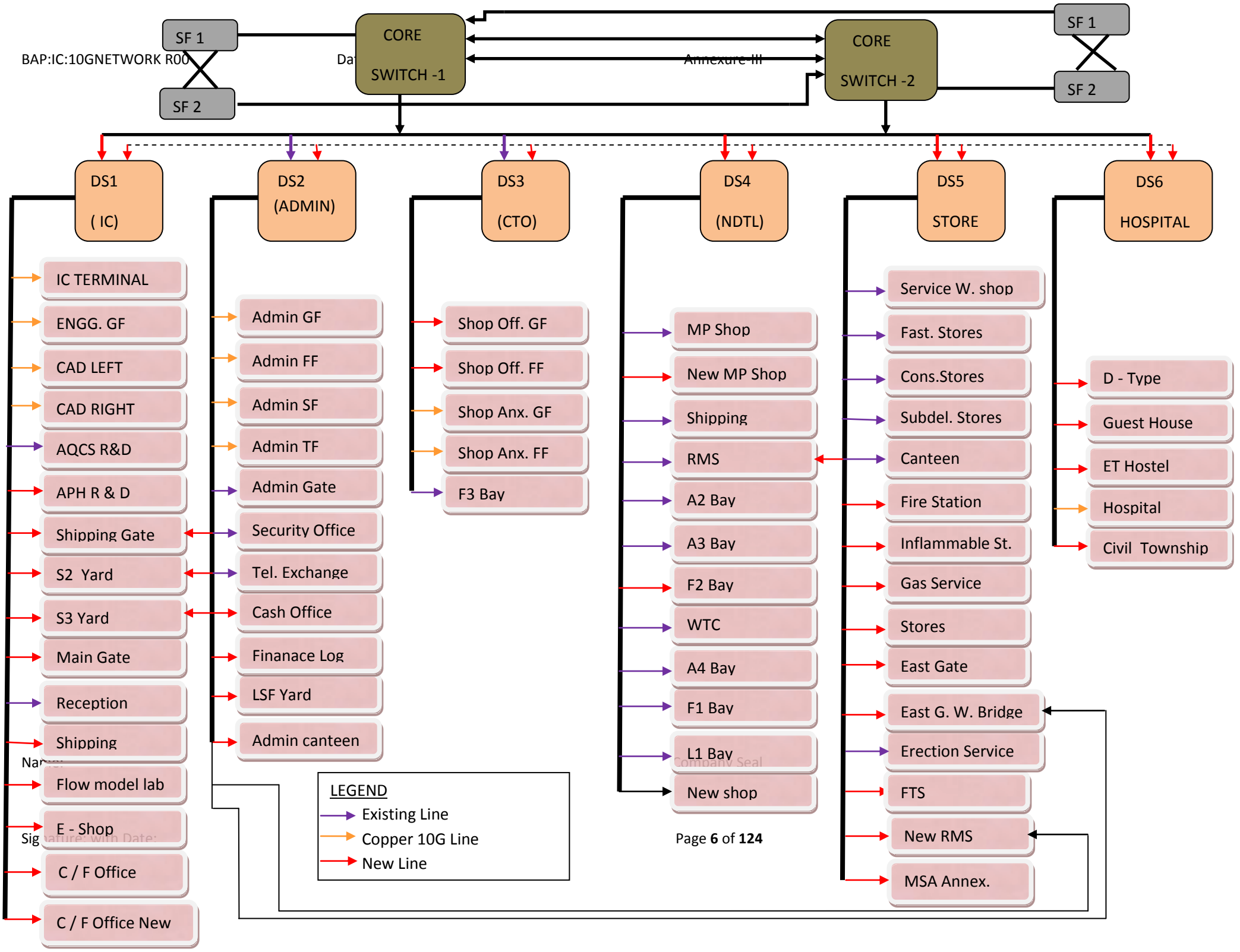
_____ Proposed fiber

---------- Existing fiber

NH4 - National highway

Name: Company Seal


EXISTING NETWORK DIAGRAM
INTERNET
VPN
BSNL Router
MPLS Router
FIRE WALL
CORESWITCH (IC)
DS2 (CTO)
DS1 ADMIN
DMZ SWITCH
Mail
Proxy
Web mail
SCM
DNS server
Rect. server
DMZ SWITCH IC ROOM
D TYPE
ET HOSTEL
GUEST HOUSE
GUEST HOUSE SITE
CAD
CAD LEFT
IC TERMINAL
ENGG.GF
SERVER RACK
DC DB
DC BLADE SER.
AQCS R&D
APH R&D
SHIPPING GATE
MAIN GATE
RECEPTION
S2 YARD
S3 YARD
HOSPITAL
C/T CR
C/T DATA
GH CR
SER.W.SHOP
PAINTING
FIRE STATION
NEW MP SHOP
NEW RMS
E SHOP
C/F OFFICE
FINANCE LOG
LSF YARD
ADMIN FF
ADMIN SF
ADMIN TF
DR SITE DB
DR SITE BLADE
ADMIN GATE
SECURITY
TEL.EXCHANGE
ADMIN GF
Cash office
Admin Canteen
MAIN STORE
FAST.STORE
SUB.DEL
CNS STORE
CANTEEN
ERECTION
FTS
EAST GATE
EAST GATE W.BRIDGE
MSA ANNEX
SHOP OFFICE GF
SHOP OFFICE FF
SHOP ANNEX GF
SHOP ANNEX FF
F3 BAY
NDTL
SHIPPING
MP SHOP
F1 BAY
WTC
A3 BAY
A2 BAY
RMS
Shipping operations
OFC
COPPER LINE
Telephone Line



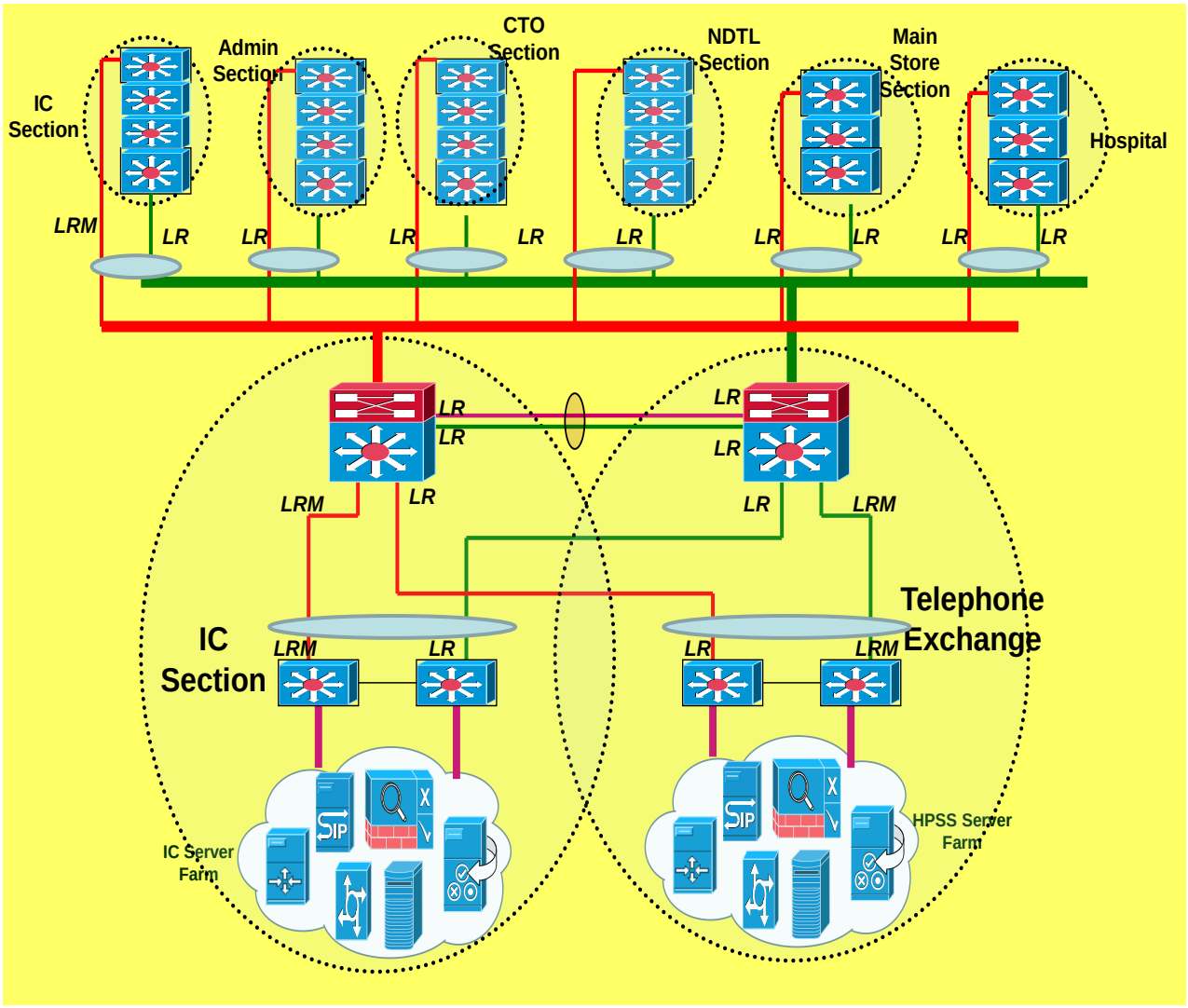
Name:

Company Seal

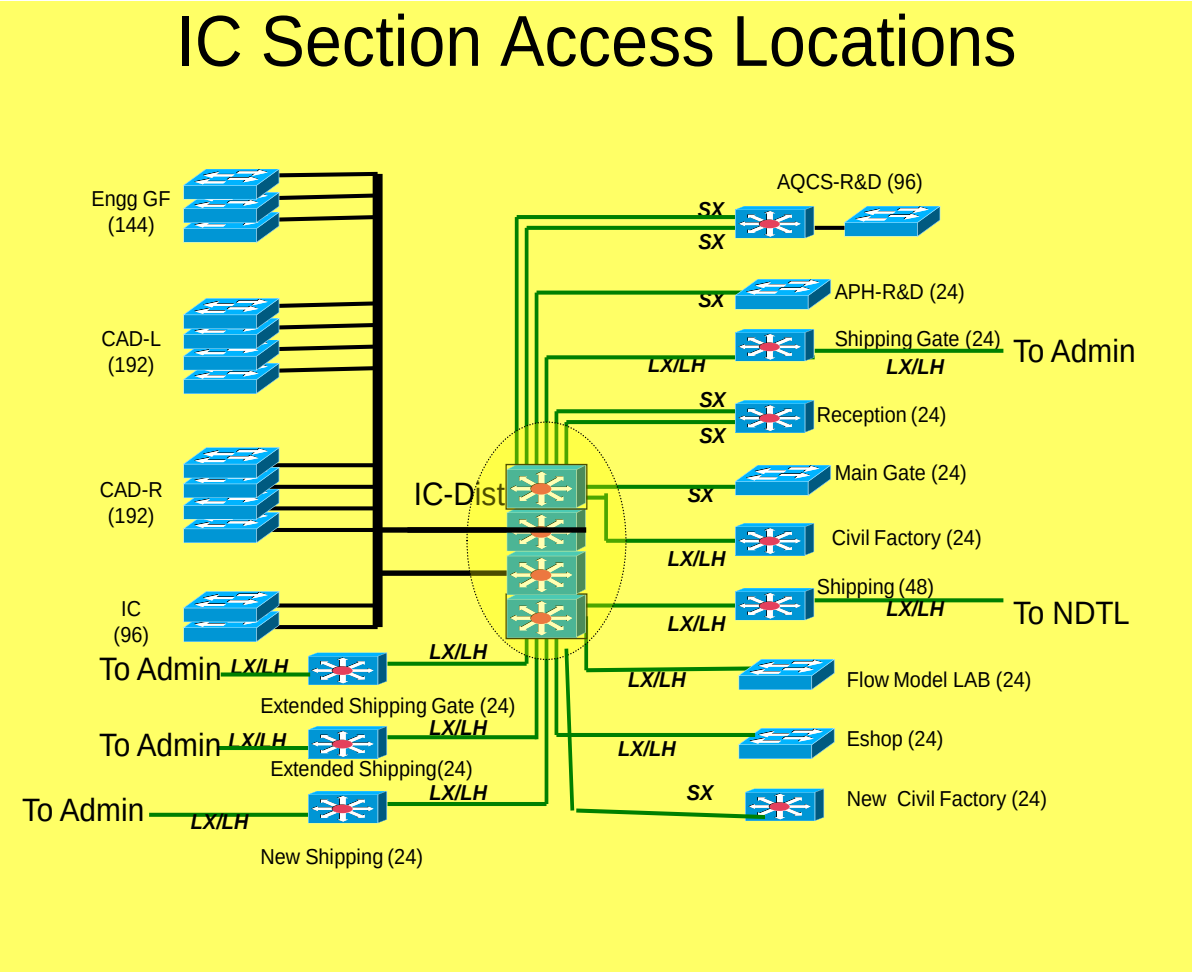
Signature with Date:

Detailed Network Diagram:

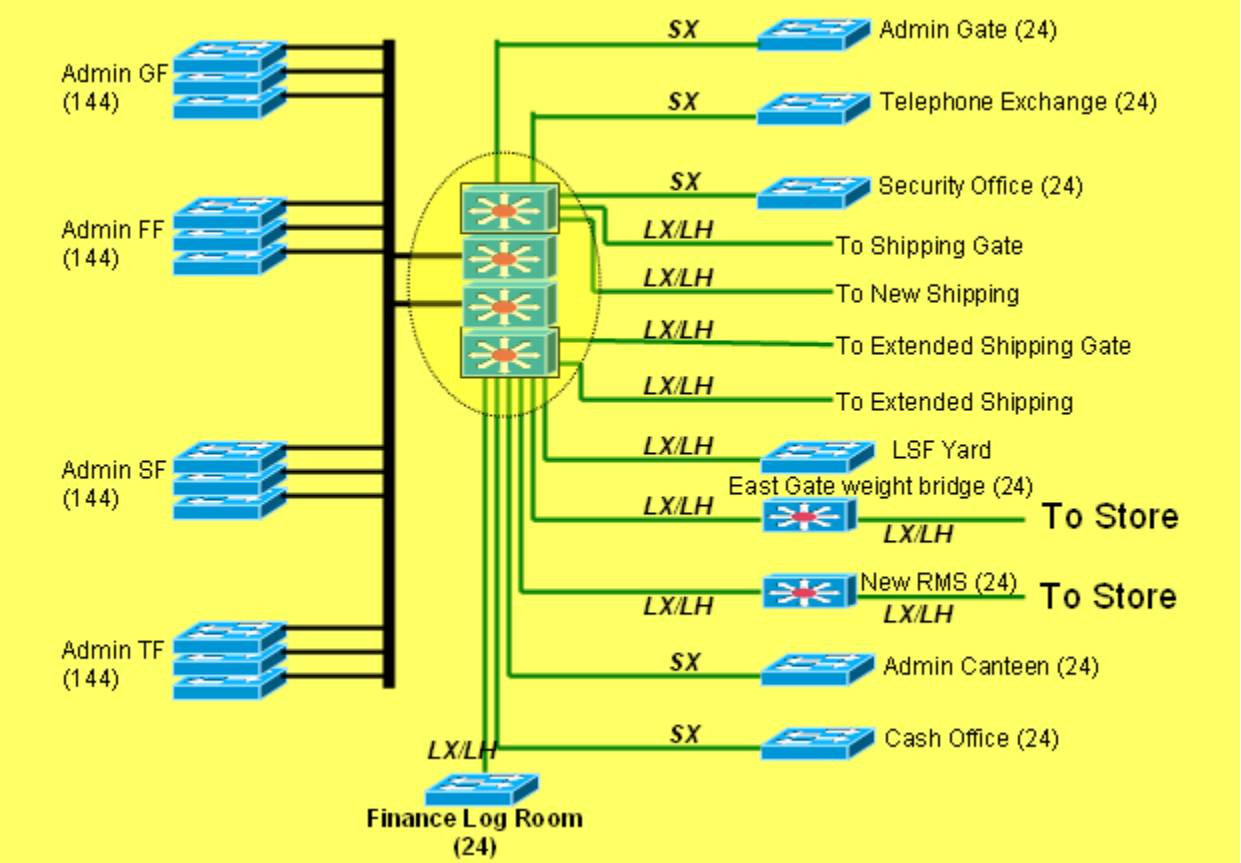
Core Distribution Server Farm Diagram



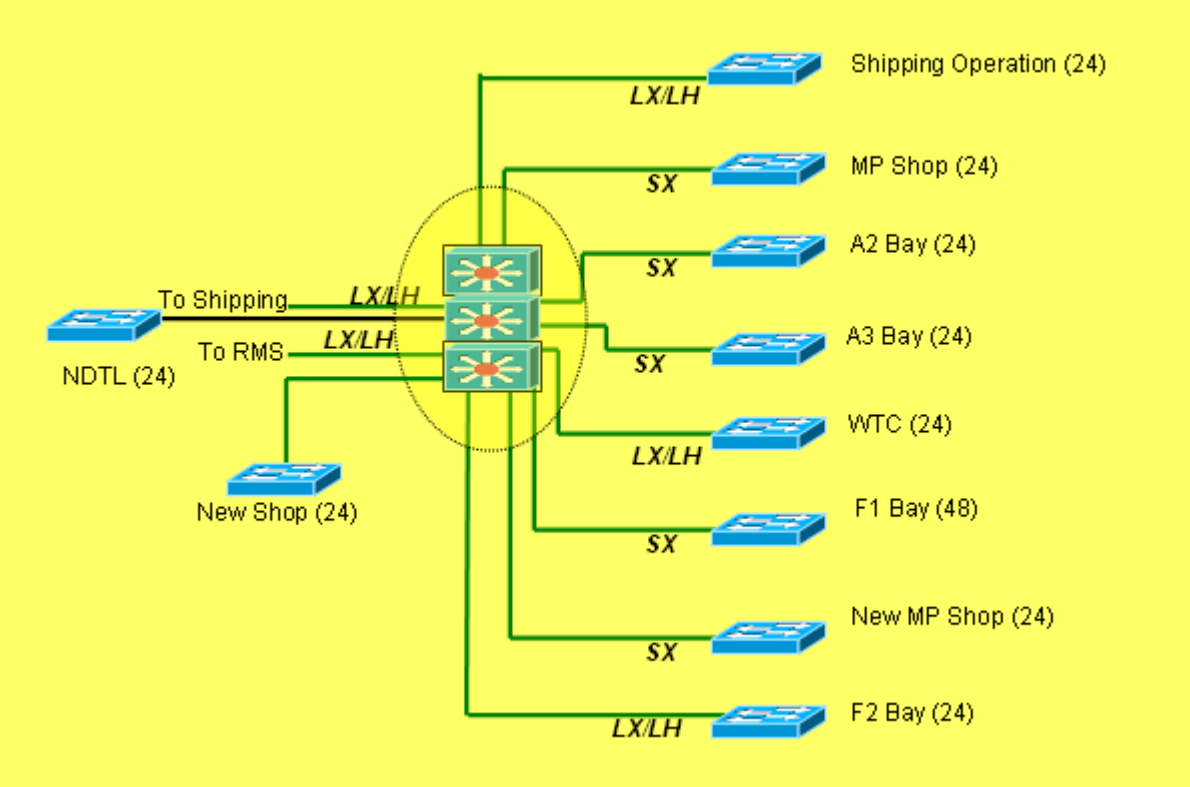
IC Distribution Section



Admin Distribution Section



NDTL Distribution Section



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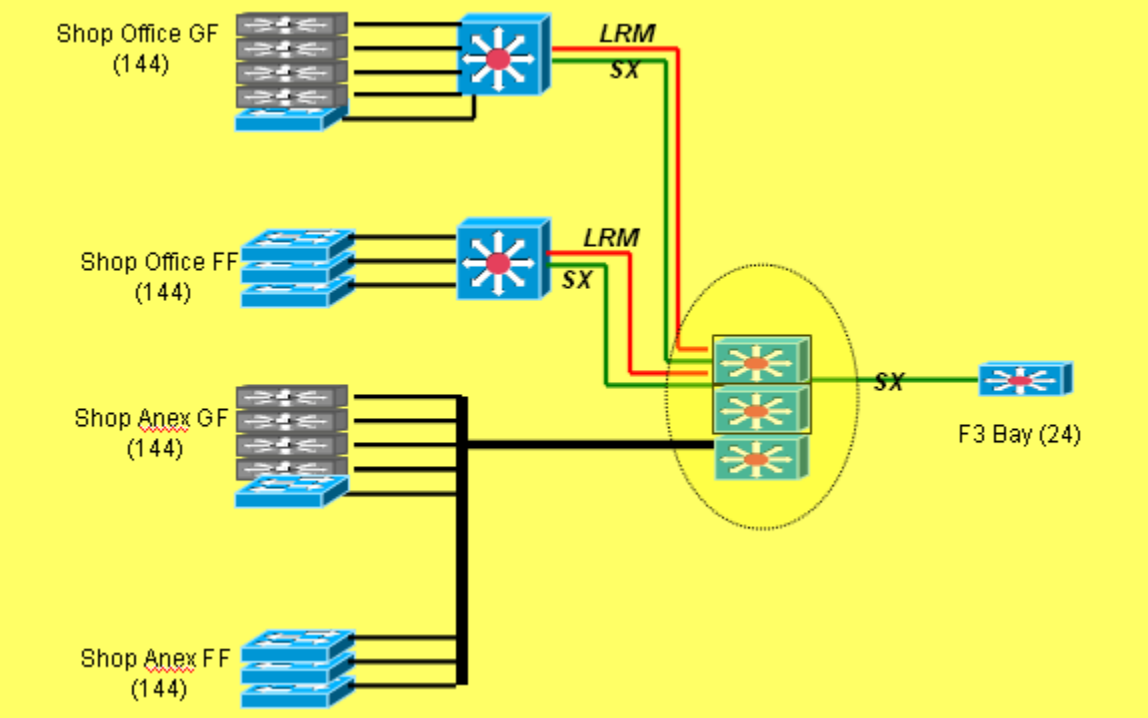
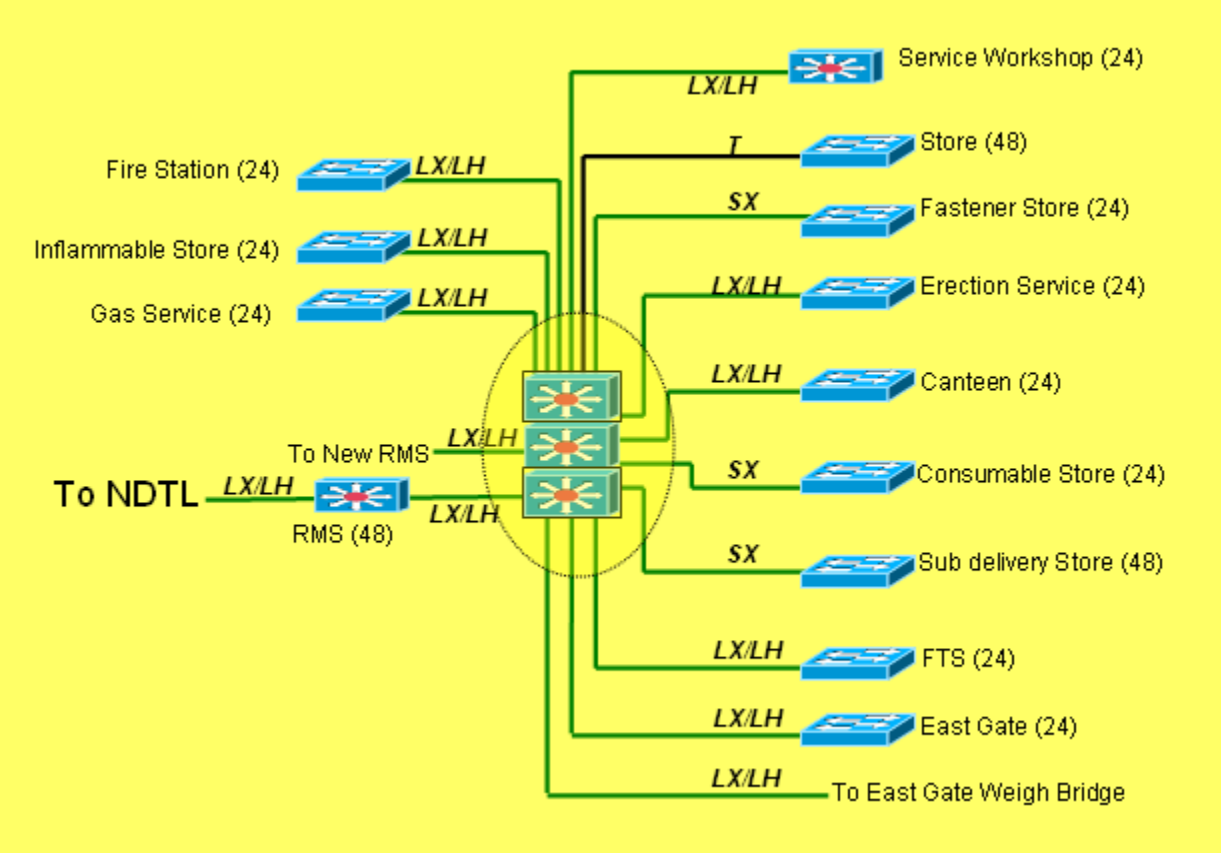
CTO Distribution



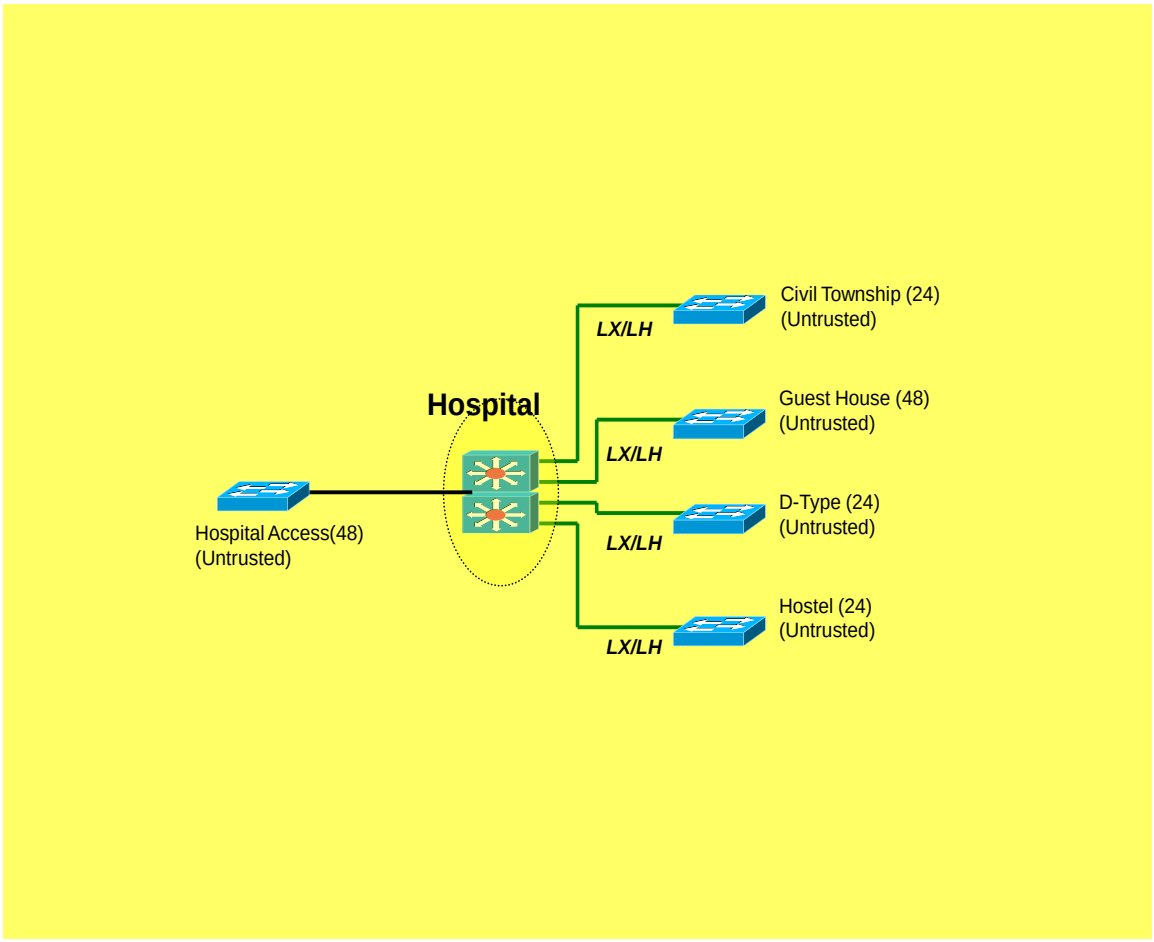
Name: Company Seal

Signature: with Date:

Main Stores Distribution



Hospital Distribution Section



3.0 DETAILED SPECIFICATIONS

All active components viz. switches, NMS, AAA server, Email and web security and desktop video conferencing solution should be from the same OEM. The switches shall be of reputed International brands. The vendor shall ensure that all switches shall be of same OEM make and all the components work seamlessly and in tandem together without any interface problems. The switches offered should be suitable for continuous operation round the clock 365 days a year.

3.1 Core Switch

Switches shall be Chassis based Multilayer architecture with Single CPU module and capable of redundant CPU modules. One core switch shall be placed at Informatics Centre and other at Telephone Exchange. Switches shall be with following specifications:

Hardware & Performance Requirements		
1	Architecture	Chassis based Multilayer Switch architecture with sufficient modules/cards to fit required transceivers/UTP ports as per the network design. Chassis shall have minimum 9 slots. Minimum 4 slots should be free after fitting all CPUs/Modules.
2	System Throughput	Single fabric throughput should be more than 700 Gbps. When combined together, the total aggregate switching capacity of both the switches should be minimum of 1.4 TBPS. Both switches should logically act as a single switch to achieve 1.4 TBPS of performance. In the event of one core switch failure the convergence time should be less than 200ms. In future, the throughput should scale to 4 TBPS.
3	Switch Redundancy	The Switch shall support redundant CPU module and shall be provided with Load-Sharing Redundant Power Supplies. All Switch Components, like modules/power supplies/fan tray should be Hot Swappable.

4	CPU Level Redundancy	If the switch is provided with redundant CPU, then the failure of one CPU Module should not result in loss of Switching and Routing Functionality. There should not be any traffic disruption during this change-over and the change over time should be less than 1 sec when operating alone.
5.	Chassis Architecture	The Chassis should have vertical slots for Line cards / Service Modules.
6	Service Module Support	The Core Switch should support following Service Module: a. Fully functional FireWall b. Fully Functional Intrusion Prevention System c. Fully Functional Wireless Service Module d. Fully Functional Server Load Balancer e. Network Analysis Module These Service Module should go into one of the slot of the Core Switch and should have dedicated resources such as Processor, RAM etc. There should be provision to have multiple service modules of same type on one switch.
7	WAN Capability	The switch should support multiple types of WAN interfaces like DS0, OC-192 etc.
8	Flash & Memory	The proposed switch should have enough Memory (Flash and RAM) to hold the latest Software Release. The switch should hold two software images. One is the previous image and other is the new image. It should support all features of switch and parameters like MAC Address Table, IP Routing Tables, VLANs etc. at their peak values as claimed in the Data Sheets of the Switch.
9	Switch Forwarding Rates (Layer 2)	The Switch should Support Minimum Switching (Layer 2) Performance of 380 Mpps. Performance should be hardware based.
10	Routing Capability	The Minimum IPv4 Routing Performance should 380 Mpps.

	(Layer 3)	Performance should be hardware based.
11	Backplane Connect Capacity	The Backplane should be 100% Passive.
12	Switching Architecture	The Switch should have a Truly Distributed Architecture. All Interface Modules should have all the resources for switching and Routing and should offer True Local Switching
13	10 Gigabit Ethernet Capability	The Switch should Support Minimum 60 nos. of 10 Gigabit Ethernet Ports for connectivity.
14	10G Port Density	There should not be more that 8 numbers of 10G transceivers populated per module/line card
15	Firewall Services	The switch should support Firewall Service Module. The Firewall Service Module should support the following : 1. Hardware Based Firewall 2. Should be capable of handling 5Gbps of traffic 3. 1 million concurrent connections 4. 100,000 connection setups and teardowns per second 5. 256,000 concurrent NAT or PAT translations 6. Jumbo Ethernet packets (8500 bytes) supported
16	Intrusion Prevention Services	The switch should support Intrusion Detection Service Module and should support the following from day one: 1. Hardware Based IDS/IPS 2. A single card with an inline performance of 500 Mbps and scale to up to 8 modules per chassis, providing up to 4 Gbps of inline prevention 3. A single module should support 5,000 new TCP connections per second, 5,000 HTTP transactions per second, 50,000 concurrent connections and supports up to 500,000 concurrent connections

		4. Should be able to identify and block new threats using Global correlation database 5. Should support risk rating for all threats using Global correlation database 6. Should support multiple capture techniques which includes SPAN/RSPAN, VLAN access control list (ACL) capture combined with shunning, TCP resets when in passive mode and drop actions when used inline allows 7. Should have the same standardized code as on the equivalent appliances 8. Single Device Management Using CLI or Web based management tool and event management and monitoring 9. Redundancy - EtherChannel load balancing and Supervisor engine and power redundancy
17	No. of 10/ 100/ 1000 BaseTX UTP Ports	-. 48 no of 10/100/1000 RJ-45 ports. The card should connect to the backplane with minimum of 40GBPS.
18	No. of 10G Fiber Transceivers	As per 3.9, Required Transceivers shall be separately ordered
Connectivity & Filtering		
19	802.3ad	Should support Industry Standard Port/Link Aggregation for All Ports. Also Cross Module Link aggregation should be supported. Etherchannel shall span across multiple chassis.
20	Jumbo Frames	Jumbo Frames support up to 9K Bytes on Gigabit / 10 G Ports
21	Storm Control	Support for broadcast/multicast/unicast storm control to prevent degradation of switch performance from faulty end stations

Layer 2 Functionality		
22	802.1Q	Should support 802.1Q protocol
23	Type of VLANs	Should support port, subnet based VLANs
24	Voice VLAN	Should Support Voice VLAN for separating and prioritising VoIP traffic and Auto QoS feature.
25	VLAN Trunking Protocol or Equivalent	Should support VTP or equivalent protocol to reduce administrative burden of configuring VLANs on multiple switches
26	No. of VLAN	Should support minimum 4000 active VLANs
27	MAC Addresses	No. of MAC Address Supported: 60000
Layer 3 Functionality		
28	OSPF, BGP, RIP/RIP2	Should support OSPF, BGPv4, RIP/RIP2 from day one.
29	NAT	Should Support H/W NAT
30	Ipv6 Support	Should support IPv6 from day one
31	Equal Cost Load Balancing	Should support Equal Cost Load Balancing
32	No. of Route Entries	Should support minimum 256000 Route entries.
Security Features		
33	Access Control Lists	Should support Standard and Extended ACLs
34	Various type of ACLs	Should support various types of ACLs like port based/time based.
35	Detection of	Should support real time detection of DoS attacks, Hacker

	Attacks	attacks from Internal/external sources
36	MAC Address Filtering	Should Support MAC Address Filtering based on source and destination address
37	802.1X	Should support 802.1X Network Security and Authentication along with auxiliary VLAN's
38	RADIUS	Should have support for RADIUS
Switch Redundancy		
39	Redundancy in Hardware	Should Have Redundancy for Power Supply, FANs and clocks to minimise unavailability of switch
40	SSO/NSF	Stateful Switchover and Nonstop Forwarding to ensure that in case of failure of active CPU module the redundant CPU should start switching L2/L3 traffic in less than 1 sec (in case switch has redundant CPU) when operating alone.
41	Hitless Software Upgrades	Should Support Hitless software upgrades to reduce downtime during software upgrade when operating alone.
42	Network Recovery	The Switch must support an independent object tracker that helps to speed network recovery during outage situations. Describe the implementation.
Network Protocols		
43	HSRP or Equivalent	Should Support Hot Standby Routing Protocol or equivalent
44	PVSTP/PVRSTP	Support for Per VLAN STP and Per VLAN RSTP
45	PortFast/ UplinkFast	Support for fast convergence features like PortFast/ UplinkFast
46	DNS, TFTP, NTP	Should support DNS, TFTP and NTP protocols
47	MPLS	Should support MPLS in Hardware

48	ERSPAN	Switch should support Encapsulated Remote Switched Port Analyzer (ERSPAN) allowing for transmission of SPAN traffic across an L3 network to a remote analyzer
Quality of Service		
49	Ingress/Egress Queuing	Should support Ingress/Egress Queuing
50	Traffic Policing	Should be able to limit traffic flows based on MAC Source/Destination address, IP Source/ Destinations address, TCP/UDP port nos etc
51	QoS Scheduling	Should support QoS scheduling with queues supported in hardware
52	Queue per port	Should support minimum 4 queues per port
53	Traffic Classification	Should support policy based traffic classification based on Type of Service (ToS), IP Precedence mapping, Layer 2/3/4 defined traffic flows, MAC address, VLANs
Multicasting		
54	Multicast	Should support H/W based IPv4 and IPv6 Multicasting
55	IGMP	Should Support IGMP v1, v2 , v3
56	Multicast Entries	Should support minimum 4000 entries
57	PIM	Should support Protocol Independent Multicast - Sparse Mode and PIM - SSM
Management		
58	Network monitoring/ management	Switch should be manageable through NMS on per port/switch basis with common interface for all manageable devices on the network. Should Support syslog, SNMP, RMON/RMON-II, SSH, telnet, web management

59	Port Mirroring	Should support port mirroring feature for monitoring network traffic of a particular port/VLAN/group of ports/entire switch.
60	Sys Log Correlation	The switch must support a programmable framework that allows you to filter, escalate, correlate, route, and customize system logging messages prior to delivery by the system message logger
Service/Security Module		
61	Firewall Module	Should have support for either integrated firewall module or external firewall appliance as per specifications mentioned later. In case any interface module is required in the core switch to connect external firewall, same shall be provisioned without cost.
62	Intrusion Prevention	Should have integrated IDS/IPS module as per specifications mentioned earlier from day one. In case any interface module is required in the core switch to connect external firewall, same shall be provisioned without cost.
63	Network monitoring	Should have support for network analysis module.
Software		
64	Software Version	Version of software for supplied switch should be latest release to support all required features
65	Software Updates	Software updates should be bundled for the entire contract period
IEEE Standards Compliance		
66	IEEE Standards	Ethernet: IEEE 802.3, 10BASE-T
		Fast Ethernet: IEEE 802.3u, 100BASE-TX, 100BASE-FX
		Gigabit Ethernet: IEEE 802.3z, IEEE 802.3ab, 1000BASE-X (mini-

		GBIC/SFP), 1000BASE-SX, 1000BASE-LX/LH
		10G Ethernet: IEEE 802.3ae, 10GBase-SR, 10GBase-LR
		IEEE 802.1D Spanning-Tree Protocol
		IEEE 802.1S & 1W for Rapid Spanning tree convergence
		IEEE 802.1p CoS Prioritization
		IEEE 802.3x Flow Control
		IEEE 802.3ad Link Aggregation

3.2 Distribution Switch Type I

These switches shall be Stack based Multilayer Switch architecture. These switches shall be placed at critical locations. Switches shall be of following specifications

Hardware & Performance Requirements		
1	Architecture	Multilayer Switch architecture with sufficient modules/cards to fit required transceivers/UTP ports (Stacked)
2	Switching Fabric Capacity	The Switch should support a minimum of 150 Gbps of Switching Fabric Capacity. It should be of non blocking architecture.
3	Flash & Memory	The proposed switch should have enough Memory (Flash and RAM) to hold the latest Software Release. It should support all features of switch and parameters like MAC Address Table, IP Routing Tables, VLANs, ACLs, etc.at their peak values as claimed in the Data Sheets of the Switch.
4	Switch Forwarding Rate	The Switch should Support Minimum Switching Performance 60 Mpps. Performance should be hardware based.
5	Stacking	The Switch should have two stacking ports and stacking bandwidth of 64 Gbps. The switch should be stackable with

		Distribution Switch Type – 2.
6	10 Gigabit Ethernet capability	The Switch should Support Minimum 2 nos. of 10 Gigabit Ethernet Ports with Local Forwarding for connectivity.
7	No. of 10/ 100/ 1000 BaseTX UTP Ports	24 Nos. 10/100/1000BaseTx UTP ports
8	No. of 1G Fiber Transceivers	As per 3.9, Required Transceivers shall be separately ordered
9	No. of 1G UTP Transceivers	As per 3.9, Required Transceivers shall be separately ordered
10	No. of 10G Fiber Transceivers	As per 3.9, Required Transceivers shall be separately ordered
Connectivity & Filtering		
11	802.3ad	Should support Industry Standard Port/Link Aggregation for All Ports.
12	Jumbo Frames	Jumbo Frames support up to 9K Bytes on Gigabit / 10 G Ports
13	Storm Control	Support for broadcast/multicast storm control to prevent degradation of switch performance from faulty end stations
Layer 2 Functionality		
14	802.1Q	Should support 802.1Q protocol
15	Type of VLANs	Should support port, subnet based VLANs
16	Voice VLAN	Should Support Voice VLAN for separating and prioritizing VoIP traffic
17	VLAN Trunking Protocol or Equivalent	Should support VTP or equivalent protocol to reduce administrative burden of configuring VLANs on multiple switches.

18	No. of VLAN	Should support minimum 1000 active VLANS
19	MAC Addresses	Minimum No. of MAC Address Supported: 12000
Layer 3 Functionality		
20	OSPF, BGP, RIP/RIP2	Should support OSPF, BGPv4, RIP/RIP2.
21	Ipv6 Support	Should support IPv6 from day one
22	Equal Cost Load Balancing	Should support Equal Cost Load Balancing
23	No. of Route Entries	Should support minimum 10000 Route entries
Security Features		
24	Access Control Lists	Should support Standard and Extended ACLs
25	Various type of ACLs	Should support various type of ACLs like port based/time based
26	Detection of Attacks	Should support real time detection of DoS attacks, Hacker attacks from Internal/external sources
27	MAC Address Filtering	Should Support MAC Address Filtering based on source and destination address
28	802.1X	Should support 802.1X Network Security and Authentication
29	RADIUS	Should have support for RADIUS
Network Protocols		
30	HSRP or Equivalent	Should Support Hot Standby Routing Protocol or equivalent
31	STP	Should Support Spanning Tree Protocol, Rapid Spanning Tree Protocol, Multiple Spanning Tree Protocol

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32	DNS, TFTP, NTP	Should support DNS, TFTP and NTP protocols
Quality of Service		
33	Ingress/Egress Queuing	Should support Ingress/Egress Queuing on per port basis.
34	Traffic Policing	Should be able to limit traffic flows based on MAC Source/Destination address, IP Source/ Destinations address, TCP/UDP port nos etc
35	QoS Scheduling	Should support QoS scheduling.
36	Queue per port	Should support minimum 4 queues per port
37	Traffic Classification	Should support policy based traffic classification based on Type of Service (ToS), IP Precedence mapping, Layer 2/3/4 defined traffic flows, MAC address, VLANs
38	Rate Limiting	Switch should support rate limiting (bandwidth control). Rate limiting should be supported on the Ingress or Egress of any port without sacrificing additional ports.
Multicasting		
39	Multicast	Should support H/W or S/W based IPv4 and Ipv6 Multicasting
40	IGMP	Should Support IGMP v1, v2 , v3
41	Multicast Entries	Should support minimum 1000 entries
42	PIM	Should support Protocol Independent Multicast - Sparse Mode and PIM - SSM
Management		
43	Network monitoring/ management	Switch should be manageable through NMS on per port/switch basis with common interface for all manageable devices on the network. Should Support syslog, SNMP, RMON/RMON-II, SSH, telnet, web management

44	Port Mirroring	Should support port mirroring feature for monitoring network traffic of a particular port/VLAN/group of ports/entire switch.
Software		
45	Software Version	Version of software for supplied switch should be latest release to support all required features
46	Software Updates	Software updates should be bundled for the entire contract period
IEEE Standards Compliance		
47	IEEE Standards	Ethernet: IEEE 802.3, 10BASE-T
		Fast Ethernet: IEEE 802.3u, 100BASE-TX, 100BASE-FX
		Gigabit Ethernet: IEEE 802.3z, IEEE 802.3ab, 1000BASE-X (mini-GBIC/SFP), 1000BASE-SX, 1000BASE-LX/LH
		10G Ethernet: IEEE 802.3ae, 10GBase-SR, 10GBase-LR
		IEEE 802.1D Spanning-Tree Protocol
		IEEE 802.1S & 1W for Rapid Spanning tree convergence
		IEEE 802.1p CoS Prioritization
		IEEE 802.3x Flow Control
		IEEE 802.3ad Link Aggregation

3.3 Distribution Switch Type 2

These switches shall be Stack based Multilayer Switch architecture. These switches shall be placed at critical locations. Switches shall be of following specifications

Hardware & Performance Requirements		
1	Architecture	Multilayer Switch architecture with sufficient modules/cards to fit required transceivers/UTP ports (Stacked)
2	Switching Fabric Capacity	The Switch should support a minimum of 32 Gbps of Switching Fabric Capacity.
3	Flash & Memory	The proposed switch should have enough Memory (Flash and RAM) to hold the latest Software Release. It should support all features of switch and parameters like MAC Address Table, IP Routing Tables, VLANs, ACLs, etc.at their peak values as claimed in the Data Sheets of the Switch.
4	Switch Forwarding Rates	The Switch should Support Minimum Switching Performance 15 Mpps. Performance should be hardware based.
5	Stacking	The Switch should have two stacking ports and stacking bandwidth of 32 Gbps. The switch should be stackable with Distribution Switch Type – 1.
6	No. of SFP Ports	The Switch should have 12 number of SFP ports.
7	No. of 1G Fiber Transceivers	As per 3.9, Required Transceivers shall be separately ordered
Connectivity & Filtering		
8	802.3ad	Should support Industry Standard Port/Link Aggregation for All Ports.

9	Jumbo Frames	Jumbo Frames support up to 9K Bytes on Gigabit / 10 G Ports
10	Storm Control	Support for broadcast/multicast storm control to prevent degradation of switch performance from faulty end stations
Layer 2 Functionality		
11	802.1Q	Should support 802.1Q protocol
12	Type of VLANs	Should support port, subnet based VLANs
13	Voice VLAN	Should Support Voice VLAN for separating and 28rioritizing VoIP traffic
14	VLAN Trunking Protocol or Equivalent	Should support VTP or equivalent protocol to reduce administrative burden of configuring VLANs on multiple switches.
15	No. of VLAN	Should support minimum 1000 active VLANS
16	MAC Addresses	Minimum No. of MAC Address Supported: 12000
Layer 3 Functionality		
17	OSPF, BGP, RIP/RIP2	Should support OSPF, BGPv4, RIP/RIP2.
18	Ipv6 Support	Should support IPv6 from day one
19	Equal Cost Load Balancing	Should support Equal Cost Load Balancing
20	No. of Route Entries	Should support minimum 10000 Route entries
Security Features		
21	Access Control Lists	Should support Standard and Extended ACLs
22	Various type of ACLs	Should support various type of ACLs like port based/time based

23	Detection of Attacks	Should support real time detection of DoS attacks, Hacker attacks from Internal/external sources
24	MAC Address Filtering	Should Support MAC Address Filtering based on source and destination address
25	802.1X	Should support 802.1X Network Security and Authentication
26	RADIUS	Should have support for RADIUS
Network Protocols		
27	HSRP or Equivalent	Should Support Hot Standby Routing Protocol or equivalent
28	STP	Should Support Spanning Tree Protocol, Rapid Spanning Tree Protocol, Multiple Spanning Tree Protocol
29	DNS, TFTP, NTP	Should support DNS, TFTP and NTP protocols
Quality of Service		
30	Ingress/Egress Queuing	Should support Ingress/Egress Queuing on per port basis.
31	Traffic Policing	Should be able to limit traffic flows based on MAC Source/Destination address, IP Source/ Destinations address, TCP/UDP port nos etc
32	QoS Scheduling	Should support QoS scheduling.
33	Queue per port	Should support minimum 4 queues per port
34	Traffic Classification	Should support policy based traffic classification based on Type of Service (ToS), IP Precedence mapping, Layer 2/3/4 defined traffic flows, MAC address, VLANs
35	Rate Limiting	Switch should support rate limiting (bandwidth control). Rate limiting should be supported on the Ingress or Egress of any port without sacrificing additional ports.

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Multicasting		
36	Multicast	Should support H/W or S/W based IPv4 and Ipv6 Multicasting
37	IGMP	Should Support IGMP v1, v2 , v3
38	Multicast Entries	Should support minimum 1000 entries
39	PIM	Should support Protocol Independent Multicast - Sparse Mode and PIM – SSM
Management		
40	Network monitoring/ management	Switch should be manageable through NMS on per port/switch basis with common interface for all manageable devices on the network. Should Support syslog, SNMP, RMON/RMON-II, SSH, telnet, web management
41	Port Mirroring	Should support port mirroring feature for monitoring network traffic of a particular port/VLAN/group of ports/entire switch.
Software		
42	Software Version	Version of software for supplied switch should be latest release to support all required features
43	Software Updates	Software updates should be bundled for the entire contract period
IEEE Standards Compliance		
44	IEEE Standards	Ethernet: IEEE 802.3, 10BASE-T
		Fast Ethernet: IEEE 802.3u, 100BASE-TX, 100BASE-FX
		Gigabit Ethernet: IEEE 802.3z, IEEE 802.3ab, 1000BASE-X (mini-GBIC/SFP), 1000BASE-SX, 1000BASE-LX/LH
		10G Ethernet: IEEE 802.3ae, 10GBase-SR, 10GBase-LR
		IEEE 802.1D Spanning-Tree Protocol

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		IEEE 802.1S & 1W for Rapid Spanning tree convergence
		IEEE 802.1p CoS Prioritization
		IEEE 802.3x Flow Control
		IEEE 802.3ad Link Aggregation

3.4 Server Farm Switches

These switches shall be stack based multilayer switches. All servers shall terminate on these switches. Two switches shall be placed in Informatics Centre and two switches shall be placed in Telephone Exchange. Specifications shall be as follows:

Hardware & Performance Requirements		
1	Architecture	Fixed Configuration Layer 3 Rack mountable Switch. Rackmount kit to be provided alongwith the switch
2	Flash & Memory	The proposed switch should have enough Memory (Flash and RAM) to hold the latest Software Release. The Memory should be large enough to support fully populated ports, all features of switch and parameters like MAC Address Table, IP Routing Tables, VLANs, ACLs, etc.at their peak values as claimed in the Data Sheets of the Switch.
3	Switching Fabric Capacity	The Switch should support a minimum of 150 Gbps of Switching Fabric Capacity.

4	Switch Forwarding Rates	The Switch should Support Minimum Switching Performance of 100 Mpps.
5	Stacking	The Switch should have two stacking ports and stacking bandwidth of 64 Gbps.
6	10G/Gigabit Ethernet capability	The Switch should Support Minimum 2 nos. of 10 Gigabit Ethernet Ports with Local Forwarding for connectivity in addition to the 48 10/100/1000BaseTx UTP ports
7	No. of 10/ 100/ 1000 BaseTX UTP Ports	48 Nos. 10/100/1000BaseTx UTP ports
8	No. of 10G Fiber Transceivers	As per 3.9, Required Transceivers shall be separately ordered
9	Type of Ports	All Autosensing, Autonegotiating, Auto-MDIX on all UTP ports
Connectivity & Filtering		
10	802.3ad	Should support Industry Standard Port/Link Aggregation for All Ports
11	Jumbo Frames	Jumbo Frames support up to 9K Bytes on Gigabit / 10 G Ports
12	Storm Control	Support for broadcast/multicast storm control to prevent degradation of switch performance from faulty end stations
Layer 2 Functionality		
13	802.1Q	Should support 802.1Q protocol
14	Type of VLANs	Should support port, subnet based VLANs
15	Voice VLAN	Should Support separate Voice VLAN for separating and prioritizing VoIP traffic
16	VLAN Trunking Protocol or	Should support VTP or equivalent protocol to reduce administrative burden of configuring VLANs on multiple switches

	Equivalent	
17	No. of VLAN	Should support minimum 1000 active VLANs
18	MAC Addresses	No. of MAC Address Supported: 12000
Layer 3 Functionality		
19	OSPF, BGP, RIP/RIP2	Should support OSPF, BGPv4, RIP/RIP2 with an software upgrade
20	Ipv6 Support	Should support IPv6 in hardware from day one
21	Equal Cost Load Balancing	Should support Equal Cost Load Balancing
22	No. of Route Entries	Should support minimum 10000 Route entries
Security Features		
23	Access Control Lists	Should support Standard and Extended ACLs
24	Various type of ACLs	Should support various type of ACLs like port based/time based
25	Detection of Attacks	Should support real time detection of DoS attacks, Hacker attacks from Internal/ external sources
26	MAC Address Filtering	Should Support MAC Address Filtering based on source and destination address
27	802.1X	Should support 802.1x Network Security and Authentication
28	RADIUS	Should have support for RADIUS
Network Protocols		
29	HSRP or Equivalent	Should Support Hot Standby Routing Protocol or equivalent

30	STP	Should Support Spanning Tree Protocol, Rapid Spanning Tree Protocol, Multiple Spanning Tree Protocol
31	PortFast/ UplinkFast	Support for fast convergence features like PortFast/ UplinkFast
32	DNS, TFTP, NTP	Should support DNS, TFTP and NTP protocols
Quality of Service		
33	Traffic Policing	Should be able to limit traffic flows based on MAC Source/Destination address
34	QoS Scheduling	Should support QoS scheduling
35	Queue per port	Should support minimum 4 queues per port
36	Traffic Classification	Should support policy based traffic classification based on Type of Service (ToS), IP Precedence mapping, Layer 2/3/4 defined traffic flows, MAC address, VLANs
37	Rate Limiting	Switch should support rate limiting (bandwidth control). Rate limiting should be supported on the Ingress or Egress of any port without sacrificing additional ports.
Multicasting		
38	Multicast	Should support H/W or S/W based IPv4 and Ipv6 Multicasting
39	IGMP	Should Support IGMP v1, v2, v3
40	Multicast Entries	Should support 1000 entries
41	PIM	Should support Protocol Independent Multicast - Sparse and dense mode
Management		
42	Network monitoring/	Switch should be manageable through NMS on per port/switch basis with common interface for all manageable devices on the network. Should Support syslog, SNMP, RMON/RMON-II, SSH,

	management	telnet, web management
43	Port Mirroring	Should support port mirroring feature for monitoring network traffic of a particular port/VLAN/group of ports/entire switch. Port mirroring should also be possible across the switches
Software		
44	Software Version	Version of software for supplied switch should be latest release to support all required features
45	Software Updates	Software updates should be bundled for the entire contract period
IEEE Standards Compliance		
46	IEEE Standards	Ethernet: IEEE 802.3x, 10BASE-T, 100BASE-TX, 1000BASE-T
		Fast Ethernet: IEEE 802.3u, 100BASE-TX, 100BASE-FX
		Gigabit Ethernet: IEEE 802.3z, IEEE 802.3ab, 1000BASE-X (mini-GBIC/SFP), 1000BASE-SX, 1000BASE-LX/LH
		10G Ethernet: IEEE 802.3ae, 10GBase-SR, 10GBase-LR
		IEEE 802.1D Spanning-Tree Protocol
		IEEE 802.1S & 1W for Rapid Spanning tree convergence
		IEEE 802.1p CoS Prioritization
		IEEE 802.3x Flow Control
		IEEE 802.3ad Link Aggregation

3.5 Layer-3 Access Switch Type I

Hardware & Performance Requirements		
1	Architecture	Multilayer Stackable Switch architecture with sufficient modules/cards to fit required transceivers/UTP ports (Stacked)
2	Switching Fabric Capacity	The Switch should support a minimum of 150 Gbps of Switching Fabric Capacity.
3	Flash & Memory	The proposed switch should have enough Memory (Flash and RAM) to hold the latest Software Release. It should support all features of switch and parameters like MAC Address Table, IP Routing Tables, VLANs, ACLs, etc.at their peak values as claimed in the Data Sheets of the Switch.
4	Switch Forwarding Rate	The switch should support minimum switching performance of 100 Mpps. Performance shall be hardware based.
5	No of 10/100/1000 Port	The Switch should have 48 Nos of 10/100/1000 ports
6	No. of SFP Ports	The Switch should have 4 number of SFP ports in addition to the above number of ports.
7	No. of 1G Fiber Transceivers	As per 3.9, Required Transceivers shall be separately ordered
8	No. of 1G UTP Transceivers	As per 3.9, Required Transceivers shall be separately ordered
Connectivity & Filtering		
9	802.3ad	Should support Industry Standard Port/Link Aggregation for All Ports.
10	Jumbo Frames	Jumbo Frames support up to 9K Bytes on Gigabit
11	Storm Control	Support for broadcast/multicast storm control to prevent degradation of switch performance from faulty end stations

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Layer 2 Functionality		
12	802.1Q	Should support 802.1Q protocol
13	Type of VLANs	Should support port, subnet based VLANs
14	Voice VLAN	Should Support separate Voice VLAN for separating and prioritizing VoIP traffic
15	VLAN Trunking Protocol or Equivalent	Should support VTP or equivalent protocol to reduce administrative burden of configuring VLANs on multiple switches.
16	No. of VLAN	Should support minimum 1000 active VLANS
17	MAC Addresses	Minimum No. of MAC Address Supported: 12000
Layer 3 Functionality		
18	OSPF, BGP, RIP/RIP2	Should support OSPF, BGPv4, RIP/RIP2.
19	Ipv6 Support	Should support IPv6 in hardware from day one
20	Equal Cost Load Balancing	Should support Equal Cost Load Balancing
21	No. of Route Entries	Should support minimum 10000 Route entries
Security Features		
22	Access Control Lists	Should support Standard and Extended ACLs
23	Various type of ACLs	Should support various type of ACLs like port based/time based
24	Detection of Attacks	Should support real time detection of DoS attacks, Hacker attacks from Internal/external sources

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25	MAC Address Filtering	Should Support MAC Address Filtering based on source and destination address
26	802.1X	Should support 802.1X Network Security and Authentication
27	RADIUS	Should support for RADIUS
Network Protocols		
28	HSRP or Equivalent	Should Support Hot Standby Routing Protocol or equivalent
29	STP	Should Support Spanning Tree Protocol, Rapid Spanning Tree Protocol, Multiple Spanning Tree Protocol
30	DNS, TFTP, NTP	Should support DNS, TFTP and NTP protocols
Quality of Service		
31	Ingress/Egress Queuing	Should support Ingress/Egress Queuing on per port basis.
32	Traffic Policing	Should be able to limit traffic flows based on MAC Source/Destination address, IP Source/ Destinations address, TCP/UDP port nos etc
33	QoS Scheduling	Should support QoS scheduling.
34	Queue per port	Should support minimum 4 queues per port
35	Traffic Classification	Should support policy based traffic classification based on Type of Service (ToS), IP Precedence mapping, Layer 2/3/4 defined traffic flows, MAC address, VLANs
36	Rate Limiting	Switch should support rate limiting (bandwidth control). Rate limiting should be supported on the Ingress or Egress of any port without sacrificing additional ports.
Multicasting		
37	Multicast	Should support H/W or S/W based IPv4 and Ipv6 Multicasting

38	IGMP	Should Support IGMP v1, v2 , v3
39	Multicast Entries	Should support minimum 1000 entries
40	PIM	Should support Protocol Independent Multicast - Sparse Mode and PIM – SSM
Management		
41	Network monitoring/ management	Switch should be manageable through NMS on per port/switch basis with common interface for all manageable devices on the network. Should Support syslog, SNMP, RMON/RMON-II, SSH, telnet, web management
42	Port Mirroring	Should support port mirroring feature for monitoring network traffic of a particular port/VLAN/group of ports/entire switch.
Software		
43	Software Version	Version of software for supplied switch should be latest release to support all required features
44	Software Updates	Software updates should be bundled for the entire contract period
IEEE Standards Compliance		
45	IEEE Standards	Ethernet: IEEE 802.3x, 10BASE-T, 100BASE-TX, 1000BASE-T
		Fast Ethernet: IEEE 802.3u, 100BASE-TX, 100BASE-FX
		Gigabit Ethernet: IEEE 802.3z, IEEE 802.3ab, 1000BASE-X (mini-GBIC/SFP), 1000BASE-SX, 1000BASE-LX/LH
		10G Ethernet: IEEE 802.3ae, 10GBase-SR, 10GBase-LR
		IEEE 802.1D Spanning-Tree Protocol
		IEEE 802.1S & 802.1W for Rapid Spanning tree convergence
		IEEE 802.1p CoS Prioritization

		IEEE 802.3x Flow Control
		IEEE 802.3ad Link Aggregation

3.6 Layer-3 Access Switch Type 2

Hardware & Performance Requirements		
1	Architecture	Multilayer Switch architecture with sufficient modules/cards to fit required transceivers/UTP ports (Stacked)
2	Switching Fabric Capacity	The Switch should support a minimum of 150 Gbps of Switching Fabric Capacity.
3	Flash & Memory	The proposed switch should have enough Memory (Flash and RAM) to hold the latest Software Release. It should support all features of switch and parameters like MAC Address Table, IP Routing Tables, VLANs, ACLs, etc.at their peak values as claimed in the Data Sheets of the Switch.
4	Switch Forwarding Rate	The switch should support minimum switching performance of 65Mpps. Performance shall be hardware based.
5	No of 10/100/1000 Port	The Switch should have 24 Nos of 10/100/1000 ports
6	No. of SFP Ports	The Switch should have 4 number of SFP ports in addition to the above mentioned ports.
7	No. of 1G Fiber Transceivers	As per 3.9, Required Transceivers shall be separately ordered
8	No. of 1G UTP Transceivers	As per 3.9, Required Transceivers shall be separately ordered
Connectivity & Filtering		

9	802.3ad	Should support Industry Standard Port/Link Aggregation for All Ports.
10	Jumbo Frames	Jumbo Frames support up to 9K Bytes on Gigabit
11	Storm Control	Support for broadcast/multicast storm control to prevent degradation of switch performance from faulty end stations
Layer 2 Functionality		
12	802.1Q	Should support 802.1Q protocol
13	Type of VLANs	Should support port, subnet based VLANs
14	Voice VLAN	Should Support separate Voice VLAN for separating and prioritizing VoIP traffic
15	VLAN Trunking Protocol or Equivalent	Should support VTP or equivalent protocol to reduce administrative burden of configuring VLANs on multiple switches.
16	No. of VLAN	Should support minimum 1000 active VLANS
17	MAC Addresses	Minimum No. of MAC Address Supported: 12000
Layer 3 Functionality		
18	OSPF, BGP, RIP/RIP2	Should support OSPF, BGPv4, RIP/RIP2.
19	Ipv6 Support	Should support IPv6 from day one
20	Equal Cost Load Balancing	Should support Equal Cost Load Balancing
21	No. of Route Entries	Should support minimum 10000 Route entries
Security Features		
22	Access Control Lists	Should support Standard and Extended ACLs

23	Various type of ACLs	Should support various type of ACLs like port based/time based
24	Detection of Attacks	Should support real time detection of DoS attacks, Hacker attacks from Internal/external sources
25	MAC Address Filtering	Should Support MAC Address Filtering based on source and destination address
26	802.1X	Should support 802.1X Network Security and Authentication
27	RADIUS	Should have support for RADIUS
Network Protocols		
28	HSRP or Equivalent	Should Support Hot Standby Routing Protocol or equivalent
29	STP	Should Support Spanning Tree Protocol, Rapid Spanning Tree Protocol, Multiple Spanning Tree Protocol
30	DNS, TFTP, NTP	Should support DNS, TFTP and NTP protocols
Quality of Service		
31	Ingress/Egress Queuing	Should support Ingress/Egress Queuing on per port basis.
32	Traffic Policing	Should be able to limit traffic flows based on MAC Source/Destination address, IP Source/ Destinations address, TCP/UDP port nos etc
33	QoS Scheduling	Should support QoS scheduling.
4	Queue per port	Should support minimum 4 queues per port
35	Traffic Classification	Should support policy based traffic classification based on Type of Service (ToS), IP Precedence mapping, Layer 2/3/4 defined traffic flows, MAC address, VLANs
36	Rate Limiting	Switch should support rate limiting (bandwidth control). Rate limiting should be supported on the Ingress or Egress of any

		port without sacrificing additional ports.
Multicasting		
37	Multicast	Should support H/W or S/W based IPv4 and Ipv6 Multicasting
38	IGMP	Should Support IGMP v1, v2 , v3
39	Multicast Entries	Should support minimum 1000 entries
40	PIM	Should support Protocol Independent Multicast - Sparse Mode and PIM – SSM
Management		
41	Network monitoring/ management	Switch should be manageable through NMS on per port/switch basis with common interface for all manageable devices on the network. Should Support syslog, SNMP, RMON/RMON-II, SSH, telnet, web management
42	Port Mirroring	Should support port mirroring feature for monitoring network traffic of a particular port/VLAN/group of ports/entire switch.
Software		
43	Software Version	Version of software for supplied switch should be latest release to support all required features
44	Software Updates	Software updates should be bundled for the entire contract period
IEEE Standards Compliance		
45	IEEE Standards	Ethernet: IEEE 802.3, 10BASE-T
		Fast Ethernet: IEEE 802.3u, 100BASE-TX, 100BASE-FX
		Gigabit Ethernet: IEEE 802.3z, IEEE 802.3ab, 1000BASE-X (mini-GBIC/SFP), 1000BASE-SX, 1000BASE-LX/LH

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		10G Ethernet: IEEE 802.3ae, 10GBase-SR, 10GBase-LR
		IEEE 802.1D Spanning-Tree Protocol
		IEEE 802.1S & 1W for Rapid Spanning tree convergence
		IEEE 802.1p CoS Prioritization
		IEEE 802.3x Flow Control
		IEEE 802.3ad Link Aggregation

3.7 Access Switch- I

These 48 port layer-2 fixed configuration switches shall be of stack based used to connect users desktops/workstations etc. These switches shall be placed across the plant. Specifications shall be as given below.

Hardware & Performance Requirements		
1	Architecture	Fixed Configuration Layer 2 Rack mountable Switch. Rackmount kit to be provided alongwith the switch
2	Flash & Memory	The proposed switch should have enough Memory (Flash and/or any other) to hold the latest Software Release. The Memory should be large enough to support fully populated ports, all features of switch and parameters like MAC Address Table, VLANs etc.at their peak values as claimed in the Data Sheets of the Switch.
3	Switching forwarding bandwidth	The Switch should support a minimum of 80 Gbps of Switching forwarding bandwidth.
4	Switch Forwarding Rates	The Switch should Support Minimum Switching Performance of 75 Mpps.

5	Stacking	The Switch should have two stacking ports and stacking bandwidth of 20 Gbps.
6	No. of 10/100/1000 Ports	The Switch should have minimum 48 nos. 10/100/1000BaseTX ports
7	No of SFP Ports	The switch should have 4 numbers of SFP ports in addition to the above mentioned ports
8	Type of Ports	All Autosensing, Autonegotiating, Auto-MDIX on all UTP ports
9	No. of Transceivers	As per 3.9, Required Transceivers shall be separately ordered
Connectivity & Filtering		
10	802.3ad	Should support Industry Standard Port/Link Aggregation for All Ports
11	Jumbo Frames	Jumbo Frames support up to 9K Bytes
12	Storm Control	Support for broadcast/multicast storm control to prevent degradation of switch performance from faulty end stations
Layer 2 Functionality		
13	802.1Q	Should support 802.1Q protocol
14	Type of VLANs	Should support port based VLANs
15	Voice VLAN	Should Support separate Voice VLAN for separating and prioritising VoIP traffic
16	VLAN Trunking Protocol or Equivalent	Should support VTP or equivalent protocol to reduce administrative burden of configuring VLANs on multiple switches
17	No. of VLAN	Should support minimum 250 active VLANs

18	MAC Addresses	No. of MAC Address Supported: 8000
Security Features		
19	MAC Address Filtering	Should Support MAC Address Filtering based on source and destination address
20	DHCP Snooping	Should support DHCP Snooping to filter untrusted DHCP messages
21	802.1X	Should support 802.1x Network Security and Authentication
22	802.1x with VLAN Assignment/ Guest VLAN	Should support 802.1x with VLAN Assignment/Guest VLAN features
23	RADIUS	Should have support for RADIUS
Network Protocols		
24	STP	Should Support Spanning Tree Protocol, Rapid Spanning Tree Protocol, Multiple Spanning Tree Protocol
25	PortFast/ UplinkFast	Support for fast convergence features like PortFast/ UplinkFast
Quality of Service		
26	QoS Scheduling	Should support QoS scheduling
27	Queue per port	Should support minimum 4 queues per port
28	Rate Limiting	Switch should support rate limiting (bandwidth control). Rate limiting should be supported on the Ingress or Egress of any port without sacrificing additional ports.
Multicasting		
29	Multicast	Should support H/W or S/W based IPv4 Multicasting
30	IGMP	Should Support IGMP v1, v2

Management		
31	Network monitoring/ management	Switch should be manageable through NMS on per port/switch basis with common interface for all manageable devices on the network. Should Support syslog, SNMP, RMON/RMON-II, SSH, telnet, web management
32	Port Mirroring	Should support port mirroring feature for monitoring network traffic of a particular port/VLAN/group of ports/entire switch.
Software		
33	Software Version	Version of software for supplied switch should be latest release to support all required features
34	Software Updates	Software updates should be bundled for the entire contract period
IEEE Standards Compliance		
35	IEEE Standards	Ethernet: IEEE 802.3, 10BASE-T
		Fast Ethernet: IEEE 802.3u, 100BASE-TX, 100BASE-FX
		Gigabit Ethernet: IEEE 802.3z, IEEE 802.3ab, 1000BASE-X (mini-GBIC/SFP), 1000BASE-SX, 1000BASE-LX/LH
		IEEE 802.1D Spanning-Tree Protocol
		IEEE 802.1S & 1W for Rapid Spanning tree convergence
		IEEE 802.1p CoS Prioritization
		IEEE 802.3x Flow Control
		IEEE 802.3ad Link Aggregation

3.8 Access Switch – II

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These 24 port layer-2 fixed configuration switches shall be used to connect users' desktops/workstations etc. These switches shall be placed across the plant. Specifications shall be as given below.

Hardware & Performance Requirements		
1	Architecture	Fixed Configuration Layer 2 Rack mountable Switch. Rackmount kit to be provided along with the switch
2	Flash & Memory	The proposed switch should have enough Memory (Flash and/or any other) to hold the latest Software Release. The Memory should be large enough to support fully populated ports, all features of switch and parameters like MAC Address Table, VLANs etc.at their peak values as claimed in the Data Sheets of the Switch.
3	Switching Forwarding bandwidth	The Switch should support a minimum of 80 Gbps of Switching Fabric Capacity.
4	Switch Forwarding Rates	The Switch should Support Minimum Switching Performance of 40 Mpps.
5	Stacking	The Switch should have two stacking ports and stacking bandwidth of 20 Gbps.
6	No. of 10/100/1000 Ports	The Switch should have minimum 24 nos. 10/100/1000BaseTX ports
7	No of SFP Ports	The switch should have 4 numbers of SFP ports in addition to the above ports
8	Type of Ports	All Autosensing, Autonegotiating, Auto-MDIX on all UTP ports
9	No. of Transceivers	As per 3.9, Required Transceivers shall be separately ordered
Connectivity & Filtering		

10	802.3ad	Should support Industry Standard Port/Link Aggregation for All Ports
11	Jumbo Frames	Jumbo Frames support up to 9K Bytes
12	Storm Control	Support for broadcast/multicast storm control to prevent degradation of switch performance from faulty end stations
Layer 2 Functionality		
13	802.1Q	Should support 802.1Q protocol
14	Type of VLANs	Should support port based VLANs
15	Voice VLAN	Should Support Voice VLAN for separating and prioritising VoIP traffic
16	VLAN Trunking Protocol or Equivalent	Should support VTP or equivalent protocol to reduce administrative burden of configuring VLANs on multiple switches
17	No. of VLAN	Should support minimum 250 active VLANs
18	MAC Addresses	No. of MAC Address Supported: 8000
Security Features		
19	MAC Address Filtering	Should Support MAC Address Filtering based on source and destination address
20	DHCP Snooping	Should support DHCP Snooping to filter untrusted DHCP messages
21	802.1X	Should support 802.1x Network Security and Authentication
22	802.1x with VLAN Assignment/ Guest VLAN	Should support 802.1x with VLAN Assignment/Guest VLAN features
23	RADIUS	Should have support for RADIUS

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Network Protocols		
24	STP	Should Support Spanning Tree Protocol, Rapid Spanning Tree Protocol, Multiple Spanning Tree Protocol
25	PortFast/ UplinkFast	Support for fast convergence features like PortFast/ UplinkFast
Quality of Service		
26	QoS Scheduling	Should support QoS scheduling
27	Queue per port	Should support minimum 4 queues per port
28	Rate Limiting	Switch should support rate limiting (bandwidth control). Rate limiting should be supported on the Ingress or Egress of any port without sacrificing additional ports.
Multicasting		
29	Multicast	Should support H/W or S/W based IPv4 Multicasting
30	IGMP	Should Support IGMP v1, v2
Management		
31	Network monitoring/ management	Switch should be manageable through NMS on per port/switch basis with common interface for all manageable devices on the network. Should Support syslog, SNMP, RMON/RMON-II, SSH, telnet, web management
32	Port Mirroring	Should support port mirroring feature for monitoring network traffic of a particular port/VLAN/group of ports/entire switch.
Software		
33	Software Version	Version of software for supplied switch should be latest release to support all required features
34	Software Updates	Software updates should be bundled for the entire contract

		period
IEEE Standards Compliance		
35	IEEE Standards	Ethernet: IEEE 802.3, 10BASE-T
		Fast Ethernet: IEEE 802.3u, 100BASE-TX, 100BASE-FX
		Gigabit Ethernet: IEEE 802.3z, IEEE 802.3ab, 1000BASE-X (mini-GBIC/SFP), 1000BASE-SX, 1000BASE-LX/LH
		IEEE 802.1D Spanning-Tree Protocol
		IEEE 802.1S & 1W for Rapid Spanning tree convergence
		IEEE 802.1p CoS Prioritization
		IEEE 802.3x Flow Control
		IEEE 802.3ad Link Aggregation

3.9 Modules Details

Sl. No.	Source	Destination	Connect Type	Transceivers	
				Type	Qty
		Core Switch 1			
1	CD1-IC	Server Farm 01 (IC)	10 Gig- MMF	10G-LRM	2
		IC Distribution	10 Gig- MMF	10G-LRM	2
		Admin Distribution	10 Gig- MMF	10G-LR	2
		CTO	10 Gig- MMF	10G-LR	2
		NDTL	10 Gig- SMF	10G-LR	2
		Main Store	10 Gig- SMF	10G-LR	2
		Server Farm 01 (HPSS)	10 Gig- SMF	10G-LR	2
		Hospital	10 Gig- SMF	10G-LR	2
		CD2-HPSS	10 Gig- SMF	10G-LR	2
		Core Switch 2			
2	CD2 – HPSS	Server Farm 02 (HPSS)	10 Gig- MMF	10G-LRM	2
		IC Distribution	10 Gig- SMF	10G-LR	2
		Admin Distribution	10 Gig- MMF	10G-LR	2
		CTO	10 Gig- SMF	10G-LR	2
		NDTL	10 Gig- SMF	10G-LR	2
		Main Store	10 Gig- SMF	10G-LR	2
		Server Farm 02 (HIC)	10 Gig- SMF	10G-LR	2
		Hospital	10 Gig- SMF	10G-LR	2
		CD1-IC	10 Gig- SMF	10G-LR	2
		Distribution Node 1			
3	Distribution Switch 1 IC Ground Floor	Civil Factory	Gig over SMF	GLC-LH-SM	2
		Shipping Gate	Gig over SMF	GLC-LH-SM	2
		Flow Model Lab	Gig over MMF	GLC-LH-SM	2
		Shipping	Gig over SMF	GLC-LH-SM	2
		E-Shop	Gig over SMF	GLC-LH-SM	2
		Extended Shipping Gate	Gig over SMF	GLC-LH-SM	2
		Reception	Gig over MMF	GLC-SX-MM	4
		CAD-L	Copper	UTP	NA
		CAD-R	Copper	UTP	NA
		Engg GF	Copper	UTP	NA
		Info. Center	Copper	UTP	NA
		New Shipping	Gig over SMF	GLC-LH-SM	2
		Extended Shipping	Gig over SMF	GLC-LH-SM	2
		Main Gate	Gig over MMF	GLC-SX-MM	2

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		AHP-R&D	Gig over MMF	GLC-SX-MM	2
		New Civil Factory	Gig over MMF	GLC-SX-MM	2
		AQCS-R&D	Gig over MMF	GLC-SX-MM	4
		Distribution Node 2			
4	Distribution Switch 2 Admin Building	Cash Office	Gig over MMF	GLC-SX-MM	2
		Admin Canteen	Gig over MMF	GLC-SX-MM	2
		Admin Gate	Gig over MMF	GLC-SX-MM	2
		Tele Exchange	Gig over MMF	GLC-SX-MM	2
		Security Office	Gig over MMF	GLC-SX-MM	2
		New RMS	Gig over SMF	GLC-LH-SM	2
		Extended Shipping	Gig over SMF	GLC-LH-SM	2
		Admin GF	Copper	UTP	NA
		Admin FF	Copper	UTP	NA
		Admin SF	Copper	UTP	NA
		Admin TF	Copper	UTP	NA
		New Shipping	Gig over SMF	GLC-LH-SM	2
		LSF Yard	Gig over SMF	GLC-LH-SM	2
		Finance Log Room	Gig over MMF	GLC-LH-SM	2
		Shipping Gate	Gig over SMF	GLC-LH-SM	2
		East Gate Weigh Bridge	Gig over SMF	GLC-LH-SM	2
		Extended Shipping Gate	Gig over SMF	GLC-LH-SM	2
		Distribution Node 3			
5	Distribution Switch 3 CTO	F3 Bay	Gig over MMF	GLC-SX-MM	2
		Shop Annex Office GF	Copper	UTP	NA
		Shop Annex Office FF	Copper	UTP	NA
		Shop Office GF	10 Gig over MMF	10G-LRM	2
			Gig over MMF	GLC-SX-MM	2
		Shop Office FF	10 Gig over MMF	10G-LRM	2
			Gig over MMF	GLC-SX-MM	2
		Distribution Node 4			
6	Distribution Switch 4 NDTL	Shipping Operation	Gig over MMF	GLC-LH-SM	2
		MP Shop	Gig over MMF	GLC-SX-MM	2
		A2 Bay	Gig over MMF	GLC-SX-MM	2
		A3 Bay	Gig over MMF	GLC-SX-MM	2
		F2 Bay	Gig over MMF	GLC-LH-SM	2
		New Shop (Not Named)	Gig over SMF	GLC-SX-MM	2
		New MP Shop	Gig over MMF	GLC-SX-MM	2

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		Shipping	Gig over MMF	GLC-LH-SM	2
		WTC	Gig over MMF	GLC-LH-SM	2
		F1 Bay	Gig over MMF	GLC-SX-MM	2
		RMS-L3	Gig over MMF	GLC-LH-SM	2
		NDTL	Coper	UTP	NA
		Distribution Node 5			
7	Distribution Switch 5 Main Stores	East Gate	Gig over MMF	GLC-LH-SM	2
		Service Workshop	Gig over SMF	GLC-LH-SM	2
		Fire Station	Gig over MMF	GLC-LH-SM	2
		Inflammable Stores	Gig over MMF	GLC-LH-SM	2
		RMS	Gig over SMF	GLC-LH-SM	2
		Gas Service	Gig over MMF	GLC-LH-SM	2
		New RMS-L3	Gig over SMF	GLC-LH-SM	2
		East Gate Weigh Bridge	Gig over SMF	GLC-LH-SM	2
		Sub-Delivery Stores	Gig over MMF	GLC-SX-MM	2
		Canteen	Gig over MMF	GLC-LH-SM	2
		Consumable Stores	Gig over MMF	GLC-SX-MM	2
		Fastener Stores	Gig over MMF	GLC-SX-MM	2
		Erection Service	Gig over MMF	GLC-LH-SM	2
		FTS	Gig over MMF	GLC-LH-SM	2
		Main Stores	Copper	UTP	NA
		Distribution Node 6			
8	Distribution Switch 6 Hospital	Civil Township	Gig over SMF	GLC-LH-SM	2
		Guest House	Gig over SMF	GLC-LH-SM	2
		D-Type	Gig over SMF	GLC-LH-SM	2
		Hostel	Gig over SMF	GLC-LH-SM	2
		Hospital	Copper	UTP	NA
		Heartbeat Switches		GlC-LH-SM	8
		Total Transceivers → 10G LRM		**10G-LRM**	**10**
		Total Transceivers → 10G LR		**10G-LR**	**30**
		Total Transceivers → 1G LX		**GLC-LH-SM**	**80**
		Total Transceivers → 1G SX		**GLC-SX-MM**	**48**

3.10 Firewall Appliance

Firewall appliances are required for network segregation as per requirements of ISMS. Specifications shall be as follows:

Hardware & Performance Requirements		
1	Architecture	The proposed firewall should work with the existing Cisco ASA 5520 in active- active mode.
2	Flash & Memory	The proposed firewall should have enough Memory (Flash and RAM) to hold the latest Software Release. The Memory should be large enough to support parameters at the peak values as claimed in datasheet
3	Number of users	Should support unlimited number of users from day one.
4	IPS	The firewall should include hardware IPS functionality
		IPS subscription license should be included for the existing IPS module in addition to this new requirement.
5	Transparent Firewall	Should support transparent (Layer 2) firewall features with NAT/PAT. Mix use of transparent and routed firewall should be possible in the same module
6	Stateful Inspection	Should support stateful inspection firewall services, application-aware inspection and controls at layer 4-7 like Web, data center application, VoIP, and multimedia protocols.
7	Access Control List	Should support Standard/Extended ACLs.
8	NAT	Should Support NAT.
9	Management	Should be manageable through CLI, telnet, SSH, web, SNMP, GUI based software. GUI Software alongwith any licenses should be supplied without extra cost
10	Protection from Attacks	Should support Protection from various DoS attacks
11	DHCP Relay	Should support DHCP relay function
12	Role Based Access	Should support role based administrative access for granular control
13	Logging/ Monitoring	Should support syslog; logging to external servers, correlation engine, SNMP
14	Software Version	Version of firewall software for supplied module should be latest release to support all required features
15	Software Updates	Software updates should be bundled for the entire contract period

3.11 Network Management System

Suitable network management system shall be provided to manage the whole network. NMS shall be of following specifications:

1	Software Requirement	Multiple administrative access logins should be possible
2		Provide tools for configuring, managing, monitoring and troubleshooting of the Campus Area Network devices.
3		Provide a flexible framework to address the device management needs of network converging voice, video and data.
4		Automatic discovery process for networked devices that create a network topology map using a color-coded, hierarchical view of the network for IP networks.
5		Tools to simplify Device configuration and management for Routers and Switches.
6		Have tools for creating, deleting and editing VLANs.
7		Should supports automated fault detection that recognizes common problems in the network
8		Threshold management features that can be set for many performance variables to generate an alarm or event notification if threshold are exceeded.
9		Path trace tool for layer 2 and layer 3 path analysis
10		Provide functionality to correlate MAC address and IP address to switch port
11		Support for Inventory Management
12		The system must manage and deploy configuration changes to multiple network devices. Changes can be downloaded immediately or run as scheduled operations
13		Provide capabilities for software updates to be performed against multiple network devices in the network.
14		Pro-active & real-time monitoring and tracking of key information and data relating to device performance, traffic, and environment, with metrics such as utilization percentage, frames transmitted and received, errors, and a variety of other device-specific indicators
15		Provide troubleshooting and diagnostics tools including Ping, Trace Route, Connections, Statistics, and Hostname/Address Lookup
16		Should be possible to Integrate with other management tools and third-party applications, like HP OV, IBM Tivoli etc.
17		New device support should be easily added
18		Web Interface for managing the network
19		Should be able to manage devices using inventory- and device-change management, network-configuration and software-image management, network availability, and syslog analysis.
20	OS Compatibility	NMS software should be Windows OS compatible

21	Hardware Requirement	Suitable hardware for running NMS shall be provided alongwith NMS without additional cost. Minimum Hardware: Dual Core Xeon 3.6 GHz Based CPU, 4 GB RAM, RAID controller, 140 GB Available Disk Capacity in RAID Configuration, DVD Writer, 2 10/100/1000 NIC, Redundant Power Supply, Rack mounting Kit, 19" TFT color monitor, Hardware make: HP/IBM/Dell. Suitable Windows Server 2003/2008 OS license should also be provided without additional cost. If solution requires Database server license, same shall be supplied without additional cost.
22	Performance Requirement	A single Installation should support minimum 200 devices. License if any shall be given for minimum 200 devices.
23	Software Updates	Software updates should be bundled for the entire contract period

3.12 RADIUS/TACACS Server

RADIUS/TACACS Server should be a appliance based on security hardened Operating system with the following specification. The Access control server should have redundancy with one server in Primary Data Center (Informatics Centre) and one server in Secondary site(Telephone Exchange).

SNo	Specification
1	The AAA Server should offer centralized command and control for all user authentication, authorization, and accounting from a Web-based, graphical interface, and distribute those controls to hundreds or thousands of access gateways in the network.
2	The AAA Server should provide the manageability and administration of user access for routers, VPNs, firewalls, dialup and DSL connections, cable access solutions, storage, content, voice over IP (VoIP), wireless solutions, and switches using IEEE 802.1x access control.
3	The same AAA Server should leverage access framework to control administrator access and configuration for all RADIUS enabled network devices in the network.
4	Automatic service monitoring, database synchronization, and importing of tools for large-scale deployments
5	Flexible 802.1X authentication type support, including Extensible Authentication Protocol Transport Layer Security (EAP-TLS), Protected EAP (PEAP), LEAP, EAP-Flexible Authentication via Secure Tunneling (EAP-FAST), and EAP-Message Digest Algorithm 5 (EAP-MD5)
6	Lightweight Directory Access Protocol (LDAP) and Open Database Connectivity (ODBC) user authentication support
7	Downloadable access control lists for any Layer 3 device, including Routers, Firewalls, and VPNs
8	Restrictions such as time of day and day of week, as well as user and device group profiles.
9	Device command set authorization
10	Network access restrictions
11	User and administrative access reporting
12	Dynamic quota generation

13	Restrictions such as time of day and day of week
14	User and device group profiles
15	The AAA Server should have a Web-based user interface to simplify and distribute configuration for user profiles, group profiles.
16	The AAA Server should be able to support large networked environments with support for redundant servers, remote databases, and user database backup services.
17	Lightweight Directory Access Protocol (LDAP) authentication forwarding support for authentication of user profiles stored in directories from leading directory vendors, including Sun, Novell, and Microsoft.
18	Windows Active Directory and Windows NT database support to consolidate Windows username and password management and uses the Windows Performance Monitor for real-time statistics viewing.
19	Different access levels for each AAA Server administrator-and the ability to group network devices-enable easier control and maximum flexibility to facilitate enforcement and changes of security policy administration over all the devices in a network.
20	The proposed AAA Server should be used across virtually any network access server from the same vendor.
21	Tight coupling with Routers and VPN solutions to provide features such as Multichassis Multilink Point-to-Point Protocol (PPP) and Router/Switch Software command authorization.
22	The AAA Server should offer token server support for any One-Time Password vendor that provides an RFC-compliant RADIUS interface (such as RSA, PassGo, Secure Computing, ActiveCard, Vasco, and CryptoCard).
23	It should also provide dynamic quotas for time-of-day, network use, number of logged sessions, and day-of-week access restrictions.
24	The AAA Server should act as a policy decision point in Network Admission Control deployments. Using policies that are configured, it should evaluate the credentials sent to it by Host Agent, determine the state of the host, and send the AAA client ACLs that are appropriate to the host state. Evaluation of the host credentials should enforce many specific policies, such as OS patch level and antivirus DAT file version. It should also record the results of policy evaluation for use with your monitoring system. Policies should be evaluated locally by AAA Server or can be the result returned from an external policy server to which the AAA Server forwards credentials. For example, credentials specific to an antivirus vendor should be

	forwarded to the vendor's antivirus policy server.
25	Support for Wireless Authentication- to support organization who cannot enforce a strong password policy and who wish to deploy an 802.1X EAP type that does not require digital certificates, support a variety of user and password database types, supports password expiration and change, and is flexible, easy to deploy, and easy to manage. For example, organization using Extensible Authentication Protocol who cannot enforce a strong password policy and does not want to use certificates can migrate to EAP-FAST for protection from dictionary attacks. The AAA Server should support for EAP-FAST supplicants available today onclient devices and 802.11a/b/g WLAN client adapters.
26	Secure ACS should includes simultaneous TACACS+ and RADIUS support for a flexible solution
27	The AAA Server should extend per-user ACL support to any Layer 3 network device that supports this feature. This include proposed firewalls, VPN solutions, and Routers. The Administrator should be able to define sets of ACLs that can be applied per user or per group. This feature complements NAC support by enabling the enforcement of the correct ACL policy. When used in conjunction with network-access filters, downloadable ACLs can be applied differently per AAA client, allowing you to tailor ACLs uniquely per user, per access device.
28	The AAA Server should have support for certificate revocation using the X.509 CRL profile. A CRL is a time-stamped list identifying revoked certificates, which is signed by a certificate authority or CRL issuer and made freely available in a public repository. The Server should periodically retrieve the CRLs from provisioned CRL Distribution Points, using LDAP or HTTP, and store them for use during EAP-Transport Layer Security (EAP-TLS) authentication. If the certificate presented by the user during an EAP-TLS authentication is present in the retrieved CRL, the AAA server should fail the authentication and deny access to the user. This capability is extremely important in view of the frequent organizational changes and protects valuable company assets in case of fraudulent network use.
29	The AAA Server should include MARs as an enhancement of Windows machine authentication. When Windows machine authentication is enabled, the administrator can use MARs to control authorization of EAP-TLS and Microsoft Protected Extensible Authentication Protocol (PEAP) users who authenticate with a Windows external user database. Users who access the network with a computer that has not passed machine authentication within a configurable length of time should be given the authorizations of a user group that the admin specifies and which he can configure to limit authorization as needed. Alternatively, the admin can deny network access altogether.

30	The AAA Server should have NAF. NAF is required to provide a flexible way of applying network-access restrictions and downloadable ACLs on AAA client names, network device groups, or the IP addresses of AAA clients. NAFs applied by IP addresses could use IP address ranges and wildcards. This feature is also required for granular application of network access restrictions and downloadable ACLs. NAF should allow flexible network device restriction policies to be defined in large environments.
31	Integration on the AAA Server should be available. This integration is to help protect the AAA Serevr from day-zero attacks. By the behavior-based technology available with Host IPS, the Server could be protected against the constantly changing threats of viruses and worms.
32	The AAA Server should allow for replicating the user and group databases separately. This is to reduce the amount of data sent between the AAA Servers during a replication event. A configurable replication timeout option should be available to provision for slow network connectivity between the AAA Server replication partners.
33	Administrators should have the capability to replicate network access profiles and all related configuration, including posture validation settings, AAA clients and hosts, external database configuration, global authentication configuration, network device groups, dictionaries, shared profile components, and additional logging attributes.
34	Capability to allow administrators to classify access requests according to network location, membership in a network device group, protocol type, or other specific RADIUS attribute values sent by the network device through which the user connects. Authentication, access control, and authorization policies should be mapped to specific profiles.

3.13 DESKTOP VIDEO CONFERENCING SOLUTION

DESKTOP CLIENT
The solution should have the capability for 100 desktop clients based on SIP protocol from the day one so that video, voice, content features can be availed by the users in the network
The desktop solution should support firewall NAT traversal so as to allow Video desktop participants over Internet. The solution should be equipped to handle 5 simultaneous calls over the internet.
The desktop clients should be capable to transmit and receive HD 720P resolution along with BFCP data sharing video when connected to a hardware based HD endpoint
The desktop client should support bandwidth up to 8Mbps
The desktop client should support video standards H.263, H.263+ and H.264
The desktop client should support audio standards MPEG4 AAC-LD 48 kHz, G.722.1 24 kbps, G.722.1 32 kbps, G.711 A-law, G.711 μ-law
The desktop client must also be able to share content at anytime during a call either with another client or with hardware based endpoint
The users must be able to use any standard based web camera and head set for the use of the desktop client feature.
The system to be provided with a common network management system based on SNMP with user friendly GUI for both the MCU and video end points. Telnet may be provided for element management
Network Management software supporting the following functionality
-Network status updates- MCU elements, call, bandwidth, end point information, error status.
-communication view – MCU controlling the communication, communication ID, communication type, video and bandwidth settings, number of participants- including the current no, the number reserved and the no of local participants
-Centralised log management- for network and element type levels, log files for MCU elements and gateways.
The management software must register Video endpoints and MCU's from 3rd party /other OEM's.
The management software must capture CDR's, diagnostics, faults , alarms.
Support for all the Video terminals and MCU in the network, as per the quantities stated in the BOM
Support IP address translation, user can make call using ITU standards numbering scheme
Monitors current number of on-call and online users
Monitors current used bandwidth
Simple fault monitoring

MANAGEMENT
COMMUNICATION CONTROL CENTER
The management application should support device registration for 10 devices
Complete communication overview on one screen
communication and participant connection control
communication-by-communication and system-by-system information
SYSTEM UPGRADES
Pre-scheduled or ad-hoc software updates
Release key import and export
SYSTEM CONTROL
Phonebook access
Monitoring and reporting
Software upgrades
Initiate, extend and terminate communications
Change video layouts
Volume control and audio mute/unmute
Microphone on/off
Edit local phone books
Send messages to systems
Detect illegal system configurations
REMOTE SYSTEM SUPPORT
Phone book access
Software Upgrades
Statistics
INTELLIGENT TICKET HANDLING
Automated ticket handling (open/close)
Ticket priority customization
Proactive system check-up prior to engaging scheduled meetings
Intelligent Trouble Ticketing Handling
Diagnostic messages and solution suggestions
System status, gatekeeper status, SNMP configuration, ISDN/IP configuration and information
TEMPLATES/PROVISIONING
Customized template creation, management and distribution to systems
Selectable audio, video, network and bandwidth settings
Mass Deployment with automatic configuration from management software
Ability to create persistent setting templates that can be proactively enforced on system
EVENT NOTIFICATION
Event Notification can be integrated into any SNMP Network Management system (e.g., HP Openview and IBM Tivoli)
E-mail notification to individuals or groups

Event logging including boot, link down/up, connect error, call connected/ disconnected, lost response/got response,
Downspeeding, upgrade start/finish scheduling, gatekeeper registration, low battery, wrong password alert
SCHEDULING AND BOOKING
SYSTEM BOOKING
Book system and meeting room simultaneously
Book recurring meetings and video resources
Create, password protect, edit or delete booked communications
Add web or data communication to meetings
Add/remove participants from reservation or connect/disconnect participants during communications
Connect communications ad-hoc or pre-schedule connection
Reserve resources for dial-in participants (telephone or video on ISDN or IP v.4 or IP v.6)
Schedule point-to-point communications or bridged meetings
Lock communication, preventing new participants from joining
Invite participants by e-mail
Customize meeting names
CALL DETAIL RECORDS (CDR) AND STATISTICS
Supports CDR capturing from Endpoints, MCUs, Gatekeepers and Gateways
Call detail records on screen or in native Excel format
Graphical display of call detail data
Support for multiple reporting formats: Onscreen, PDF or HTML
Number of incoming and outgoing calls
Bandwidth usage
Network type
Number/address called
Statistics in data, graph and chart format
Number of scheduled communications per person
Network, gatekeeper and ISDN inter face
Authentication failure
Error statistics
Battery status
SIP REGISTRAR FOR DESKTOP CLIENTS
H.323 gatekeeper (Control Application)
SIP Proxy/Registrar (Control Application) for desktop software based clients
SIP and H.323 support, including SIP/H.323 gatewaying for locally registered endpoints
IPv4 and IPv6 support, including IPv4/IPv6 gatewaying
SIP and H.323 gatewaying for non-registered endpoints

Bandwidth management on both a per-call and a total usage basis, configurable separately for calls within the local subzones and to neighboring systems and zones
Automatic downspeeding option for calls that exceed the available bandwidth
URI and ENUM dialing via DNS, enabling global connectivity
Up to 2,500 registrations, 50 concurrent calls. Scalable to support 10,000 registrations
Flexible zone configuration with prefix, suffix and regular expression support
Can function as a standalone system or be neighbored with other systems
Gatekeepers and SIP proxies
Suppor ts up to 5 Alternate gatekeeper for redundancy purposes
Optional endpoint authentication
Control over which endpoints that are allowed to register
Administrator Policy including support for CPL
Embedded setup wizard via a serial port for initial configuration
System administration via a web inter face or RS-232,Telnet, SSH and HTTPS
ARCHITECTURE
Secure appliance based architecture
Flash memory and hard drive
ITU-T H.323 v5 compliant
ITU-T H.225 v4 compliant
H.323 v5 Annex O (for DNS dialing suppor t)
H.460.18/.19 compliant
H.460.18 client proxy support
Suppor ts H.460.19 multiplexed media
SECURITY
Secure Management with HTTPS, SSH and SCP
– Secure File Transfer
– Inactivity Timeout
Can lock-down IP ser vices
Authentication required on HTTP(S), Telnet, SSH, SCP and serial port
Compatible with H.235 v2 and v3 enabled H.323 devices
H.235 Authentication suppor t
TLS for SIP signaling
MANAGEMENT
Suppor ts industr y standards such as RS-232, Telnet,HTTP(S), XML, SNMP, SCP and SSH
Embedded setup wizard on serial por t for initial configuration
Advanced management support and configuration with
Call logging and diagnostics
Support for logging to a syslog ser ver
Local time zone aware

CALL CONTROL AND REGISTRATIONS
Suppor ts manual registration of H.323 and SIP endpoints
and API call control
Suppor ts H.225/Q.931, H.245 call control routed mode
Suppor ts H.323-SIP Inter working Encr yption
Suppor ts H.323-SIP Inter working DuoVideo
Registration of H.323 ID, E.164 aliases and ser vices
Disconnect H.323 calls from the API inter face
URI Dialing
Call Policy Management (RFC 3880) including
ZONE CONTROL
Suppor ts Remote Zone monitoring
Suppor ts Remote Zone redundancy
Supports sub-zone area definition for bandwidth management
Flexible zone configuration with named zones and default zone
Registration Control (open, specifically allow, specifically deny)
BANDWIDTH MANAGEMENT
Interzone — definable call by call
– Max bandwidth per call
– Max aggregate bandwidth for all neighboring zones
Intrazone — definable call by call
– Max bandwidth per call
– Max aggregate bandwidth
Auto-downspeeding if call exceeds per-call maximum
Gateway load balancing
INTERFACES
4x 10/100/1000 Base-TX Ethernet por ts (RJ-45) (front)
1x RS232 console por t (RJ-45)2 (front)
2x USB (front)

Gateway Security Solutions

3.14 Email Gateway Security Solution

SECURE MAIL GATEWAY APPLIANCE		
Sl. No	**Specification**	**Minimum Requirements**
1	Manufacturer and Model	The solution should be appliance based MTA for SMTP traffic and should support 1500 users scalable to 5000 users. The solution should also support redundancy **in future**
2	Operating System	Hardened and Secured Proprietary Operating System. Mention the OS name and the version of the OS.
3	File System	Proprietary File System Built and Optimized for Messaging
4	MTA software	Proprietary MTA (not sendmail, Qmail or postfix)

		Should support domain based destination queue for out going mails. Multiple domains, multiple queues.
		Ability to perform SMTP session control and traffic rate limiting (down to per recipient) according to sender's IP address/range, domain
5	Denial of Service Defense	Could assign maximum SMTP sessions per IP address on appliance
		Need to use one of the biggest web and email traffic monitoring network for sender reputation
6	Reputation Filter Protection	Should be based on different sources for collecting Data.
7	Data Loss Prevention	The solution should be scalable to add support of On-Box DLP with predefined policies including International Regulatory compliance like HIPAA/SOX etc, International standards like PCI etc, non regulatory compliance policies and should also support custom DLP policies. The adminstrator should be able to track messages based on the DLP policies and should be able to define the remidiation actions like BCC, notify, quarantine, encrypt. The solution should also support detailed reporting for DLP violations.
8	Bounce Verification	Should be able to support a mechanism to block the Bounce Attacks.
9	DHAP Support	Should support Directory Harvest Attack Prevention
10	Anti Virus	The Appliance should support On-Box Dual AntiVirus scanning for SMTP (Single Antivirus engine to be provided from day one). Mention the names of the Antivirus engines.
11	Virus Outbreak Filter	Virus outbreak prevention on abnormal increase of emails with specific email attachments
12	Outbreak Quarantine	Dynamic quarantine (release of quarantined messages not falling into new virus/worm characteristics upon outbreak rule update and before virus signature update)
		Should support End User Spam Quarantine Access, Spam Digest Notification option and Option for Safelist/Black List by End Users via Portal from day one.
13	Spam Quarantine	The solution should support Centralized Spam Quarantine Access when redundancy is added in the future
		Could assign different IP addresses on single appliance to allow different host identities and also own traffic flow policy and sender groups (each IP address represents one department or one faculty MX host)
14	Multiple Host Identities	Each IP address can respond with different SMTP response and banner
		Could customize SMTP banner, hostname and response code per IP address or sender group
		Could support multiple domains per IP address or multiple domains using different IP address on single appliance. Mention the exact
15	Multiple IP's Supported	number of IP's supported in the Appliance
		Per User or User Group Policy (Based on sender/recipient address/domain or LDAP group, i.e. single email to multiple recipients can be processed with different policies)
16	User Policy Management	Single View of all user policies for easier management
17	Sender Group	Blacklists (IP, Domain, Reputation)

		Whitelists (IP, Domain, Reputation)
		Third party RBLs/ORBLs
		Sender and Recipient address whitelist and blacklist
18	Email Throttling	Have the capability to block or throttle bad senders and define individual mail policies of senders (both internal and external) based on:- Sender IP/IP Range, Domain, Email Reputaion, DNS List
19	Traffic Rate Control	Rate limit control by IP address, domain and sender's reputation
		Maximum Recipients per period traffic control
20	Fine-grained Mail Policies	Ability to define traffic flow based on time period down to minutes (say 15 minutes)
21	Sender Verification	Reverse DNS Domain Lookup and Policy Assignment
		Maximum Messages per connection (Per Policy)
		Maximum Recipients per message (Per Policy)
		Maximum message size (Per Policy)
		Maximum Concurrent sessions per IP address (Per Policy)
		TLS enforcement and preferred option (Per Policy)
		SMTP Authentication enforcement and preferred option (Per Policy)
		Sender Verification on connecting IP address DNS PTR record and also envelope sender address (Per Policy)
22	LDAP support	LDAP routing
		LDAP masquerading
		LDAP recipient address verification
23	Multiple DNS Servers	Support both Internet Root DNS servers or local DNS servers
		Support multiple DNS servers and should provide option for DNS server overrides
24	Message Tracking	Should support Message tracking based on sender and/or recipient address/domain, subject, time period, message event
		Should support Centralized Message Tracking for multiple appliances in the future when redundancy is added.
25	System monitoring	SNMP v2/v3 support
		MIB-II
26	Report API support	XML
		Syslog
27	Alerts	Email-based
		SNMP Trap
28	Configuration Interfaces	WebUI (HTTP and HTTPS)
		CLI (SSH and Telnet)
29	Configuration files	XML based files archived on the box itself or downloaded to local system or sent out as attachment to email from the appliance itself
30	Centralized Management	The solution should be capable of supporting Centralized management support for managing and configuring multiple appliance without the need for additional dedicated management console in the future
		Allow policies to apply based on cluster, group or per machine

31	Outbound Mail Monitoring	Real-Time Outbound Mail Flow per IP/Domain
		Distinct Message Queue Per Destination Domain
32	Centralized Reporting	The Solution should support centralized reporting of multiple security gateways in the future
33	Destination Domain Rate Control	Domain-based Delivery Rate and Session Control
34	Footer or Disclaimer	Could add different footers or disclaimers based on sender domain or sender email address/group
35	Outbound TLS Support	Support outbound SMTP over TLS based on destination domains or systemwide
36	Outbound SMTP Authentication Support	Support outbound SMTP authentication
37	Domain Key Signing	able to signing outgoing emails based on domain key
38	Bounce Management	Should support different bounce profiles for destination domains (retry frequency, maximum retry period, etc.)
39	Support Options	The solution should provide Customer Support over Phone/Email.
		The solution should provide Portal login access for accessing tools, userguides, forums & knowledge base. For advanced support/troubleshooting, the product should support the ability to open a secure tunnel over port 25 to the support datacenter for remote access and diagnostics/troubleshooting
40	Updates and Upgrades	Support should cover all updates and upgrades for the time period the licenses and support purchased from principal vendor including hardware replacement warranty for a period of 5 years

3.15 Web Gateway Security Solution

SECURE WEB GATEWAY APPLIANCE		
Sl. No	**Specification**	**Minimum Requirements**
1	Requirement and Functionality	The solution should be appliance based Web Proxy for HTTP/HTTPS and FTP & Caching, Web based Reputation filtering, URL filtering, Dual Anti Malware, HTTPS decryption, Onbox Data Security. All the functionalities should be in a single appliance only.
2	Operating System	The appliance based Solution should be provided with Hardened Operating System
3	Number of users supported	The solution should be able to support 700 users scalable to 1000 users
4	Operating System Security	The operating system should be secure from vulnerabilities and hardened for web proxy and caching functionality only.

5	Forward proxy mode	The forward proxy mode deployment should Support for Explicit proxy integration (e.g. PAC files or host browser settings) and should also Support for hosting PAC files on-box
6	Transparent mode	The solution should also support transparent mode deployment using WCCP v2 and L4 switches/PBR (Policy-based Routing)
7	Multiple Upstream Proxy support	The solution should be able to support configuration of multiple upstream proxies for failover, load balancing, and conditional routing (specific clients or destinations routed to a specific upstream proxy).
8	DNS Splitting	The solution should support configuration to use Split DNS. It should be able to refer to different DNS for Different Domains e.g. (root DNS for all external domains and internal DNS for organization domain
9	IP Spoofing support in transparent mode deployments	The solution should have facility to do IP spoofing. When enabled, requests originating from a client should retain the client's source address and appear to originate from the client instead of the appliance. This is useful in scenarios where policies are based on original IP and logging/reporting is required to track activity of individual IP basis.
10	High Availability	The solution should be able to support High Availability
11	Proxy support	The proposed solution should be a Web Proxy and should support HTTP, Native FTP and HTTPS proxy. The solution should also support HTTPS scanning. Should Support HTTPS de-cryption natively (i.e. no additional hardware required)
12	Protocol Tunneling	The solution should support to tunnel certain ports via HTTP e.g. Tunneling FTP via HTTP
13	Native FTP protection	The solution should act as an FTP proxy and enable organizations to exercise granular control, including: allow/block FTP connections, restrict users/groups, control uploads/downloads, and restrict sent/received files of certain types or sizes.
14	File download and size restrictions	The solution Should be capable of blocking specific files downloads and based on size per user group basis. It should also block object using MIME types.
15	User Agent Blocking	Should support blocking User Agents e.g. Mozilla Firefox version 1.x, etc
16	Proxy Bypass List	The solution should have flexibility to create a list of source / destination addresses that bypass all Web Proxy security and access policy features, such as authentication, web reputation, URL filtering, and anti-malware scanning.
17	Time Based Policies	The solution should support policies based on time of the day (or day of the week)
18	User Agent Policies	The proposed solution should be able to configure policies specific to applications defined by user agent strings
19	Routing Policies	The solution should support conditional routing policy to determine where to pass the client request to, either to

		another proxy, or to destination server
20	Outbound Malware detection	Should detect Phone Home attempts occurring in the Entire Network. It should also provide visibility into which systems are infected with Malware. The Appliance should catch malware that attempts to bypass port 80.
21	HTTPS Decryption & Scanning	Should support HTTPS Decryption & Scanning of HTTPS transaction as per the Policy Defined
22	Intelligent Decryption	The solution should be able to Decrypt HTTPS traffic based on custom policy settings such as only certain categories of web sites shall be decrypted or those with poor reputation shall be decrypted or all HTTPS access of certain users shall be decrypted
23	IP based Access Control	The solution should allow administrator to define access to internet based on IP addresses, range of IP addresses, subnet and CIDR basis. It should also support to be forced for Authentication from Specific IP addresses, Subnet or CIDR's
24	User based Access Control	The solution should support integration with Lotus Domino R8 and Microsoft Active directory and other LDAP directories. This should allow administrator to define user or group based access policies to Internet
25	Access Control	Should seamlessly Integrate with Lotus Domino R8 / Microsoft Active Directory / Other LDAP directories for authentication & access control
26	Multiple Authentication Server Support	The solution should support Multiple Auth Servers / Auth Failover using Multi Scheme Auth (NTLM and LDAP).
		Support for Lotus Domino R8
		Support for Novell eDirectory client auth
		Support for Microsoft Active Directory client auth
		Support for authentication without requiring a client on the authentication server
27	Authentication Exemption	The Solution should support authentication exemption for specific URL's/Categories
28	Caching Capacity	Should Have Inbuilt Caching Mechanism. The appliance should do Caching with more than 50 GB of Caching capacity. Mention the Exact Caching capacity of the appliance.
29	Object caching	Should Cache up to 1 GB of a single object. Mention the exact cache of a single object.
30	Application Signatures	Should support Granular controls for social networking tools such as Facebook and LinkedIn (e.g allow Facebook access but block Entertainment application within Facebook)
31	Bandwidth Controls	
		Control Bandwidth of streaming media at a per policy level
32	Anti Malware	The Appliance should have an inbuilt multiple AntiMalware Engines. Please mention the Antimalware Engines
		The solution should provide protection from Web 2.0

		exploits (e.g. Koobface
		The solution should provide protection from financial theft botnets (e.g. Zeus)
		The solution should provide protection from phishing websites
		The solution should provide protection from spyware / adware
		The solution should provide per-object security filtering
		The Solution should detect botnet phone-home traffic on any port (not just proxy ports)
		The solution should support parallel scanning with multiple scanning engines (On the same hardware)
		The product should support scanning zip files for embedded exploit payloads
33	Web Reputation	The solution should provide Web Reputation Filters that examine every request made by the browser
		the initial HTML request to all subsequent data requests) – including live data, which may be fed from different domains. The Reputation system should provide botsite protection, URL outbreak detection and exploit filtering – protecting users from exploits delivered through cross-site scripting (XSS), cross-site request forgery, SQL injections or invisible iFrames
34	Web Reputation Dashboard Controls	The solution should support controllable dashboard for Web Reputation , like Allow, Scan and Block based on the scoring settings by the Administrator.
35	Web Reputation Threat Details	The solution should Provide detailed reports on the threats that Web Reputation is defending against.
36	Internet Traffic/ Phone Home Traffic scanning	The solution should provide protection for the internet traffic and phone home traffic
37	Outbound Traffic monitoring	The Appliance should support Outbound traffic monitoring/ Network Layer Malware Detection for AntiSpyware and block Phone home attempts. The Outbound traffic monitor /Network Layer Malware Detection should detect and block Spyware/ Malware in all the 65535 ports and details reporting should be provided on a per IP basis.
38	URL filtering	The Appliance should have an inbuilt URL filtering functionality with Pre-defined categories.
39	Custom URL filtering	The Appliance should support unlimited custom categories.
40	Dynamic categorization of unknown websites on box	Provision should be available to enable Real Time Dynamic categorization that shall classify in real time in case the URL the user is visiting is not already under the pre-defined or custom categories database
41	Reporting Mis-categorization	The solution should have facility for End User to provide False Positives in URL Category.
42	End User Acceptance Page	The solution should have facility to inform end user with notification page informing them of organization internet

		usage policies and provide reasons as to why they have been blocked
43	URL check & submission	Support portal should provide facility to check URL category and submit new URL for categorization and also should have the Ability to track URL re-categorization requests
44	Data Security - On-Box	Ability to allow access to Web 2.0 sites, but prevent data leakage
		Support for File/MIME type filtering (e.g. blocking *.xls in webmail sites)
		Options should be provided to block file uploads to specific categories for specific users, block specific mime types, file sizes, etc. Option for specifying separate file sizes for different commonly used file types should be provided.
45	Data Loss Prevention - Off-Box	The solution should be able to integrate with the DLP Solutions like RSA, Vontu over ICAP
		Ability to scan POST content through integration with DLP solutions
46	Remote support	The remote support from principal company should be available via India Toll Free and Email. The Support Portal access should be provided for CASE management, knowledgebase, new version information, tools etc.
47	Secure Remote Access	The support engineer should be able to login to appliance using secure tunneling methods such as SSH for troubleshooting purposes
48	Diagnostic Tools	The appliance should have diagnostic network utilities like telnet, traceroute, nslookup and tcpdump
49	Updates and Upgrades	The appliance should provide seamless version upgrades and updates without any user intervention. Operating System Upgrades should be manual
50	Out of Band Management Support	The solution should be able to support out of band management. i.e management port should be separate from the proxy ports
51	Secure Web Based management	The appliance should be manageable via HTTP/HTTPS/SSH
52	CLI based management	The appliance should be manageable via command line using SSH
53	Serial Console access	The appliance should have serial console access
54	Policy Trace Tools	For troubleshooting and debugging, the solution should provide a policy trace tool, which can simulate a transaction to show what policies matched, what policies did not, and ultimately, what policies were applied.
55	Configuration Backup & export	The solution should be able to provide backup of configurations via email or file store which can be easily restored in the event of failure. Also should have facility to export config to multiple appliances.
56	Console Restriction	The proposed solution should be able to restrict administrative access based on IP address restrictions

57	Role Based Administration	Should support multiple roles like administrator, operator, guest user roles
58	Radius Integration for Appliance management	The solution should support integration with Radius servers for appliance administration
59	Centralized Management	The solution should support centralized management console for policy administration for multiple proxy appliances when redundancy is added in the future
60	SNMP Support	The proposed solution should support SNMP V1, V2, and V3. And should have capabilities of hardware & software monitoring via both enterprise grade MIBS as well as alerts via SNMP traps.
61	Retention Period	Solution to provide the flexibility of keeping the logs for specified no of days
62	Custom EUN (End User Notification Page)	The solution should be able to display custom notifications to the end users as desired by the corporate policies.
63	Hosting EUN (End User Notification Page)	The solution should be able to host basic custom HTML notification pages
64	User Reports	Informative and exhaustive set of reports on User Activity and URL filtering activities (GUI to report past activity, top usage users and top malware threat)
65	Bandwidth Reports	Reports on Bandwidth Consumed / Bandwidth Saved
66	Detailed logging	Product to maintain detailed access logs that can be searched via filters, for easy location of any desired access of the user and to see how the product dealt with it
67	Outbound traffic reports	Detailed report on a per user basis should be provided on the L4 traffic monitoring / Network Layer Malware Detection.
68	Updates and Upgrades	Support should cover all updates and upgrades for the time period the licenses and support purchased from principal vendor including hardware replacement warranty for a period of 5 years
69	Web Tracking	Detailed Visibility into browsing patterns for all users or a specific user for finding out complete info related to specific event/incident
70	Support Options	The solution should provide Customer Support over Phone/Email. The solution should provide Portal login access for accessing tools, userguides, forums & knowledge base

3.16 UPS

All switches shall be powered through uninterrupted power supply. Three types of UPSs have been planned as given below:

- For core switches, 10 KVA UPS with 30 min. backup at full load
- For distribution switches, 5 KVA UPS with 30 min. backup at full load.
- For access switches, 1 KVA UPS with 5 min. backup at full load.

All UPS shall be of either APC, Liebert, Emerson make. Specifications are as given below:

3.16.1 1 KVA UPS

1	Make	APC/ Liebert/ Emerson/
2	Rating	1000 VA or above
3	Technology	Line-Interactive
4	Nominal Input Voltage	230V single phase
5	Input Voltage Range	175V AC to 275V AC
6	Input Frequency	50 Hz +/- 3 Hz
7	Nominal Output Voltage	230V AC +/- 5%
8	Output Frequency	50 Hz +/-1 Hz
9	Output power capacity	Min. 600 watts
10	Automatic Voltage Regulation	Automatic Voltage Regulation to be provided
11	Transfer time	< 6ms
12	Protection	Surge, brownout, sag, short circuit etc protection to be provided
13	Battery Type	Sealed maintenance-free
14	Battery make	OEM/ Panasonic / Global Yuasa / Rocket
15	Power Sockets	Output power sockets should be 5/15A standard Indian type or necessary Interface power cords should be provided to connect to network devices
16	Battery Refresh	The bidder shall replace all the batteries after every 2.5 years and whenever the batteries get faulty during the entire contract period
17	Communication Port	RS232C or USB port & necessary communication cables to be provided
18	Backup	Min. 5 minutes on full load
19	Power Management Software	The UPS should come with Power Management Software to view & monitor UPS status, backup time & shutdown scheduling for Windows XP/2003/Vista systems
20	Warranty	OEM warranty (labour/parts/on-site) for the entire contract period

3.16.2 5 KVA UPS

1	Make	APC/ Liebert/ Emerson
2	Rating	5KVA or Higher
3	Technology	True Online, Double Conversion with PWM technology and IGBT based inverter
4	Nominal Input Voltage	230V Single Phase
5	Input Voltage	175V AC to 275V AC

	Range	
6	Input Frequency	50 Hz +/- 3 Hz
7	Nominal Output Voltage	230 Vac +/- 5%
8	Output Frequency	50 Hz +/- 1 Hz
9	Output power Capacity	3.5KW or Higher
10	Input power factor	>0.90
11	Output power factor	0.7 or higher
12	Battery Type	Sealed, maintenance-free. If external, proper casing to be provided
13	Battery Make	OEM/Panasonic / Global Yuasa / Rocket
14	Desired Backup	Min. 30 minutes backup on full load
15	Battery Management	All batteries whether external or internal should be recognised by UPS. UPS should be able to test all batteries periodically. UPS should be able to show actual backup time considering all batteries
16	Power Sockets	Output power sockets should be 5/15A standard Indian type or necessary Interface power cords should be provided to connect to network devices
17	Cold Start	Cold start on 100% load
18	Communication Port	RS232 or USB port & necessary communication cables to be provided
19	SNMP Card	SNMP Card to be provided for connecting UPS to Ethernet LAN to monitor and manage the UPS with a standard Web browser, while simultaneously providing shutdown & restart for multiple windows, Linux & Unix computer systems over LAN
20	Power Management Software	The UPS should come with Power Management Software to view & monitor UPS status, backup time & shutdown scheduling for Windows 9x/NT//200/XP/7 & Red Hat Linux 7.2 & above systems
21	Battery Refresh	The bidder shall replace all the batteries after every 2.5 years and whenever the batteries get faulty.
22	Warranty	OEM warranty (labour/parts/on-site) for the entire contract period

3.16.3 10 KVA UPS

1	Make	APC/Liebert/Emerson
2	Rating	10KVA or above
3	Technology	True Online, Double Conversion with PWM technology and IGBT based inverter
4	Nominal Input Voltage	230V single phase or 415V three phase
5	Input Voltage Range	175V AC to 275V AC
6	Input Frequency	50 Hz +/- 3 Hz
7	Nominal Output Voltage	230 Vac +/- 5%
8	Output Frequency	50 Hz +/- 1 Hz
9	Output power capacity	7KW or higher
10	Input Power factor	>0.9
11	Output Power factor	0.8 or Higher
12	Inverter efficiency	>89%
13	Overall efficiency	>85%
14	Static Bypass switch	A Built-in static transfer switch shall be provided as an integral part of the UPS. The static switch shall be a bi-directional naturally committed high-speed static (SCR type) device rated to carry full load current continuously.
15	Manual Bypass switch	The UPS should have a Built-in Maintenance Bypass Isolator to directly connect the load to the input AC power source, bypassing the rectifier, inverter and static transfer switch.
16	Battery Type	Sealed, maintenance-free. If external batteries, proper casing to be provided
17	Battery Make	OEM/Panasonic / Global Yuasa / Rocket
18	Desired Backup	Min. 30 minutes backup on full load
19	Battary Management	All batteries whether external or internal should be recognised by UPS. UPS should be able to test all batteries periodically. UPS should be able to show actual backup time considering all batteries. Protection: Battery low cut-off
20	Power Sockets	Output power sockets should be 5/15A standard Indian type or necessary Interface power cords should be provided to connect to network devices
21	Cold Start	Cold start on 100% load
22	Communication Port	RS232 or USB port & necessary communication cables to be provided
23	SNMP Card	SNMP Card to be provided for connecting UPS to Ethernet LAN to monitor and manage the UPS with a standard Web browser, while simultaneously providing shutdown & restart for multiple

		windows, Linux & Unix computer systems over LAN
24	Power Management Software	The UPS should come with Power Management Software to view & monitor UPS status, backup time & shutdown scheduling for Windows 9x/NT//200/XP/7 & Red Hat Linux 7.2 & above systems
25	Battery Refresh	The bidder shall replace all the batteries after every 2.5 years and whenever the batteries get faulty.
26	Warranty	OEM warranty (labour/parts/on-site) for the entire contract period

3.17 Network Racks

Network racks of various sizes shall be required for various new locations. Racks of some old locations shall also be replaced due to size constraints. Specifications are as given below:

3.17.1 42 U Network Rack

1	Make	APW/RITTAL
2	Mounting	Floor Standing
3	Dimensions	Dimensions (Width X Depth) - 800 x 1000 mm, 42U Height
4	Doors	Lockable front door of toughened tinted glass & lockable vented rear door of steel
5	Side Panels	Side Panels vented with Slam Latches and Key Locks
6	Top & Bottom Covers	Top & Bottom Covers with cable entry gland plates and cut outs. Removable and vented top cover for allowing heat conduction with provision for mounting fan housing unit and cable entry provision from rear side. The top cover should have provision for mounting a fan Housing unit for hosting the fans
7	Stationary Shelves	3 No. of Stationary Shelves
8	Equipment Mounting Angles	One pair of Equipment Mounting Angles to provide 19" mounting positions
9	Cooling Fans	Min. 4 Nos. of Cooling Fans (230VAC, 90 CFM) in top mounted Fan Housing Unit
10	Mounting Hardware	Captive Mounting Hardware (10 Pkts)
11	Power Distribution	Min. Two independent & redundant vertical or horizontal power strips each containing 10 Nos. of 5/15A power sockets, a fuse, indicator lamp and 15A Switch
12	Castors	4 castors with foot operated brakes
13	Earthing Kit	Copper earthing kit (bars, straps, continuity kit, etc)
14	Cable Management accessories	Two horizontal, two vertical cable managers. Cable entry - Bottom and Top

3.17.2 24 U Network Rack

1	Make	APW/RITTAL
2	Mounting	Floor Standing
3	Dimensions	Dimensions (Width X Depth) - 600 x 800 mm, 24U Height
4	Doors	Lockable front door of toughened tinted glass & lockable vented rear door of steel
5	Side Panels	Side Panels vented with Slam Latches and Key Locks
6	Top & Bottom Covers	Top & Bottom Covers with cable entry gland plates and cut outs. Removable and vented top cover for allowing heat conduction with provision for mounting fan housing unit and cable entry provision from rear side. The top cover should have provision for mounting a fan Housing unit for hosting the fans
7	Stationary Shelves	2 No. of Stationary Shelves
8	Equipment Mounting Angles	One pair of Equipment Mounting Angles to provide 19" mounting positions
9	Cooling Fans	Min. 4 Nos. of Cooling Fans (230VAC, 90 CFM) in top mounted Fan Housing Unit
10	Mounting Hardware	Captive Mounting Hardware (5 Pkts)
11	Power Distribution	Min. Two independent & redundant vertical or horizontal power strips each containing 5 Nos. of 5/15A power sockets, a fuse, indicator lamp and 15A Switch
12	Castors	4 castors with foot operated brakes
13	Earthing Kit	Copper earthing kit (bars, straps, continuity kit, etc)
14	Cable Management accessories	Two horizontal, two vertical cable managers & two vertical Cable Channels with cabling loops. Cable entry - Bottom and Top

3.17.3 12 U Network Rack

1	Make	APW/RITTAL
2	Mounting	Wall Mounting
3	Dimensions	Dimensions (Width X Depth) - 600 x 500 mm, 12U Height
4	Doors	Lockable front door of toughened tinted glass
5	Top & Bottom Covers	Sealed cable entrance with access holes with gland plates top and bottom
6	Equipment Mounting Angles	One pair of Equipment Mounting Angles to provide 19" mounting positions
7	Cooling Fans	Min. 2 Nos. of Cooling Fans in top mounted position
8	Mounting Hardware	Captive Mounting Hardware (2 Pkts)
9	Power Distribution	Min. One horizontal power strip containing 5 Nos. of 5A power sockets, a fuse, indicator lamp and 5A Switch
10	Cable	Two horizontal cable managers

	Management accessories	

3.18 STRUCTURED CABLING SOLUTION

- The vendor should quote the OEM's first level of product.
- The structured cabling solution shall be from AMP/ Systimax/ Panduit
- All passive cabling shall be from single OEM.
- For Core to distribution fiber links, 12 core fiber is to be laid and all 12 cores to be terminated.
- For Distribution to access fiber links, 12 core fiber is to be laid and 6 cores to be terminated.
- All UTP Cabling shall be of Category 6 type or higher.
- All Multimode optical fiber shall be of OM3 50 micron.
- All Single Mode optical fiber shall be of OS2 Standard.
- End to end numbering of structured cabling including patch cord in the rack.
- The vendor shall label all cables and cords, LIUs, jack panels, SMBs etc according to industry standards
- Racks to be dressed every 3 months or on demand for the entire contract period.
- The vendor shall install all passive components through a certified system integrator of cabling OEM.
- Existing Cat5/Cat5e cables are to be changed with Cat 6 cables. All the passive components required for this are to be replaced.
- New passive network shall integrate with existing passive network. Existing fiber segments shall be terminated again. BoM required for the same has been provisioned in new solution. Existing Cat 6 UTP shall be used without any change. Wherever, racks are being changed, some UTP points may need to be terminated again by the vendor as per actual material and labour.
- The vendor shall use the existing trenches, conduit for cabling wherever possible.
- The cabling system installed by the vendor shall meet the specifications as prescribed in ANSI/EIA/TIA, ISO 11081 standards and to that effect shall submit a certificate after the completion of the work that the work has been done as per standards.
- Completeness of the configuration for the working network must be ensured by the vendor.
- The actual quantities of various passive items (UTP /fiber/ Pipes/ digging/ labour) shall depend upon their actual consumption at the time of installation. Payment for these items shall be done on actual.
- Most of the LAN locations are within the BHEL factory campus and BHEL property. OFC paths will be dictated by BHEL. There are few segments where the fiber needs to pass through or nearby the Third part property such as Railway track, Roads etc.. The bidder

should be ready to work in conjunction with BHEL convenience to take the Digging/OFC laying in such segments.

- Outdoor fiber cabling will be laid by vendor along the finalized route between the buildings. The laying work covers road-cutting wherever needed, digging the trenches (100cm deep X 30cm wide), laying of cable inside the HDPE pipe with nylon rope preloaded which will enable the smooth pulling, covering with bricks and sand, filling the trenches with excavated soil/sand and finishing. Hume pipes shall be used at road crossings only. Wherever the roads are cut, these have to be cemented. Care is to be taken for providing smooth curved pipe with acceptable radius at the bends as per standards. The entire outdoor fiber cabling should be done through HDPE pipes.
- Road crossing from BHEL main plant premises to external shipyard using the horizontal directional drilling methodology. Horizontal directional drilling is based on the concept of mechanical cutting a subsurface bore along a pre determined path using Drill bits, reamers and specially designed drilling fluids. Soil and / or rock cuttings are mixed with drilling fluids to create displaceable fluids slurry. Once the bore is sufficiently enlarged a product pipe is pulled into the bore and installed in the subsurface .The high density polythene pipes will be placed inside these bore to run/blow the fiber cable from one side to another side.
- Inside the building/manufacturing blocks, the fiber cable shall be laid inside the PVC conduit/MS pipe. Bending radius shall be as per standards. Route inside the building shall be mutually decided by BHEL and vendor.
- Vendor shall observe the bending radius and pulling strength requirements for both UTP and fiber.
- The vendor shall be responsible for removing and replacing all ceiling/floor tiles (in case of suspended ceiling/raised floor) required for installation of the wiring. Any damage to tiles shall be made good by the vendor.
- At all stages, there shall be flexibility for future expandability.
- The information outlet shall be surface mounted with single or dual sockets.
- In some of the cases, the data cable must be running along with the power cable. The vendor must ensure that there is only acceptable level of interferences in such cases.
- Any opening made in the existing / new racks as well as in LIUs for cable entry shall be closed to control damages by rodents.
- The scope of work shall also include removal of old LAN infrastructure including horizontal cabling on all floors where new nodes are replacing old network nodes.
- The selected bidder needs to do comprehensive site survey in coordination with BHEL officer to analyse the actual requirement of passive component and to plan the installation strategy.
- The selected bidder shall be responsible to provide within scope of work all facilities like transportation, tool kits, testing equipments etc, which is necessary for successful installation, implementation and testing.

Specifications are as follows:

Cat 6 UTP		
1	Cat 6	Should meet minimum Category 6 requirements
2	Type of Conductors	4 Pair 23 AWG Conductors
3	Frequency	Characterised to 250 MHz
4	Standards	TIA/EIA 568B, ISO Class E 11801-2002
5	Gigabit Requirements	Should meet or exceed Gigabit Ethernet Requirements at 100 meters

Cat 6a 4-Pair UTP Patch Cord - 33 Feet		
1	Cat 6a	Should meet minimum Category 6a requirements and extend the frequency to 500 MHz
2	Length	33 Feet
3	Boots	Should include snagless, Strain Relief boots at both ends
4	Standards	Should meet or exceed TIA/EIA 568B, ISO Category 6a Performance Requirements
5	Gigabit Requirements	Should meet or exceed 10Gigabit Ethernet Requirements at 100 meters

Cat 6 Dual Face Plate with RJ45 I/O and Surface Mount Box		
1	Cat 6	Should meet minimum Category 6 requirements
2	Dust Cover	Should have integrated dust cover
3	Strain Relief	Should provide strain relief for terminated cables
4	Standards	Should meet or exceed TIA/EIA 568B, ISO Category 6 Performance Requirements
5	Gigabit Requirements	Should meet or exceed Gigabit Ethernet Requirements at 100 meters

24 Port Cat 6 UTP Straight Jack Panel Unloaded		
1	RJ45 I/O Compatibility	Should be compatible with RJ45 I/Os (ordered separately), Should be able to accept 24 I/Os
2	Dimension	19" Width, 1U Height
3	Labels	Should include labels and clear label covers

24 Port Cat 6 UTP Angled Jack Panel Unloaded		
1	RJ45 I/O Compatibility	Should be compatible with RJ45 I/Os (ordered separately), Should be able to accept 24 I/Os
2	Dimension	19" Width, 1U Height
3	Labels	Should include labels and clear label covers

Cat 6 RJ45 Information Outlet		
1	Cat 6	Should meet minimum Category 6 requirements
2	Compatibility	Should be compatible with 24 port jack panel (ordered separately)
3	Standards	Should meet or exceed TIA/EIA 568B, ISO Category 6 Performance Requirements
4	Gigabit Requirements	Should meet or exceed Gigabit Ethernet Requirements at 100 meters

Cat 6 4-Pair UTP Patch Cord - 3 Feet		
1	Cat 6	Should meet minimum Category 6 requirements
2	Length	3 Feet
3	Boots	Should include snagless, Strain Relief boots at both ends
4	Standards	Should meet or exceed TIA/EIA 568B, ISO Category 6 Performance Requirements
5	Gigabit Requirements	Should meet or exceed Gigabit Ethernet Requirements at 100 meters

Cat 6 4-Pair UTP Patch Cord - 7 Feet		
1	Cat 6	Should meet minimum Category 6 requirements
2	Length	7 Feet
3	Boots	Should include snagless, Strain Relief boots at both ends
4	Standards	Should meet or exceed TIA/EIA 568B, ISO Category 6 Performance Requirements
5	Gigabit Requirements	Should meet or exceed Gigabit Ethernet Requirements at 100 meters

1U 19" 24 port Rack Mount loaded LIU (Fully Loaded-LC)		
1	Rack Mount	Should be 19" rack mounted with 1U height, Rubber grommets shall be provided at the cable entry points, for tight sealing.
2	Couplers	Should be complete with LC Duplex Couplers, etc for terminating 24 core SM/MMFiber
3	Type	Fiber management rings, Cable Strain Relief, Sliding Drawer
4	Labeling	Adhesive labeling for easy port identification

1U 19" 12 port Rack Mount loaded LIU (Fully Loaded-LC)		
1	Rack Mount	Should be 19" rack mounted 12 port with 1U height, Rubber grommets shall be provided at the cable entry points, for tight sealing.
2	Compatibility with Adapter Plates	Should be complete with LC Duplex Couplers, etc for terminating 12 core SM/MM Fiber
3	Type	Fiber management rings, Cable Strain Relief, Sliding Drawer

4	Labeling	Adhesive labeling for easy port identification

Single mode pigtails		
1	Type	LC/SC pigtail with min 1 mtrs buffered fiber
2	connecter	Should be complete with LC connectors for terminating 9/125 Single mode fiber

Multimode Pigtails		
1	Type	LC/SC pigtail with min 1.5 mtrs buffered fiber
2	connecter	Should be complete with LC connectors for terminating 50/125 OM3 Multi mode fiber

Suitable Fiber Patch cords for Switch connectivity from LIU		
1	Type of connectors	Duplex SC /LC on one side and Duplex LC/SC connector on other side.
2	Length	Minimum 3 meters
3	Polishing	Factory polished and tested
4	Insertion Loss	Less than 0.5dB per patch cord
5	Type of Fiber	OM3 50/125 micron Multimode or 9/125 Micron Single Mode
6	Compatibility	The patch cord fiber and connectors should be compatible to make the connectivity from LIU to the vendor given switch port.

Suitable 10 meter SC to SC Fiber Patch cords for Switch Interconnection from Rack to Rack		
1	Type of connectors	Duplex SC /LC on one side and Duplex LC/SC connector on other side.
2	Length	Minimum 10 meters
3	Polishing	Factory polished and tested
4	Insertion Loss	Less than 0.5dB per patch cord
5	Type of Fiber	OM3 50/125 micron Multimode or 9/125 Micron Single Mode
6	Compatibility	The patch cord fiber and connectors should be compatible to make the connectivity from LIU to the vendor given switch port.

Multimode Fiber armored 12 Core		
1	Type of Fiber	12 Core Multimode 50/125 micron Tight buffered OFNR Riser rated armored
2	Application	outdoor / Underground
3	Compliance	Should be compliant to new ISO/IEC 11801 Standard

Single mode Fiber armored 12/24 Core		
1	Type of Fiber	12/24 Core Single mode 9/125 micron Tight buffered OFNR Riser rated armored
2	Application	outdoor / Underground
3	Compliance	Should be compliant to new ISO/IEC 11801 Standard

Pipes & Other Specs

1. **1" PVC Pipe, Medium Strength. ISI Mark**
2. **1 1/4" PVC Pipe, Medium Strength, ISI Mark**
3. **1 1/2" PVC Pipe, Medium Strength, ISI Mark**
4. **1" MS Pipe, Medium Strength, ISI Mark, Minimum Wall Thickness 1.6mm**
5. **1 1/4" MS Pipe, Medium Strength, ISI Mark, Minimum Wall Thickness 1.6mm**
6. **1 1/2" MS Pipe, Medium Strength, ISI Mark, Minimum Wall Thickness 1.6mm**
7. **1" GI Pipe, Grade B, ISI Mark**
8. **2" HDPE Pipe with nylon rope pre-loaded for smooth and easy pulling of fiber cable through the pipe.**
9. **Cable Route Marker (at every 20 meters) with round/rectangle shape, " IC FIBER OPTIC CABLE" imprinted on it. Cast Iron Make. Total Height: 2 Feet (one foot above ground and one foot below ground), with proper grouting**

3.19 COMPREHENSIVE MAINTENANCE OF THE EXISTING PASSIVES

Details		
1	6 core SM Dark Fiber segments (without termination, as these fibers are to terminated again in new contract)	3 segments of total 1750 Meters length
2	6 core MM Dark Fiber Segments (without termination, as these fibers are to terminated again in new contract)	47 segments of total 10498 Meters length

3.20 DATA CENTRE REVAMPING

BHEL will provide required space for establishing Datacenter (DC) at its Ranipet premises. Around 450sqft is envisaged to be for the server farm area. Approximately 220sqft will be provided adjacent to the server farm area to house other utilities of the data center

The bidder has to undertake Design, construction of International Standard DC as per detailed technical requirements specified in the concerned section of this document.

The bidder must also provide the entire required infrastructure with redundancy at DC. Care has to be taken that the existing Datacenter and superstructure of building is not damaged/disturbed while DC is constructed.

The selected bidder should conduct a site survey and submit the preliminary plans, and other illustrations as required for the design of DC for BHEL's approval. The structural plans, data centre diagram, cabling diagram and layout plan should be submitted to BHEL.

The proposed DC will house the following physical infrastructure / Equipment

- Civil Interiors
- Electrical power distributions
- Uninterruptible power supply-Ups
- Precision air-conditioning
- Comfort air-conditioning
- Fire detection system
- High sensitivty smoke detection system
- Rodent repellant system
- Generator Set

BHEL operations will be housed in this data centre. Hence the data centre to be designed to meet

- High Availability
- Scalability
- Security
- Reliability

Broad scope of work of the bidder:

The DC has to comply with International Data centre standards designs and the Bidder has to:

- Design the DC (Tentative load PDC1 – 30 KVA, PDC2 – 38 KVA and DR – 35 KVA)

- Design should be scalable to address 25 KVA additional loads in PDC2 for next five years. Provision to add UPS and PAC in future to meet the additional load to be made in the design. Primary site Genset to be designed to cater the PDC1 and PDC2 current and future loads.
- Undertake Civil works for the DC, erect partitions, do the false flooring, false ceiling etc.
- Demolition of the existing partitions/structure in the identified DC premises, if any
- Carry out electrical power distribution works inside the Data center
- Supply UPS (N+N) and integrate the same
- Supply Generator Set and integrate the same
- Size the Precision cooling requirement of the server farm area with redundancy (N+1), supply and integrate the equipment
- Size the comfort air conditioning unit with redundancy (N+1) for the UPS room
- Design and implement intelligent fire detection system and complement the same by a high sensitivity smoke detection system
- Rodent repellent system for the server farm area
- Implement the data center in the scheduled timeframe and project manage the same

Infrastructure availability

Multiple layers of Power supply as follows:

- Feeder from the State electricity Board which will be provided by BHEL.
- Generator back up for the primary power one with Auto Switch

Minimum requirements

HVAC system

- Air supply typically should be through false flooring and there should be redundancy to ensure Air conditioning is available for the server farm
- The Temperature inside the server farm is to be precisely controlled to maintain the temperature at 21 degrees centigrade (+/- 1 degree) with precision Air conditioning
- Comfort cooling for the UPS room to be provided by bidder cooling at around 22 to 23 degrees centigrade. The unit to have redundancy to take care of 24 x 7 operations.

Smoke detection & Fire Detection Systems with alarm.

- DC should have high sensitive Smoke Fire detection systems
- Environmental conditions to be taken into account while designing the DC. Rodent menace to be monitored and controlled in the server farm area.

Electrical/ UPS

- Electrical cabling inside DC for the distribution of the critical server farm load will be the responsibility of the bidder.
- The bidder to supply the appropriately sized UPS for the critical load and the non critical load (office IT equipment). The panel for the same also to be provided by bidder. Power distribution- to build redundancy upto the rack level with double circuits

Generator Set

- The bidder supply the appropriately sized Generator set for the requirement of each data centre
- Diesel Generator shall operate continuously without injurious heating at the rated KVA.
- Diesel Generator sets shall be capable of delivering the rated current at a voltage equal to 110 percent of the rated voltage without exceeding the limiting temperature rise. Load test will be witnessed by owner/consultant before despatch.
- Unless otherwise specified, the equipment shall be designed for Operation at a frequency of 50 Hz.
- Unless otherwise stated, the set shall be capable of operating continuously. In accordance with the applicable standard loading guide at their KVA.
- Overloads shall be allowed within the conditions defined in the loading
- Guide of the applicable standard. Under these conditions, no limitations by terminal bushings, or other auxiliary equipment shall apply.
- Diesel Generator sets complete with Bus Ducts, etc. shall be Designed and constructed to withstand without damage, the effects of external short-circuits as per the specified standards. Account shall be taken of the different forms of systems faults that can arise in service, such as line to earth faults and line to line faults associated with the relevant system and equipment earthing conditions.
- Every care shall be taken to ensure that the design and manufacture of the equipment shall be such as to reduce noise and vibration to the level obtained in good modem practice. The supplier shall ensure that the noise level shall not be more than specified in the standards.
- The equipment shall be designed with particular attention to the Suppression of harmonic voltage, especially the third and fifth , so as to eliminate wave form distortion

and form any possibility of high frequency disturbances reaching such a magnitude as to cause interference with communication system.

- All rated quantities subject to the supplier's guarantees shall be within the tolerances given in applicable standards.

3.20.1 CIVIL INTERIORS

The location identified for the DC is to be ideal and free from sources of EMI, industrial pollution, and vibration. Leveling the flooring to be 0 – 0 level.

The proposed server room should have non-permissible airtight thermally insulated partitions. Both the real ceiling and real flooring to be leak proof, air tight and thermally insulated.
Minimum required height from real floor to real ceiling to be minimum 12 feet (between real ceiling and real flooring) which is available at the proposed site.

One side of the server room/Network room to be covered with appropriate Fire rated partitions. Opening in the partition at required place to be provided for Electrical and LAN/WAN cabling entry to the server room and then sealed.

Access: Appropriate door sizes negotiable corners, ramps and smooth floor surfaces inside the facility are required. The access pathway to the Data center would be minimum 4 feet. In addition, proper access has to be provided in support areas to allow for service or replacement of UPS, HVAC and other large items.

Special Requirements: All materials used in data center have to be of non- combustible, self-extinguishing or fire retardant and have the properties of smooth surface finishing

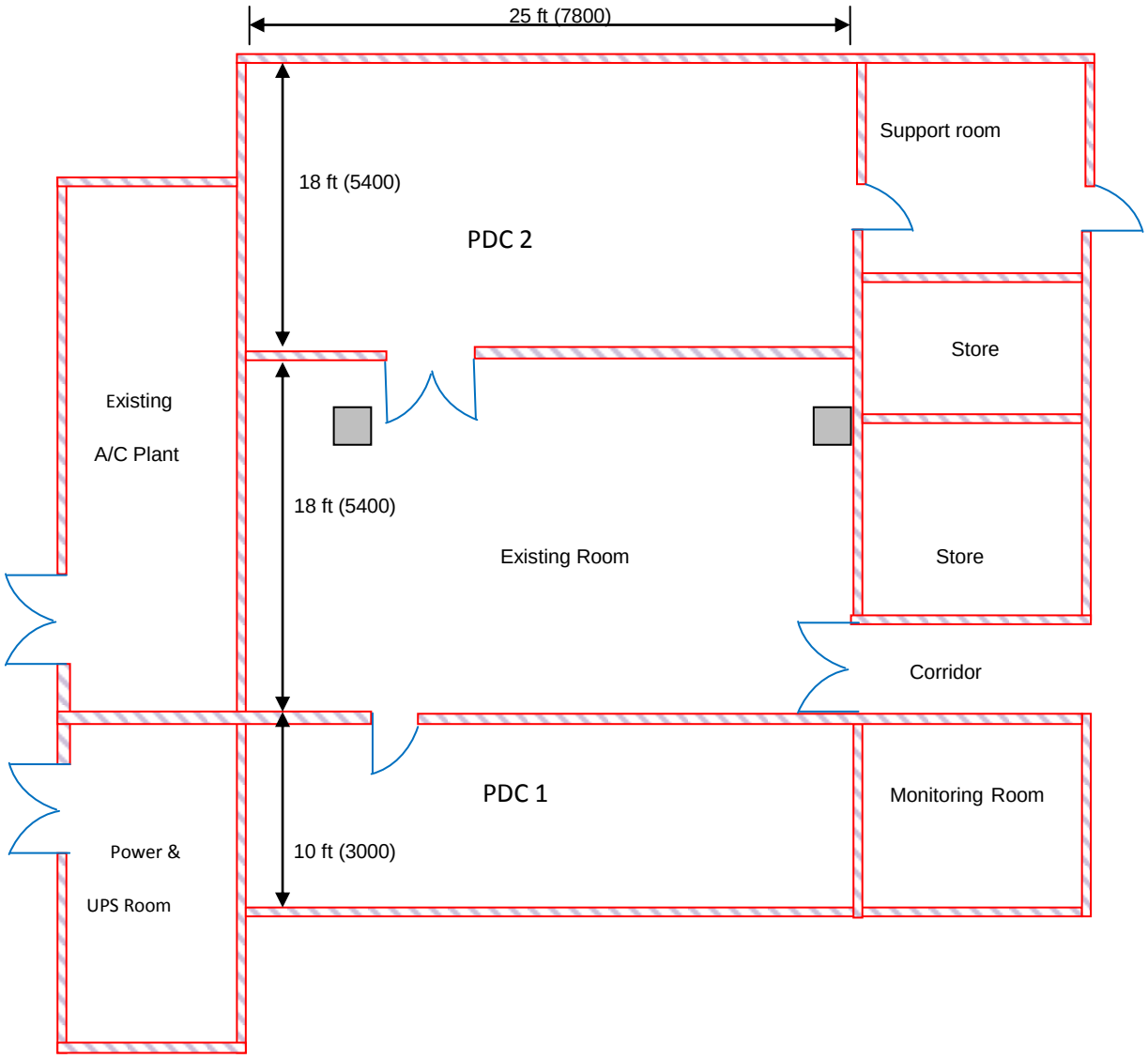
Walls/Partitions: For data center, rigid floor-to-ceiling perimeter walls/partitions having 2-hour fireproof rating to be considered.

Internal Partitions: Partitions inside data center will be built to the false ceiling height in case they are in the same zone. Otherwise rigid floor-to-ceiling perimeter walls/partitions to be considered. For these areas minimum 30 minutes fire rating to be considered

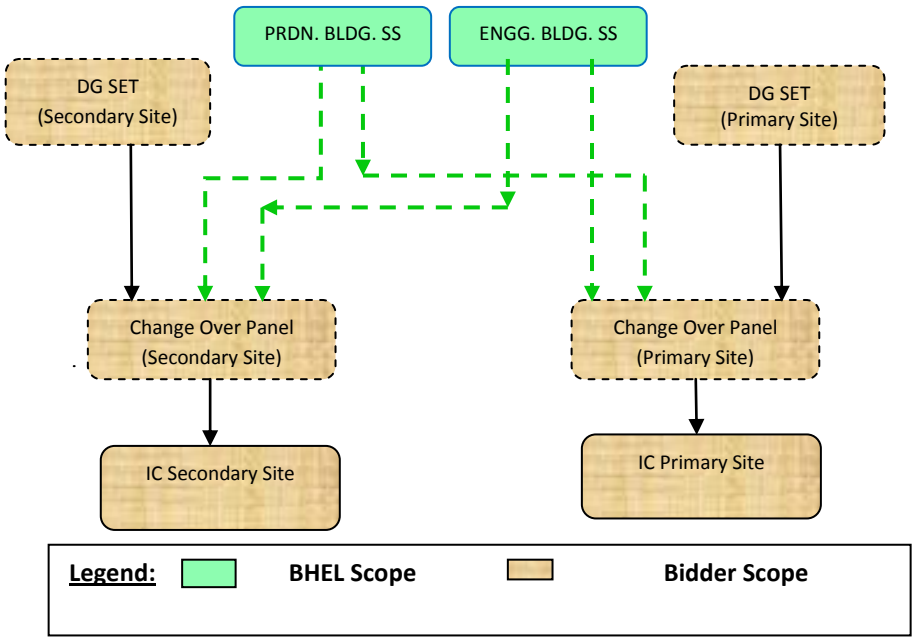
Wall Finishing: Internal walls will be finished smoothly with emulsive paint. Finishing of light colour should enhance the illumination of data center

Thermal insulator: Thermal insulator will be laid on the structural floor to prevent heat gain inside the data center. The junctions between the insulator and fixtures are watertight and airtight.

Layout of Data Centre



POWER DISTRIBUTION DIAGRAM



Dismantling

The demolition work should be done with utmost care while removing the false ceiling and other supports fixed onto the wall. The partition wall shall be gently removed by without disturbing the existing infrastructure and structure. This material shall be packed in gunny/plastic bags and carted down for clearance by way of service lift or service staircase and to be cleared from the site within 24 hours to designated dumping area.

Cutting and chipping of existing floor: The existing floor shall be cut only by mechanical cutters and then chipped gently by the chisel.

Partitions

The proposed server room to have non-permissible, air tight, thermally insulated surrounding. Both the real ceiling and real flooring to be leak proof, air tight and thermally insulated.

Depending on the plan to have either brick walls (of existing building) or fire rated gypsum partitions. Wherever existing walls are being retained. The windows to be closed with brick wall construction

Providing and fixing in position of 125 mm thick Fire rated Gypboard partition or Promat fire rdated board partition horizontally with GI fixing channel of ≥ 0.99 mm thick, screw it on either side of the G.I frame etc. and also ensure that the stud frame at the top level of the joinery opening with joints staggered to avoid continuous joints etc.

Fixing of channels shall also provide for suitable attachment of fixtures to the partitions and the perimeter opening should be trimmed with G.I metal studs packed with best quality treated Malaysian Sal wood to required size and shape with -2 coats of fire proof paint over a coat of anti-termite treatment / anti-corrosive primer to receive screws / anchor fasteners to fix Joinery frame in position etc.

Provide metal frame for erecting the doors of the server room for reinforcement

False ceiling

Server Room:

Providing and fixing metal false ceiling with powder coated 0.5mm thick hot dipped galvanised steel tiles 595 x 595 mm with tegular edge (10mm) suitable for 25 mm grid supported on suitable powder coated galvanised steel grid as per manufacturer specification. The same shall be inclusive of cut outs for lighting, AC grills, Fire detectors, nozzles and 25 mm thick glass wool of 16 kg.sq.m density wrapped on both sides with aluminium foil and placed over each tile etc.

Other Areas:

It should be modular and grid system where the ceiling can be accessed for a frequently for cabling, maintenance work and emergency needs. The false ceiling structure and grid is erected at height of 9 feet from the real floor, which is 600x600 tiles type.

Horizontal level False Ceiling grid (Make Armstrong) using hot dipped galvanized steel section, exposed surface chemically cleaned capping pre-finished in baked polyster paint, rotary stitched Main Tee of 24 x 38 x 0.33mm at every 1200 mm C/C max and supported by 2.5 mm GI wire which is fixed to the RCC slab with GI hook and Raw Plug and rotary stitched Cross Tee of size 24 x 30 x 0.254 mm at every 600 mm C/C max and rotary stitched Sub Cross Tee of size 24 mm x 25 x 0.254 mm at every 1200 mm C/C max and 15 x 15 x 0.457 mm Wall Angle all round the wall to form a grid of size 600 x 600 mm and laying of Tiles Prima Fine Fissured Tegular Edge Tiles with life time warranty 600 x 600 x 15mm thick tiles having RH 99 %, NRC of 0.55 and CAC of 34 dB in the above grid.

Approximate size of the voids

False Ceiling Void : Remaining height

Room Void : 8 feet

False floor void : 18 inches

Flooring

The Server room to have access flooring with antistatic properties. The UPS room to have flooring with antistatic nature. The rest of the Data centre areas to have vitrified tiles flooring of colour shades as per BHEL's approval.

False flooring

Supply and installation of 600mm x 600mm grid access floor (false Floor) system in the server room along with raceways for power distribution and data & voice cabling underneath.

For server room the understructure system shall be rigid-grid with 16" Clearance between bottom of tile and top of treated real floor. Assembly shall provide a means of leveling and locking at a selected height. Assembly shall provide 30mm adjustment.

The purpose of false flooring is to provide air plenum, to house the raceways for electrical, networking etc., Also to act as a separate void for smoke detection.

For non-full tiles (cut out tiles): treat / insulate edge with PVC
AC Grills/Tiles (600mm X 600mm): With Manual dampers.
Suction Equipment for lifting tiles (Access Floor Systems Panel Lifting Tools: 1 Number).
UNITILE SF 1000/ EDGE SUPPORT RIGID GRID SYSTEM

(The model to be selected as per the load requirements)

PANEL: UNITILE SF 1000 Access Floor panel is all steel welded construction with an enclosed bottom pan with uniform pattern of modular pockets of 49 hemispherical cones and 12 nos. reversible cones. The top and bottom plates are fused together by resistant welding at 81 spots. The maximum depth of a BARE tile will be 29 MM. The panel is epoxy coated (50/60 microns thick coating) for protection from corrosion and cavity formed by the top and bottom plate is filled with non-combustible cementitious compound to support no less than 85% of the top plate of the panel.

The UNITILE construction will be in a position to withstand a Concentrated Load of 450 kgs applied on area 25mm x 25mm in the center of the panel which is placed on four steel blocks without deflecting more than 2mm and without setting permanently more than 0.25mm.

The UNITILE construction will be in a position to withstand an Uniformly Distributed Load minimum 1350 kg than 1 mm and without deflecting more than 1 mm and without setting permanently more than 0.25mm

FINISH OF THE PANEL

The access floor panel if not required to be supplied BARE shall be laminated with finishes as required and same shall be factory laminated on semiautomatic lamination lines leaving no chance for human error.

The finish shall be either High Pressure Laminate/ Antistatic Vinyl flooring of required shade and color and the Laminate shall be either:
Protected on its edges with PVC beading with mitered corners which shall factory fit.
Or integral trim design.

JACK ASSEMBLY

PEDESTAL: The Pedestal consists of 110 x 110 x 2mm thick embossed steel base plate having 8 nos. of holes. Steel pipe 25-mm (OD) 2 mm thick. is orbitally riveted to the base plate on one side and is thread rolled (3/4" BSP) on the other side to receive the head.

HEAD: The jack head consists 90 x 90 x 4mm thick. Die cut steel plate having tapped holes either to receive screws for locking stringer or bare tiles. To the bottom of the head a flared pipe of 40mm ϕ is MIG welded. The reduced end (25mm ϕ) has internal threads enabling it to be engaged to the pedestal. The adjusted height of the jack assembly is locked by specially designed check nut, which allows locking without use of spanners. The pedestal is either powder coated or electrogalvanised for prevention of corrosion and the head is electrogalvanised for prevention of corrosion.

STRINGERS: The stringer is hot dipped galvanized steel construction, rectangular C channel with inverted flanges 0f 6mm width each. The size of the C channel is 20 x 25 mm, 1.2 mm thick having special notching arrangement for panel alignment.

Earthing to be done in consultation with the electrical consultant. A pedestal can be connected to the main earthing pit by providing necessary copper earthing and end termination.

Thermal Insulation: The real ceiling and the real flooring to be thermally insulated using suitable material of rubberized nature with fire proof properties for the reason that the cold air is blown from below false floor to rise in to the server room through A/C grills. The thermal insulation will also avoid heat/cool loss in to the below floor and avoid inter floor sweating. The recommended material for the insulation is of Armaflex/Trocelene.

Fire door

The server room shall be provided with a main access door and an emergency exit manufactured from high quality galvanized steel and having fire rating up to 2 hours (conforming to BS 476 part 22 and IS 3614 part 2 standards). The doors shall be suitable for openings of sizes 4" x 7" (or as required) The main access door shall of two pane type, one pane to be bolted and the other with automatic door closer and locking to suit the access control specs. The emergency door shall have a single pane and should have facility for opening outside only during emergency. Both doors shall have vision panel of suitable sizes and painted with etch primer and finish painting of approved color to match the color scheme of the area.

The doors are of appropriate size and as per the standards set by CBRI [Central Building Research Institute – Roorkee [UP], IS 3614 Part 2 and BS 476 Part 20 and 22.

Required Features of Doors:

- Galvanized Painted
- Fire rating 60 to 120 minutes (Stability and integrity)
- Clear Fire Glass- (size300x 200) 120 minutes fire rating tested at Central Building
- Research Institute
- Shutter Thickness- 46 mm
- Fully Flush Construction
- Robust structure can be prepared to receive all types of hardware
- May be provided with Circular [380 Dia] and rectangular vision 300 x200mm channel.
- Should be suitable for Panic Hardware.
- Approved makes: Godrej/ Shaktimet / MPP

Thermal Insulation

The real ceiling to be thermally insulated using suitable material of rubberised nature with fire retardant properties for the reason that the cold air is blown from below the false floor to the room void through AC grills. The thermal insulation will also avoid heat/ cool loss into the below floor and avoid inter floor sweating. The recommended material is Armaflex/ Torcelene

Painting

All material required for the works shall be of specified and approved manufacturer, delivered to the site in the manufacture's containers with the seals, etc., unbroken and clearly marked with the manufacture's name or trade mark with a description of the contents and colour.

Debris Cleaning

Removal of Debris: The material shall be packed in gunny sacks/plastic bags and dumped in the area instructed by customer after taking prior permission from the project in charge on a daily/weekly basis

The Bidder is required to provide detailed architectural diagrams and other illustrations like conceptual architectural plan, electrical layouts, false ceiling layouts; communication networks layouts etc., for the envisaged DC requirements.

3.20.2 ELECTRICAL POWER DISTRIBUTION

Availability of Distribution System

The distribution system should have N+1 configuration. It should also have a Dual Bus configuration in order to have dual power supply to each rack, thus minimizing downtime during maintenance operations. Dual feeders should also be provided for incoming feed from main feeder. All electrical distribution cables / conduit / casing / caping, etc. should be FRLS type only

Redundancy

Power Supply for each rack should be dual power supply. The concept is based on n + 1 redundancy, where n is the number of systems or main items of equipment required to maintain the specified operational requirements. That means, failure of a single such system or equipment item can be tolerated

Primary/Secondary power

Bank will make provisions for availability of power to the main panel of data center. From the main panel bidder needs to provide for the power distribution.
For the secondary source, a Generator of required capacity complete with acoustics and AMF panel to be provided.

Main LT Panel

All switchboards should be designed to support non-linear load with neutral conductors at 2x phase/line conductors, this is as per IEEE1100-1999 specifications The Main LT Panel will be

housed in the switchgear room. The panel boards for UPS and raw power distribution should be installed in the UPS room.
Main panel shall have 3 incomers. Two from EB supply and one from DG set.

Lighting

Adequate illumination (400 Lux) should be designed for the Server room. 10% of the power for lighting will be from emergency panel and the rest will be direct electricity board. Lighting on rack area need to be adjusted in order to eliminate lighting in un-proper areas such as over the top of the rack for the purpose of energy saving and cost saving. Bidder to provide sufficient lighting for the Data center as per the standards of data center

General Requirement

The scope of the electrical services will include design, supply and installation of

- LV Cables
- Installation of Wiring & Cable
- Electrical Panel comprising of
    - Molded Case Circuit Breakers (MCCB's)
    - Current Transformers (CT"s)
    - Measuring Instruments
    - Indicator Lamps
    - Distribution MCB Boards
    - Lighting Switches
    - Switch Socket Outlets
    - Luminaries
    - Earthing

Cable Entry Ducts

Cable entry ducts (glands) would be used wherever cables in pipe sleeves, in trenching or conduits have been drawn through floor/wall openings and riser ducts, Contractor shall arrange to seal off the remaining gaps in the sleeves, or floors/walls with cable glands.

Cables

All LV cables required and as indicated shall be supplied, installed in position and terminated at their various items of equipment.

Cables supplied and installed shall be in accordance with the following requirements:

For Low Voltage (LV) wiring which is surface-run on cable tray or PVC conduit, PVC-Insulated & Sheathed (PVC/PVC) cables of 450/1100V grade.

Where LV cables are installed in PVC conduit, such cables shall be of PVC-insulated

(PVC) type, of 450/1100V grade in case of single phase, and the wiring of all 3-phase, 4-wire sub-mains in PVC conduit, cables shall be of 450/1100V grade.

All types of cable described above shall be provided with Multi-strand high-conductivity, annealed copper conductors.

Installation of Wiring & Cable

Conduits

All conduits and accessories installed on walls, concrete shall be of PVC types.

Raceways

Raceways duct type would be provided for server room below the false floor, which shall have removable cover plates through its entire length so that cables can be placed in it rather than pulled. The raceway appropriate length and size will be used made of GI

Electrical Panel

The data center electrical panel of appropriate capacity to be proposed by bidder. The electrical panel shall have provision for distribution for raw power to the AHU units, UPS and lighting distribution board. Busbar's of appropriate current carrying capacity shall be used for branching out. Busbar's supports of insulating material and appropriate mechanical strength shall be used to mount the busbar. The busbar shall be sleeved with PVC material. PVC cable with lugs will be used to terminate the switching equipment with busbar terminations. Earth busbar shall be provided internally throughout the full length of each switchboard.

The electrical panel to comprise of

- Molded Case Circuit Breakers (MCCB's)
- Current Transformers (CT"s)
- Measuring Instruments
- Indicator Lamps

All the above components to be appropriately rated as per the requirement

Distribution MCB Boards

The distribution board shall be of metal clad, cubicle construction and suitable for installation on wall will be located inside the UPS room.

All switchboard panels, main earth bonding lead and outgoing earthling leads for wiring circuits shall be securely bonded to the main earthling bar for each switchboard.

Lighting requirement can be calculated by assuming 350lux/sq.ft for effective illumination.

Appropriate number of 3x18W CFL based tiles type 600x600mm recessed light fitting with electronic choke type/ 1FL and other lighting as required. Some lights should be powered by the data center UPS.

Lighting Switches

All control switches for lighting points shall be supplied and installed as mentioned in the BOQ. Lighting switches shall be flush mounted, and fitted with all-insulated on open-type, recessed, metal-clad or PVC boxes.

Switch Socket Outlets

All switch-socket outlets as indicated in the BOQ, shall be supplied and installed. General-purpose switch-socket outlets connected to 230V 50Hz. AC supplies shall be 16A x 3-pin, flush mounted type, installed in recessed, metal clad boxes and provided with flush-fitting, all insulated type cover plates of ivory-color finish. Each rack will have dual power source from UPS. Two separate cables will be run from two separate UPS and terminated at racks. Servers having dual power input will be connected to both the power supply units. The servers which has only single input source, will be powered by using Static Transfer switch or redundant switch. This will ensure the redundancy up to the rack level and avoid single point failures.

Each rack will have two UPS power source located below the false flooring. These power sources will have 16/32A plug and socket type connectors (IEC 320/309).

Depending on the requirement either 3 phase/single phase power to be provided for each rack.
(Detailed study of the IT equipments to be made before the wiring is started)

Earthing

UPS Neutral Earthing (copper)
Body Earthing (GI)
Server room Earthing (Copper)

Copper earth strip would be provided for Server room and UPS room. The copper earth strip would be of 25mm x 3mm. The location of earth pits shall be studied and precise information obtained from the client.

Copper plate Earthing
600mm x 600mm x 3mm copper plate with necessary material of 8’ GI pipe, funnel set, salt, charcoal & 25mm x 3mm copper strip from copper strip to funnel set and 12 “ x 12” chamber cover

GI earth strip would be provided for Main electrical panel and distribution boards. The location of earth pits shall be studied and precise information obtained from the client.

The total power requirement of the data centre to be specified by the vendor in the technical submission.

3.20.3 UPS FOR DATACENTER

Make: APC/Emerson/Socomec

UPS specifications

- This specification is for a three phase, on line, continuous operation, solid-state uninterruptible power supply (UPS). The UPS has to operate in conjunction with the existing building electrical system backup power protection, and power distribution for the critical loads.
- The UPS shall be True Online with delta or double conversion technology. The power flow is through Rectifier and then the Inverter. The rectifier shall be with SCR / IGBT based as power conversion element. The inverter shall be with IGBT design and with state of the art sine wave control technology, for the rated UPS which shall ensure high quality of power conditioning.
- The design must provide for a mean time between failures, field proven minimum of 120,000 hours. For ease of maintenance and service, the UPS must have field replaceable modular sub assemblies.
- All material comprising the UPS module must be new, of current manufacture and should not have been in prior service except as required during factory testing. The UPS module must contain no PVC materials.
- The UPS shall be capable to operate and charge battery even when the incoming supply goes to +/-15% over the nominal (300V to 480V). It shall be ensured that the battery charging should be possible at minimum input supply voltage condition. Battery should not be discharged up to the minimum input supply voltage level.
- Being a high-end data centre application a Full fledged and highly reliable Power Conditioning system (UPS) is desirable.
- The system should have a close voltage regulation viz. 400 +/- 1% for the entire computer / server load spectrum. Also the output frequency correction of +/- 1% is preferable when the input frequency goes out of tolerance and system should not go to battery mode during 47Hz input or 53 Hz input. This might happen with DG sets some time.
- The system shall have the highest industry efficiency, employing appropriate conversion technology and built in isolation transformer for load safety and cost effective operation all through.
- Since power quality is a key factor for load safety and mains safety (both output and input of the UPS) the following major specs may be called for.

- Voltage Regulation and Transient Response: Voltage regulation should be 1% of the set value, and transient response should be less than 5% with fastest correction (< 5 milli seconds).

UPS shall have parallel redundant feature for scalability.

UPS shall be considered N+N configuration with LBS (Load Bus Synchronization) kit.

Note: The output quality is a major concern and therefore very low Total Voltage harmonic Distortion is required to be maintained, at all load points especially at Server Input terminals to minimize load side false trips etc. The total number of series power devices may be reduced to ensure high uptime (MTBF) and overall reliability.

RECTIFIER

The rectifier design shall be state of the art PWM rectifier, employing IGBT/SCR as rectifying element along with filters (incase SCR technology) to achieve Input Power Factor is expected to be better than 0.9 and the current harmonic distortion level less than 12%. The Total Voltage harmonic Distortion should be < 5% for 100% non linear / SMPS /Computer loads. This will reduce the load side current harmonics to a great extent and the UPS system shall be low impedance type using appropriate technology. The generator rating required for the UPS shall be max.50% more than the rating of input power for the UPS.

Float charge:

Under nominal operating conditions, the battery charger has to provide a nominal DC bus voltage.

Boost charge:

The battery charger has to provide a boost charge of 2.27 to 2.40 volts per cell (programmable) for a period of 1 to 24 hours programmable.

Battery charger temperature compensation:

For protection of the batteries, the unit must monitor the temperature of the batteries. To extend battery life, charge voltage must be compensated for changes in battery temperature.

Battery charge current limit:

The battery charge current limit must be limited to 10% of nominal DC discharge current (programmable to lower level).

INVERTER

The UPS shall provide state of the art power conditioning. The output waveform shall be pure sine wave with distortion level of less than 2% on 100% linear load and less than 5% on non-linear load. It should support loads with crest factor of 3:1 or higher. The dynamic regulation shall be superior and the UPS should have capability to clear branch circuit fuses (HRC type) – with minimum of 20% rating. The control shall be fully digital employing dual microprocessor or superior technology. The inverter has to be capable of supplying overload current of min. 150% of the system rating for 30 seconds.

BATTERY

The batteries shall be sealed maintenance free lead acid type, the batteries shall be housed in a powder coated open rack complete with battery, inter cell connectors etc. The cabinet shall be cubicle type, floor mounted and powder coated. All sides of the cabinet shall be open and with louvers for ventilation. The battery cabinet shall be designed to allow for ease of maintenance easy access.

Battery type: Sealed valve-regulated, flooded, battery cells designed for high rate of discharge.

- Design Lifetime: ≥ 5 years
- DC ripple: Max. 2%

Low battery voltage protection: To prevent total discharge or damage to the battery, the UPS must transfer to standby operation when the battery voltage reaches a set minimum voltage level (programmable). If the AC input source has not returned within 10 minutes after "low battery" shutdown, the UPS shall automatically disconnect DC power from the battery to avoid deep discharge.

A battery-monitoring unit must be part of the system and it shall be capable of monitoring and defining battery capacity. It must be possible to program the unit to perform an automatic battery test every 90 days to test the condition of the battery.

Battery manufacturing controls: Each battery cell must be clearly identified as to cell type, voltage, and capacity. All cells in the battery have to be tested to verify 100% system capacity. The equipment must be designed and manufactured under a quality assurance program that is controlled and documented by written policies, procedures, or instruction.

Battery load test: Battery load test to be carried out during commissioning at BHEL.

UPS DISPLAY AND CONTROLS

Display unit

A microprocessor-controlled display unit shall be located at the front of the UPS cabinet. The display shall consist of an Alpha-numeric backlit LCD display, an alarm LED, and a touch key pad. The UPS should have a minimum of 200 record histories.

UPS status messages

The display unit shall show the following UPS status messages:

- Normal operation, load power xxx%
- Battery operation, time xxx minutes

Standby

The display unit shall show the following metered parameters:

- Input AC voltage (line-to-line, three-phase simultaneous).
- Input AC current (line-to-neutral, three-phase simultaneous).
- Output AC voltage (line-to-line, three-phase simultaneous).
- Output AC current (line-to neutral, three-phase simultaneous)

Battery voltage

- Battery current (charge/discharge)
- Battery temperature.

Output peak current

- Input / Output Power - KVA / KW
- Input / Output Power Factor
- Input / Output Frequency

The display unit shall record a log of all active alarms. More than 40 alarm conditions must be monitored. The record shall be in the form of a time and date stamped log of the 500 most recent UPS status and alarm events. These alarm events must be able to be seen thru the RS485 C interface in a designated PC/BMS.

Controls:

The following control and operational commands shall be shown on the display unit:

- Silence an audible alarm.
- Set the alphanumeric display language to English or the alternative language.
- Display or program the time and date
- Enable or disable the automatic restart feature.
- Transfer to or from forced battery operation.
- Program the unit for economy operation.
- Program the battery charger.
- Calculate battery back-up time.
- Test battery condition on demand.
- Program the unit to periodically test battery condition.
- Program voltage and frequency windows
- Calibrate metered parameters
- Enable or disable adaptive slew rate. Set maximum slew rate.
- Adjust set points for different alarms.

- Program the remote shutdown contact (enable/disable remote shutdown, polarity, delay.)
- Set the delay for the common fault contact.
- Program the unit for soft start for use with a generator.
  UPS ON and OFF Push buttons:

Momentary UPS on and off push button must be provided in a locked user accessible compartment. Upon activation of the on push button, the UPS must automatically connect the UPS output to the load. Upon activation of the off push button, the UPS must remove power from the load.

UPS Potential free contact:

The UPS must be equipped with potential free contacts for indicating:

- Common fault alarm
- Battery operation.
- Other optional indications / control.

UPS Communication interface board:

The system shall have a communication interface board, which shall provide the following communication ports, and it must be possible to use two or more ports simultaneously.

1. RS485 serial port
2. COM PORT with the following normally open or normally closed potential free contacts:
   - ✓ UPS on.
   - ✓ Battery operation.
   - ✓ Battery low.
3. SNMP

The UPS shall have to communicate with the BMS on RS485/MODBUS protocol. All hardware / software (with passwords) required for the communication is deemed as included and shall be provided whether expressly mentioned or not.

Remote Display:

All electrical parameters, faults, alarms etc must be displayed on a remote alphanumeric LCD display. All alarms shall be displayed with a built in sounder and should be possible to be acknowledged and reset at this remote panel also.

MECHANICAL DESIGN

The UPS, Battery cubicle and Switching cubicle must be housed in a powder coated open rack. All service access must be from the front and top. The cable entry shall be from the Top. The UPS and switching cubicle can be cooled by forced air. The battery cubicle can be cooled by free air ventilation and convection.

- Performance:

The UPS system shall be designed for full power rating. The DCO needs to specify output current at rated power factor and considering 45 Deg. as ambient temperature.

- Efficiency:

  The overall efficiency of systems shall be very high and minimum as specified.

- Accessories:

  Only MCCB shall be provided in battery path. Switch fuse unit for battery isolation is not acceptable. The monitoring software and BMS compatibility using RS485 MODBUS/BACENT protocol and the UPS to battery cables shall be integral part of Systems and made available at no extra cost.

- Total Power Protection:

  The multiple power protections to the rectifier as well as inverter and to the load shall form integral part of UPS design.

Codes of Operation:

The UPS has to operate as an online system in the modes listed below:

Normal

The rectifier / inverter charger has to operate in an online mode to continuously regulate the power to the load. The inverter / battery charger also has to derive power from the AC input source and supply DC power to float charge the battery.

Mains A.C Input power failure

Upon failure of the AC input source, all the output loads must continue to be supplied by the inverter without any break by switching over to battery derived input power. There must be no break / interruption of power to the load upon failure or restoration of the AC input source.

Recharge

Upon restoration of the AC input source, the battery charger must simultaneously recharge the battery and regulate the power to the critical load.

STANDARDS

The UPS and all its components, SMF battery etc shall comply with all the relevant ISI and global standards and norms.

3.20.4 PRECISION AIR CONDITIONING

Make: Emerson/Uniflair/Stulz

DC requires round the clock 365 days precision cooling to maintain temperature of 21Deg. C and relative humidity of 50 % RH. The tonnage calculation must cater to the server heat dissipation and maintain the constant temperature. Sequential controller should be supplied along with PAC.

For effective and uniform distribution of cooling, bottom discharge with high CFM units are considered which will give uniform cooling and eliminate hot spots created surrounding high-end servers. Only Server room will have Precision Air conditioning system in the date center.

The server /network rooms will have precision A/C units with redundancy installed to maintain round the clock 21 degree +1 and relative humidity of 50 % + or - 5 variation. The cold air discharge will be from false floor void. The raised floor will be provided with volume controlled diffuser.

The unit supplied should have redundancy. A sequential timer facility should be available for the alternate use of the units.

The minimum requirements for the AC are mentioned below. Bidder has to comply to these specifications.

i. PRODUCT

The frame shall be constructed of 2.5, 2.0 and 1.2 mm folded galvabond steel. The external panels shall be constructed of 1.2mm zinc coated sheet steel. Front, rear and end panels shall be fitted with 25 mm glass fibre insulation, fire rated to Australian Standard 1530 (indices 0,0,0,3). The cabinet shall powder coated with and have a texture finish. The hinged front panels shall be removable and include captive ¼ turn fasteners. The cabinet shall be assembled with pop rivets providing ease of disassembly.

ii. FILTRATION

The filter chamber shall be an integral part of the system and withdrawal from the front of the unit. Filtration shall be provided by deep V form G4 performance dry disposable media to ASI324.

iii. FANS

The fan section shall be designed for 4400 L/s at an external static pressure of 25Pa. The fan shall be located downstream of the evaporator coil and be of the forward curved centrifugal type, double width, double inlet and statically and dynamically balanced to G6.3 DIN ISO 1940 part I. Each fan shall be separately driven by a high efficiency electric motor with an IP22 enclosure rating. The drive arrangement shall be self-tensioned and provide for belt replacement without the use of tools. The motor base plate shall include locators to ensure optimum axial alignment of the motor.

iv. SCROLL COMPRESSOR

The compressor shall be of the high efficiency complaint scroll design, with E.E.R (Energy Efficiency Ratio) of not less than 11.1 BTUH/Watt (C.O.P not less than 3.25) at ARI rating

conditions. The compressor shall be charged with mineral oil and designed for operation on R407C.

v. REFRIGERATION CIRCUIT

The refrigeration system shall be of the direct expansion type and incorporate one or more hermetic scroll compressors, complete with crankcase heaters. Cooling steps shall be a maximum of 50% of total unit cooling capacity for two compressor models. A hot gas bypass solenoid valve shall be used on single compressor models. The system shall be include a manual reset high pressure control, auto reset low pressure switch, externally equalized thermal expansion valve, high sensitivity refrigerant sight glass, large capacity filter drier and charging/access ports in each circuit. Each refrigeration circuit shall include rigidly mounted isolation valves in the discharge and liquid lines to aid servicing and installation (air cooled units only).

vi. EVAPORATOR COIL

The evaporator coil shall be an A-coil configuration incorporating draw-through air design for uniform air distribution. The coil shall be constructed of rifled bore copper tubes and louvered aluminium fins, with the frame and drip tray fabricated from heavy gauge aluminium. All metal parts in contact with condensate shall be the same material to prevent electrolytic corrosion. The drip trays shall ensure the collection of condensate and be accessible for cleaning. The cooling shall be a maximum of 4 rows and 55I fins per meter and the face velocity shall not be more than 2.5 m/s.

vii. DEHUMIDIFICATION

Multiple Compressor Models

A specific dehumidification cycle (split-liquid) shall operate by reducing the operating surface temperature in a section of one of the refrigeration coils by means of a solenoid valve in the liquid line. Full air flow of the unit will be maintained at all times to ensure consistent air distribution to the conditioned space.

viii. REMOTE AIR COOLED CONDENSER

The Air cooled condenser shall be the low profile, weatherproof type incorporating high efficiency, direct drive, external rotor motors with axial blade fans. The condenser shall balance the heat rejection of the compressor at 40^0C ambient. The condenser shall be constructed from heavy duty aluminium and corrosion resistant components. Heavy duty mounting legs and all assembly hardware shall be included. Condensers shall be suitable for 24 hours operation and be capable of providing vertical or horizontal discharge. The condenser shall be fully factory wired and require a 230 volt, single phase,50.Hz electrical service.

ix. HUMIDIFIER

Humidification shall be provided by boiling water in a high temperature polypropylene steam generator. The steam shall be distributed evenly in to the bypass air stream of the environmental control system to ensure full integration of the water vapour in to the supply air without condensation. The humidifier shall be capable of providing steam per hour. The humidifier shall have an efficiency of not less than 1.3 kg/kW and be fitted with an auto flush cycle activated on demand from the microprocessor control system. The humidifier shall be fully serviceable with replaceable electrodes. Waste water shall be

flushed from the humidifier by the initiation of the water supply solenoid valve via a U-pipe overflow system. Drain solenoid valves will not be used. The humidifier shall be type test certified for direct connection to portable water supplies in accordance with Australian Standard MP52.

x. ELECTRICAL HEATING

The electric heating elements shall operate at a heat density level not exceeding 60 kW/m2. The low watt density elements shall be of finned tubular steel construction finished in high temperature paint. The heating circuit shall include dual safety protection through loss of air and manual reset high temperature controls.

xi. UNIT SIZE

The maximum foot print area of the unit shall not exceed:-

1.45 m2 above 35 and up to 70 kW

The unit shall require front access only for routine service and installation work.

xii. UNIT CONTROLLER

The unit controller shall be microprocessor based and include a large 115 x 65mm (240 x 128 pixel) LCD backlit graphic display for clear visibility of text and graphics. The display and control buttons shall be accessible from the front without removing any external panels. The controller shall features ISP (In-System-Programming) technology to support program upload via a PC.

Control strategies shall be P-I-D with dew point compensation for accurate temperature and humidity control. A selection of return or supply air control shall be provided to suit the application. The controller shall have a user-friendly menu driven interface with supporting help screens and shall use multi-protocol data communications. Access to the controller setting shall be protected with three levels of passwords to prevent against unauthorized access.

In normal operating mode the main screen shall display unit number, temperature and relative humidity set points and actual, graphs, time, date and operating status. Dynamic icons shall identify the system operating mode. A 48 hour real time log of temperature and humidity data shall be retained by the control system. All parameters and data shall be protected in memory by an onboard battery. An EIA-232 communications interface shall provide the capability of remote monitoring with the option of an EIA-485 interface on a 2 or 4 wire connections.

xiii. CONTROL

The control system shall allow programming of the following conditions:

- Temperature set point : 17 to 32^{o} C (return), 10 to 16^{0}C (supply)
- Humidity set point : 35 to 65% RH (return)
- High temperature alarm : 15 to 35^{0} C
- Low temperature alarm : 5 to 35^{0} C
- High humidity alarm : 30 to 80% RH
- Low humidity alarm : 10 to 70% RH

xiv. ALARMS

The microprocessor shall activate an audible, visual and general alarm in the event of ant of the following conditions:

- High temperature
- Low temperature
- High humidity
- Low humidity
- Loss of air
- Water under floor

These alarms shall have selectable control action enabled, disabled or off. The microprocessor shall activate a visual alarm only in the event of any of the following conditions:

- Service intervals (cool, filter and humidifier)
- Compressor short cycle
- Low battery
- Unit off (history only)

All alarm occurrences shall be time and date stamped.

xv. GENERAL ALARM OUTPUT

A general alarm output shall be provided to interface enabled alarms via a set of normally open dry contacts. A selection to invert the contact action shall be provided in the controller.

xvi. DATA LOGGING

The control system shall maintain cumulative operating hours of model (cool, heat, humidify, dehumidify) and component (compressors, heater, humidifiers and fans). The 100 most recent alarms shall be retained in memory.

xvii. COMMUNICATIONS

The microprocessor shall be compatible with all remote monitoring and control devices.

xviii. BMS Integration

PAC shall get integrated to BMS with MODBUS Protocol through RS 485 / SNMP

xix. 2 Stage Electric Heating

A second stage of electric heating, complete with manual reset high temperature safety switch, shall be provided to satisfy temperature space conditions.

3.20.5 COMFORT AIR CONDITIONER

Functional areas of the data center other than the server rooms to have comfort cooling facility Areas where 24 x 7 operations are expected the UPS room to have redundancy built in for the cooling. Comfort cooling units of appropriate capacity to be proposed as part of the solution.

a) Star Rating:

All the Hi Wall Split AC should have a minimum of 3 star rating.

b) Moisture Removal:

The comfort air conditioning to ideally suit a moisture removal rate around 1 litre/hour for 1.5 tonner Hi-Wall Split AC and 2 litters / hour for Cassette AC.

c) Compressor

The compressor shall be of Rotary type for the Hi-Wall Split AC and high efficiency Scroll or reciprocating type for Cassette AC. Compressor shall have inbuilt overloads, and shall be mounted on anti vibration mountings.

d) Evaporator Fans

Fan shall be of forward curved centrifugal type, separately driven by a high efficiency electric motor. The drive arrangement shall be self tensioning and provide for belt replacement without the use of tools.

e) Air Filtration

Filtration shall be provided by dry media disposable filters capable of filtering air to 95% down to 5 micron efficiency and shall be replaceable from the top of the unit.

f) Air-cooled condensers

Condenser shall be the low profile, weather proof type incorporating high efficiency direct drive, external rotor motors with axial blade fans. Condenser shall be suitable for 24 hours operation and be capable of providing vertical or horizontal discharge.

g) Controls

The unit should be advantages on Control System as below

a. LED indication of operating modes and set points.
b. LCD display Remote control

h) Conduits:

Required supply of piping for refrigerant flow and necessary electrical wiring to be provided for effective installation. The same should be installed & tested for successful operation at the project site.

i) Stabilizers

Appropriate high quality stabilizers to be provided with the comfort AC.

3.20.6 FIRE DETECTION SYSTEM

The fire detection and alarm system shall be of high quality fast-acting electronic type adopting Soft Addressing Technique. The FDA System comprising of main fire alarm control panels; heat sensors; optical sensors; manual call points; electronic sounders; transponders; sounder controllers, conforming to the relevant and applicable requirements and recommendations of BS5839/EN54 and Local Civil Defence Authority.

The fire detection and alarm system shall be designed to facilitate accurate identification of the source of heat / smoke / fire in their early stages to minimise occurrences of false alarms due to faulty equipment, electrical transients, system faults etc.

The process analog detectors shall make the final decision on whether a fire or fault exists by comparing the sensed fire/fault patterns against all known fire and fault patterns held in it's memory. System shall be true Analogue with the ability to print the output from a fire sensor over a period of time.

All system components and devices shall be connected to two-wire loop circuits with isolators provided before and after a group of 15 devices (max). Removal or disconnection of

any component from the loop shall not affect the functioning and performance of those devices between two isolators.

The System shall be of soft addressable type i.e. Addressing of all devices shall be done automatically from FACP wherein the use of hard switches to set addresses is eliminated.

Facilities are provided to constantly monitor and check the following circuits and fault conditions:

- The power supply to the loop /s;
- For open-circuit, short-circuit, earth fault and any other fault condition in the loop wiring;
- For communication failure and errors in all cards and loops
- For faults in keyboard and printer circuits
- monitoring of all devices status every 1.3 minutes to create a table of each 1 analogue channel for event analysis

All devices i.e., Detectors, MCP's, Sounder Controller Units etc. shall be installed on the same loop.

All devices shall be assigned a maximum of 25 character alphanumeric label. In case of fire, fault or warning, the label of device sensing threshold shall appear on visual display unit of the panel.

Any event i.e. Fire, fault or warning shall be recorded with time, date and place of occurrence in the memory of FACP. These events shall either be displayed on VDU or printed, as required.

Provision shall be done at the fire alarm control panel to silence the alarm sounders but the visual indication shall remain until the system is reset.

Facility to introduce / change delay periods in operating individual sounder / group of sounders, shall be possible to program from FACP.

Main Fire Alarm Panel

The main fire alarm control panel shall be located at the Ground Floor and as shown on the schematics. The main FACP shall be capable of accommodating a maximum of 127 analogue addressable devices per loop.

The panel shall be computer controlled using analogue technique to detect smoke / heat / fire conditions. The panel shall be complete with inbuilt printer and not limited to the following elements. It shall have the

1. Flexibility for future extensions and / or extendibility.
2. Reliability for early warning detection using intelligent detectors.

3. Modular construction with individual extendability.
4. Sealed lead acid battery and charger, with 24 hour back up in the event of supply mains failure.
5. Essential controls- sound alarms, silence alarms and reset fire. These shall be enabled by a keyswitch.

6. Cancel fault buzzer
7. Fire, fault, warning and power on lamps.
8. Simple menu driven function keys with password protection will allow users to an extensive range of software based features such as:
   - last 200 system events
   - Current fault and warning logs.
   - Analysis of analogue sensor information
   - Interrogation of sensor cleanliness
   - loop map connections
   - enable/ disable sensors, zones, sounders, interface unit channels.
   - address allocation
   - Status of all cards
   - Printer on, off, line feed and test facilities.

9. All control buttons and keyboard shall be enclosed behind a lockable cover.
10. Up to 127 analogue addressable device capacity per 2km loop.
11. TTY Serial Interface for computer communication option.
12. Will have a secure networking facility to indicate a remote zone and remote zone text across the network.
13. Detector related test functions, such as Activate detector LED, Activate remote detector output, Open/close zone isolator may be selected for individual fire detectors.
14. Graphic indications shall be displayed for the sensor status of the intelligent fire detector selected. The graphics shall show operating data, such as the detector type, the serial number, the number of alarms and operating hours from the date of operation as well as degree of detector soiling, date of manufacture, the date of last maintenance. Also the Graphic display of the multi sensor shall represent status of optical / ionization / heat separately in addition to the summary status.

    The graphic status of the sensor shall also show the birth value, the adjusted quiescent value, the actual value, the alarm level, the warning range - dirt / electric.

    The status shall also represent the sensitivity. ie. The distance between the quiescent value and alarm level shall remain the same even in the situation of detector becoming dirty.

15. It shall be possible to test a /all single intelligent fire detector and a single detector zone on the analog ring loop. The data of all the intelligent fire multi sensors shall be tested,

evaluated and verified for soiling, dust or small insects and messages as listed below shall be displayed on the screen.

i) Detector is functional
ii) Clean O - chamber, clean O - chamber and I - chamber or clean I - chamber.
iii) Return detector to factory.

In addition to the above, all other necessary controls, elements and accessories are included to provide a complete and efficient panel conforming to the requirements of EN54.

Detectors

These shall be of multi sensor type (optical/ionization/heat detector – all in a single head) (OTI).

* The multi sensors shall be of the soft addressing type.
* The alarm and operating data memory shall be in the detector.
* The detectors shall be such that it is possible for:

a) Quick maintenance via detector interface ie. Status of each individual sensor shall be shown on the PC monitor.
b) Easy commissioning via software support.
c) Automatic sensitivity check through signal analysis using dynamic filters.
d) Analog compensation of changing environmental conditions with constant alarm sensitivity.
e) Identification of a polluted or defective detector and automatic maintenance request.

All process Analog detectors in the ring loop shall be addressed automatically by the fire alarm control panel.

Manual call points

These shall comply with the requirements of BS 5839: Part 2: 1983 / EN54 and shall be complete with all electronic components and circuitry for a soft addressable device. The manual call point shall have an inbult microprocessor to ensure a response time of less than 2 seconds. The unit shall incorporate a key operation facility for testing purposes.

Alarm sounders

The Alarm Sounders shall be configured via software to operate in sectored groups as shown in the schematics. The Alarm sounders shall be wired to the loops via the Sounder Controllers.

The Sounders shall have a minimum output of 90dBA at 1 metre.

Wiring

All cables associated with Fire Alarm installation shall be fire resistant 2 core 1.5 sq mm screened type. Cables shall comply with BS 7629 : 1993 and BS 6387.

3.20.7 HIGH SENSITIVITY SMOKE DETECTION SYSTEM

GENERAL

The HSSD system shall be VESDA type, or equal in quality features and performance. It shall provide a early warning of fire in it's incipient stage, analyze the risk, and provide alarm and actions appropriate to the risk. The system shall include, but not be limited to, a Display Control Panel, Detector Assembly, and the properly designed sampling pipe network in complete compliance with the "SNIFF" type computer aided design program. The system equipment shall be manufactured by International OEM and supplied by authorized distributor.

Regulatory Requirements

A. National Electrical Code (NEC)
B. Factory Mutual
C. Local Authority having Jurisdiction

System Description

The VESDA system provides early warning of a fire in its incipient stage. VESDA Detector shall be installed to sample the air from a protected area.

In, operation the air from the protected area is drawn through a piping network in the detector unit by an aspirating fan unit to the detector assembly. The air is the illuminated by a laser light source. Smoke particles scatter this light to a sensitive solid state photo sensor. An Analogue signal is transmitted to the display control panel which displays the smoke obscuration levels in a bar graph display. Each increment in the bar graph represents 120% of the full-scale sensitivity of the detector.

Three independently programmable alarm points provide additional visual indications on the display control cards and activate associated relays for additional annunciation and alarm.

Similar systems which incorporate a nepholo metric type detector and require periodic replacement of the light source unless all the conditions are met shall not be considered in any manner as a equal or replacement for the VESDA laser light source system.

Equipment

Display Control Panel

The display control panel shall consist of an enclosure assembly, installation kit, and required number of DISPLAY control cards. Each Display control panel shall be powered from a 24 V DC source and monitored for alarm and trouble condition by the DC fire alarm system. The control unit shall incorporate all of the following features:

1. Compatibility with the Windows based software.
2. Programmability via a PC or terminal.
3. Built-in data and event logger.
4. Separate day/night alarm levels
5. Signal averaging .Signal offset (Fixed)
6. Signal offset function which automatically adjusts for normal fluctuations in background obscurations.
7. Remote test capability
8. Remote real time display
9. Cumulative and non cumulative alarms
10. Latched and timed latch alarm and trouble functions

The Detector assembly

1. The detector assembly shall be approved makes.
2. The VESDA Detector is mounted in an enclosure, which contains a fan that draws air through a piping network and into an air chamber in the detector.

The detector shall examine particulate drawn in by the fan by illuminating them in a small chamber using a laser and a photo detector to capture the light scattered by the particulate.

The particle size discriminator shall inhibit the output whenever a particle pulse exceeds predetermined amplitude, thus permitting the detector to ignore large pulses commonly produced by dust pr airborne contaminant.

A logic pulse associated with each particle detected shall be used to produce an analogue signal that shall be proportional in value to the amount of particulate detected.

Systems which use mechanical filters requiring periodic maintenance or replacement will not be considered an equal or replacement to the VESDA Particle Size Discriminator.

Engineering Sampling Pipe Network

1. Piping networks shall be laid out to provide detection points with spacing as indicated on drawing. Piping shall be as specified on manufacturer's shop drawings and shall be 1" to1/2" I.D. smooth bore pipe with airtight connections.
2. For piping installed above a dropped ceiling, the open end[s] of the sampling pipe[s] shall penetrate the ceiling tile to act as a additional sampling point.
3. Pipes shall be suspended from ceiling slab using hangers or clamp at intervals of no more than 4 feet to ensure the stability of the piping and reduce the possibility of cracks and breaks at the joints.
4. All connections and joints shall be made with standard connections designed to be compatible with the pipe materials. All joints shall be secured according to standard practices.
5. All joints shall be airtight to prevent air leakage or infiltration, which may adversely affect the desired venturi affect in the piping.

6. Provide all sampling point pipe caps with predrilled holes per manufacturer's shop drawings.
7. Sample pipe network shall of the closed end engineered design. Systems using "Open End" design will not be allowed.
8. The design program for the air sampling pipe network shall be listed or approved by Underwriters Laboratories or Factory Mutual [FM].
9. The design program for the air sampling pipe network shall provide a balanced engineered system and ensure equal sensitivity at each sampling point.

Engineered Design Drawings

The authorized distributor shall provide all required installation drawings at the time of execution.

A. Provide to the owner drawings showing all sampling pipe layouts and the locations of the sampling points. Non symmetrical type piping systems shall include a copy of the "Sniff" software calculation printout.
B. Drawings are to include point-to-point wiring diagrams and all necessary scaled floor plans showing conduit layouts and detector locations.

System Guarantee

A. The entire VESDA HSSD system, components, parts and labor shall be guaranteed for 12 months from the date of installation.

VESDA DETECTOR SPECIFICATIONS

Dimensions : 14 x 8-5/8 x 5-1/2 "

Weight : 16 Lbs

Finish : Off white semigloss

Mounting : 4-1/4" bolts

Input Voltage : 24 VDC ± 10%

Electrical Connection : 5/8" Flexible Conduit

VESDA Assy.Current : 420mA

VESDA Detector Current : 300 mA

Ambient Environment : 32° to 125° F

Relative Humidity : 0-95%,Non-Condensing

Sensitivity :

89-100000-010 : 0.0015 to 0.015 % obscuration per foot

89-100000-011 : 0.003 to 0.03 % obscuration per foot

89-100000-012 : 0.006 to 0.06 % obscuration per foot

89-100000-010 : 0.012 to 0.12 % obscuration per foot

Inlet Port : ¾ inch pipe (mates with a ¾ to 1 inch adapter)

VESDA Control Panel Specification

Operating Temp.Controller : 32° to 125° F

Charter Recorder Output : 0-5 V,220 ohm

Control Assembly Weight : 14 Lbs

Relative Humidity : 0-95%,Non-Condensing

Intelligent Interface module (IIM) Specification

Input Power : 24 VDC 50mA(max)

Operating Temp. : 32° to 125°F 95% RH

Contact Inputs :(2) 1 Alarm ,1-trouble input for monitoring contact type circuits

RS-232 : 2 RJ-11 style serial connections for PC and FENWAL NET

RS-485 : 1 Serial connection Max.No. of connected AnaLASER zones is 30

3.20.8 RODENT REPELLANT SYSTEM

INTRODUCTION:

Ultrasonic Pest Repellers shall be electronic transmitters of high frequency sound waves (well above the 20 KHz frequency which is the upper limit of the hearing range of the human ear.) They should emit intensive sound at high decibel levels (sound pressure) that is audible and painful to pests, but inaudible and harmless to humans.

THE SYSTEM

System shall consist of Master Console with corresponding twelve Satellites/ Transducers. The Master Console shall be installed in the main control room/ server room, and the satellites in the problematic areas i.e. above and below false ceiling and below false flooring.

1. Master Console

The Master console shall be powered through a 230 VAC, 5 A quality supply.

2. Satellites

- Each Satellite shall cover an open area of 300 sq ft given the average height of the ceiling is 10 ft. Installed in the false ceilings or false floorings, it shall be capable of covering an minimum area of 150 sq ft.
- The whole system (12 nos.) will accordingly be capable of covering an open area of approximately 3,600 sq ft.(If installed in false ceilings and false floorings, the area covered will be less).

TECHNICAL INFORMATION

1. Satellites

- **Crystal :** Shall be similar to DM 44T 24V of MAS Germany. Visible Hexagonal, Triangle excitor – Centre damp horizontal line excitors.

- **Frequency :** Peak frequency responses of the satellites are,
  - 21.6 KHz +/- 3 KHz
  - 31.6 KHz +/- 3 KHz
  - 50.4 KHz +/- 3 KHz
  - 60 KHz +/- 3 KHz

- **Nature Of Sound Waves :** The sound waves propagated by the satellites shall be linear sine waves with constantly varying frequencies.

- **Operating Environment :** The satellites shall be capable of operation in a temperature range of - 4^0C to 60^0C, and should propagate sound waves in 100% humid conditions, and even when they are submerged under water.

2. Power Supply

Provision for 230 V AC and 24 V DC shall be provided to bidder.

Specifications

1)	Configuration	:	One master console with 12 satellites/ transducers
2)	Operating frequency	:	Above 20 KHz (variable)
3)	Sound output	:	80 dB to 110 dB (at 1 metre)
4)	Power output	:	800 mW per satellite
5)	Power consumption	:	15 W approximately
6)	Power supply	:	230 V AC 50 Hz
7)	Dimensions	:	16” x 8” x 4”
8)	Weight	:	5.5 kgs approximately

9) Mounting : Wall/ table mounting

3.20.9 DIESEL GENERATOR SET

DESCRIPTION OF WORK & SPECIFICATIONS

A.1. **Commissioning of Diesel Generator (Detailed Technical Compliance is provided in the Technical Bid**

Make: Cummins/Kirloskar/Volvo Penta

Scope. DCO has to Commission a DG sets comprising of 1No. 300 KVA, for the SDC as per following requirements & specifications as per the detailed Technical Specifications & drawings as given in the tender

Introduction

One DG Sets of 300KVA prime output capacity is required for this project. The set shall automatically start one after the other upon mains power failure depending on the line loads, run up to full speed within 6 seconds of power failure. The set shall be provided with a multiple start mechanism with indication of alarm for “failed to start” condition. A Tachometer switch shall provide control for the start mechanism and also for the "run” indications. The set shall be skid mounted on independent foundation. The acoustic treatment shall ensure a maximum sound pressure not more than 68 dB (A) at 1 meter from the room during the day and 45 dB (A) at the neighbour’s premises during night, while running on partial or full load. This condition shall apply to the engine exhaust noise levels also. A vertical type “Critical” silencer shall be fitted on the exhaust pipe after the flexible coupling to reduce the exhaust noise. The exhaust gases shall be piped to the top of the building covering full height of the building. The pipe shall be thermally insulated with ceramic insulation and covered overall with aluminium jacketing. The exhaust pipe and Critical Silencer shall be fixed on a steel structure which shall be rigidly fixed to external wall vertically.

Specification for Equipments Included In Tender Design Data & Technical Specification

A. ENGINE

The basic diesel engine shall be Water cooled diesel engine with exhaust Turbo charging and charge air cooling, four valve, individual cylinder heads with exhaust valve rotators, fuel oil pump, fuel duplex filter with diverter valve, fuel injection system, electronically controlled injection, lube oil circulation and coolant thermostats for main cooling and charge air cooling circuit, necessary drives, dry exhaust manifolds, vibration dampers, all necessary pipe work, electric starter suitable for 24 V DC, Generator 28V DC, Electronic speed governor, Fuel filters, Oil dip stick, Oil extraction equipment with hand pump, set of air filters including maintenance indicators, exhaust bellows with connecting flange.

B. GENERATOR

One No. 300KVA Output, 415 Volts, 3 Phase, 50 Hz Generator with Class F Insulation for both stator and rotor with high response static exciter and automatically operated regulator suitable to maintain the voltage within 1% of set value having response time not more than 1 second.

C. SWITCH BOARD – AUTO SYNC PANEL

The Switch Board shall be of standard design, free standing, dust and vermin proof and wired upto terminals ready for installation. The Switch board with Auto Synchronizing Facility included Auto Start and Auto OFF facility.

AUTO START LOGIC

The DG set with enclosure and Auto Start Logic. The Panel should have provision to receive reference EB Supply through potential free contacts to enable connection of external audio alarm in case EB Supply has resumed. Separate battery charger cost to be indicated and the reference EB Supply can be used to charge the batteries. The Auto Start Logic shall be in such a way that the moment EB supply has failed or if the voltages reduce to a pre-determined level, it shall be detected through a voltage monitor and a command shall be given to DG to start with a timer. After the DG voltage has built up to a certain level, the command for changing over of motorized MCCBs from EB to DG or vice versa shall be given.

When the EB supply gives normal voltage or has resumed, the command to change over shall be issued with a timer. However, the /stopping of the DG shall be only after the DG has run for about 5 minutes on no load basis for it to cool down.

Please refer the BOQ for the specifications of Auto Synchronous Panel.

D. BATTERY CHARGER AND BATTERY

24 Volts Battery with Float cum boost charger.

E. CABLES

Power cables & Control cables are interconnected to use between Generator and Auto Sync Auto load Sharing panel. The required cables for all auxiliary equipment are to be included in the scope of supply.

All Starters and auxiliary devices / drives if any required should be Included in the scope of supply

Audio Alarm and Indicators

A separate 24 Window annunciation panel shall be installed in the panel for indicating the following conditions on both sets. A common alarm shall also be sound locally.

- Engine Run Condition
- Set failed to start
- High Water temperature
- Low Lub Oil Pressure
- Engine Over Speed
- System Power ON
- MCCB Open
- Under Voltage
- Over Voltage
- Frequency Out of Limit
- Over current trip
- Earth Fault
- Reverse Power Trip
- Reverse KVA Trip
- Low and High Fuel level
- Fail to Synchronize

- Load exceeding limit
- Low and High Coolant level in the radiator
- High Alternator Stator temperature
- High Alternator Bearing temperature Alarm
- Restricted earth fault trip.

INDICATORS

The indication shall be provided with the following:-

- Set On
- Load On
- Auto / Manual Load
- DG Set Trip due to Over Load
- DG Set Trip due to Short Circuit
- EB supply fails
- EB supply restored and Reset
- Battery charging (Trickle charger with Volt Meter and Ammeter required) Indicator for Battery charging and discharging in one Ammeter shall be provided.
- Mains On

BATTERY CHARGER

Proper DC Charging circuits shall be incorporated in the control panel to boost and trickle charge the 24 V DC batteries used for starting the engine. The Control circuit voltage shall be 48 V DC. Proper DC charging circuits shall be incorporated in the Control Panel to boost and trickle charge the 48 V batteries used to power the control circuit. The selection of battery shall be done in such a way that the batteries will be able to power the circuit even if charging does not take place for 48 hours.

AUDIO ALARM

Audio Alarm along with indication shall be provided whenever the synchronizing batteries as well as the control circuit batteries reach a voltage level below 20 V and 40 V respectively.

AUTO MANUAL SELECTOR SWITCH

The function of the Auto Manual Selector switch is to

- Make the operation of the entire panel including operation of change over MCCBs. D G Set starting, stopping etc., selectable between Auto & Manual.
- Care should be taken in such a way that the panel does not remain partly in Auto and partly in Manual mode when the switch is operated.

MEASURING DEVICES IN CONTROL PANEL

The following Meters shall be provided in the Control Panel Compartment:-

- DC Ammeter in the DG Charging Kit

- DC Voltmeter to measure battery voltage
- DC Ammeter in the trickle charging Kit.
- DG Set speed in RPM
- Hours Run Meter
- 2 Nos. CTs of 1000/ 5 A of Class 5 P 10 for Protection.

DUTY CONDITIONS

The Generator shall be capable of starting and running continuously for about 12 hours.

GENERAL

- The DG must be stiffened properly and reading for noise and vibration at full variable condition to be checked before dispatch to Site. Expansion bellows to be provided before and after silencer.
- DCO would be responsible for conducting the Load Test of D.G set for 6 hours with Diesel (Load to be arranged by the Tenderer).
- All consumables towards testing of DG at the factory and project site shall arranged by the DCO till the issue of commissioning certificate.
- DCO shall obtain permission / approval from the Board for the installation of the DG Set as per exact Rules at their own cost.
- BMS integration through MODBUS protocol with RS485 interface should be provided

Technical Compliance for DG set

Diesel Engine – Diesel Engine, water cooled, Naturally Aspirated, developing 1 x 300 KVA @1500 RPM, under NTP conditions of BS: 5514, with Dry Type Air Cleaner, Compact Radiator with Recovery Bottle and Pusher type Fan, Engine with Coolant, Engine mounted panel with wiring harness, Holset Coupling and Industrial Silencer, as per engine manufacturers design standards.

Alternator – Standard design Alternator, rated at 0.8 PF, 415 Volts, 3 Phase, 4 wires, 50 cycles/sec, 1500 RPM, self-excited and self regulated, with brushless excitation, Self- ventilated, Screen Protected Drip Proof, Insulation Class “H”, enclosure IP 23. The A.C. Generator shall be Horizontal foot mounted single bearing type and shall be fitted with Automatic Voltage Regulator (AVR) for Voltage regulation of +/- 1% or better. The Alternator generally conforms to BS:

5000/IS: 4722 and suitable to deliver output of the engine capacity having 300 KVA.

Base Frame – Sturdy, fabricated, welded construction, channel iron Base Frame for mounting the above Engine and Alternator.

ControlPanel – Cubicle type, floor mounting Control Panel, with hinged doors, bottom gland plate and accommodating the following:

- 1-No. ACB or Molded Case Circuit Breaker
- 3-No.’s Ammeters /1 No. Ammeter with Selector Switch

- 1 No. Voltmeter with Selector Switch
- 1 No. frequency meter
- 1 Set Pilot Lamps LOAD ON/GENERATOR ON
- 1 Set Instrument Fuses

Fuel Tank – Necessary liters capacity Fuel Tank with mounting brackets to run for 8 hours complete with level indicator, fuel inlet and outlet, air vent, drain plug, inlet arrangement for direct filling and set of fuel hoses for inlet and return. Diesel storage requirement for minimum 24 hours should be maintained

Battery – Dry uncharged maintenance free batteries with leads and terminals.

Management - The DG set should be manageable via Building Management System/ NOC with MODBUS Protocol with RS 485 Communication Port so that all software features like Diesel Consumption, Power, and Current etc. can be monitored on the BMS screen.

3.21 BILL OF MATERIAL

SNo	Item		Quantity
1	Core Switch	No.	2
2	Distribution Switch Type I	No.	14
3	Distribution Switch Type II	No.	9
4	Server Farm Switch	No.	4
5	Layer-3 Access Switch Type I	No.	2
6	Layer-3 Access Switch Type II	No.	10
7	Access Switch Type I	No.	44
8	Access Switch Type II	No.	37
9	10G LR Fiber Transceivers	No.	30
10	10G LRM Fiber Transceivers	No.	10
11	1G SX Fiber Transceivers	No.	48
12	1G LX/LH Fiber Transceivers	No.	80
13	Firewall Appliance	No.	1
14	Network Management System	No.	1
15	RADIUS/TACACS Server	No.	2
16	Desktop Video Conferencing	Set	1
17	Email Gateway Security	No.	1
18	Web Gateway Security	No.	1
19	24 Port Rack Mount Fiber LIU (Fully Loaded - LC)	No.	48
20	12 Port Rack Mount Fiber LIU (Fully Loaded - LC)	No.	72
21	Single Mode LC Pigtail	No.	845
22	Multi Mode LC Pigtail	No.	441
23	Suitable Fiber Patch Cord for Switch Connectivity (3 Meter)	No.	120
24	Suitable Fiber Patch Cord for Switch Connectivity (10	No.	25

	Meter)		
25	Suitable Fiber Patch Cord for Switch Connectivity (15 Meter)	No.	8
26	Mode Conditioning Patch Cord (10 Meter)	No.	20
27	Cat 6 Dual Faceplate with I/O and Surface Mount Box	No.	1500
28	24 Port Unloaded UTP Straight Jack Panel 1U Height	No.	19
29	24 Port Unloaded Angled UTP Jack Panel 1U Height	No.	84
30	Cat 6 RJ45 Information Outlet	No.	1956
31	Cat 6 UTP Patch Cord - 3 feet	No.	1500
32	Cat 6 UTP Patch Cord - 7 feet	No.	1612
33	Cat 6A UTP Patch Cord - 33 Feet	Nos	50
34	Multimode Fiber armored 12 Core	Mtrs	2134
35	Single mode Fiber armored 12 Core	Mtrs	30975
36	Single mode Fiber armored 24 Core	Mtrs	1890
37	Category 6 UTP Cable	Mtrs	63135
38	UPS 10 KVA	No.	2
39	UPS 5 KVA	No.	16
40	UPS 1 KVA	No.	50
41	42U Rack	No.	5
42	24U Rack	No.	12
43	12U Rack	No.	50
44	1U Horizontal Cable Manager	No.	50
45	1" GI Pipe	Mtrs	2000
46	1" MS Pipe	Mtrs	2000
47	1.5” MS Pipe	Mtrs	2000
48	1" PVC Pipe	Mtrs	2000
49	1.5” PVC Pipe	Mtrs	2000
50	1” Casing and Capping	Mtrs	1200
51	2” Casing and Capping	Mtrs	700
52	Power Cable for UPS	Mtrs	390
53	HDPE Pipe 2" with preloaded Nylon rope	Mtrs	20000
54	Cable Route Marker (at every 20 meters)	No.	1000
55	Cement Hume Pipe 6" Dia	Mtrs	50
56	Velcro - Pack of 20 meters	No.	50
57	Fixing of PVC Pipe/Casing and Capping on the wall and laying of UTP/Unarmored fiber cable inside it	Mtrs	5900
58	Fixing of HDPE pipe for outdoor cabling	Mtrs	50
59	Fixing of MS/ GI Pipe on steel columns /beams/ wall and laying of UTP/Fiber unarmored cable inside it	Mtrs	4000
60	Installation of 12U Rack	No.	50
61	Installation of 24U Rack	No.	12
62	Installation of 42U Rack	No.	5
63	Installation of 12/ 24 port Fiber LIU	No.	120
64	Installation of 24 ports Patch panel (Straight / Angled)	No.	103
65	Fiber Cable laying charges	Mtrs	34999
66	UTP Cable laying charges	Mtrs	63135
67	Splicing/Testing/Labelling of MM fiber cable (per fiber core basis)	No.	220.5
68	Splicing/Testing/Labelling of SM fiber cable (per fiber	No.	422.5

	core basis)		
69	Connectorisation/ pentascanner testing /Labelling of UTP Points (1500 points x 2 sides)	No.	1500
70	Cutting of hard surface like road, floor etc, digging of trench 300 X 800 mm, laying of fiber optic cable inside GI pipe/hume pipe, laying of brick, refilling of trench, and finishing with cement	Mtrs	100
71	Cutting of soft surface like soft soil etc., digging of trench 300 X 800 mm, laying of fiber optic cable inside GI pipe/Hume pipe, laying of brick, refilling of trench	Mtrs	20000
72	Directional Horizontal Drilling across National Highway Road, Laying of fiber optic cable inside GI pipe / HDPE pipe	Mtrs	40
73	Fire Detection System	Set	2
74	VESDA System	Set	2
75	Rodent Repellent System	Set	2
76	Comfort AC	Set	3
78	Precision AC	Set	2
79	UPS for Data center	Set	2
80	Genset	Set	2
81	Electrical Distribution (Data Centre Revamping)	Set	1
82	Civil and Interior Work (Data Centre Revamping)	Set	1

Note: Item Sl.No. 19 to 72 quantity is indicative figures only. Payments will be made based on actuals.

General Terms and Conditions

1. BIDDER TO INFORM HIMSELF FULLY:

1.1. The bidder shall closely peruse all the clauses, specifications and requirements and drawings etc., specified in the tender documents, and the offer made should be in accordance with these documents. If bidder requires any clarification and additional information on any of the tender documents/conditions, the bidder shall contact the BHEL Official inviting bids with due return request much before the tender due date.

1.2. Bidders are advised to study all the tender documents carefully and submit their offer and the Bidder is obliged to honor the offer without any modifications. Any offer not meeting the scope/specifications, terms, conditions, and any other clause specified in the tender documents shall be liable for rejection.

2. PROCEDURE FOR SUBMISSION OF BIDS

2.1 Tender documents may also be downloaded from www.bhel.com and www.tenders.gov.in

2.2 Tenders shall be received upto 1400 Hours (P.M) on the said due date and be opened on the same day at 14.30 Hours (P.M). Tenders received after 1400 Hours (P.M) would not be opened. The times indicated are Indian Standard Time (IST).

2.3 Offer shall be made in two parts in separate envelopes, as specified below.

Part-I: Techno-Commercial Bid

This part shall consist of the following documents in a separate envelope:

a. Technical Specifications as per the format given in Annexure-III duly signed by Authorised signatory.

b. The Scope, Terms and Conditions as per the format given in Annexure-II, duly signed by Authorised signatory.

c. The General Terms and Conditions as given in Annexure-IV , duly signed by Authorised signatory.

d. Authorisation Letter from the OEM duly signed by Authorised signatory.

e. Price Bid without price/values as per Annexure-VI duly signed by Authorised signatory..

f. Proof / record of Bidder's experience and / or qualifications as requested in FORM-E duly signed by Authorised signatory.

g. All the other documents as mentioned in Clause-10 of this document.

h. Technical offer should contain Complete BOM with product part number and quantity.

Part-II: Price Bid

This part shall consist of the following documents in a separate envelope:

a. Price Bid as per the format defined in Annexure-VI. The prices shall be quoted in Indian Rupees only.

b. Price Bid shall not contain any technical details and / or Techno-Commercial terms and conditions.

2.4 **Mode of Signature**

Tenders shall be signed by persons duly authorized / empowered to do so. Certified copies of such authority and relevant documents shall be submitted along with the tenders. The Declaration (see FORM-I) shall be signed by the duly authorized person.

One more original of the authorization letter should be kept in the PART-I. Authorizations received by fax/email would not be acceptable.

3. MARKINGS ON THE ENVELOPE

3.1 The two part of the offer – Part-I and Part-II – shall be submitted in separate envelopes with bidder's distinctive SEAL and super-scribed with the details given below:

PART-I: 1. Enquiry Number and Item Description for the Tender ("10 GIGABIT ETHERNET LOCAL AREA NETWORK UPGRADATION")

2. Due Date for Opening of the Tender

3. "PART-I: TECHNO-COMMERCIAL BID"

PART-II: 1. Enquiry Number and Item Description for the Tender("10 GIGABIT ETHERNET LOCAL AREA NETWORK UPGRADATION")

2. Due Date for Opening of the Tender

3. "PART-II: PRICE BID"

Note: Un-sealed envelopes and envelopes not super-scribed as above will be liable to be rejected.

4. BID SUBMISSION

4.1 Bids shall be addressed to the BHEL official inviting Bids and sent to the following address on or before the tender due date:

Dy. General Manager, Purchase,

Admin Building,

BHEL, RANIPET,

TAMILNADU – 632406.

Bids can also be dropped in tender box provided in purchase department on or before the tender due date. Bids can be submitted by post with due allowance for postal delay.

5. BID OPENING

Name: Company Seal

Signature: with Date:

5.1 PART-I (Techno-commercial bid) shall be opened on the due date and time as specified in the Enquiry, in the presence of bidders who may like to attend. Part-II (Price Bid) shall be opened only for such offers, which have qualified in PART-I.

5.2 In case of Price Bid opening, date and time of Price Bid (Part-II) opening shall be intimated to the technically and commercially acceptable bidders only.

5.3 Not more than two representatives will be permitted to be present for the tender opening. Persons attending the bid opening should have authorization letter.

5.4 No correspondence shall be entertained from the bidders after the opening of Price Bid(s).

5.5 Standard pre-printed conditions of the bidders attached to the offer will not be considered and only those mentioned in the body of the offer will be considered.

5.6 Unsolicited bids shall not be entertained. Unsolicited revised Price Bids also, shall not be entertained at any stage of the tendering process.

5.7 No Literature, Pamphlets other than what is relevant for the offer shall be enclosed. All such enclosures shall be considered as unread and also will not be considered as part of the quotation.

5.8 Manufacturer's name, trade Mark or Patent No., if any, should be specified.

5.9 BHEL reserves the right to negotiate the tender. Purchaser/Lessee reserves the right to negotiate the tender, if required.

5.10 **Reverse Auction (RA) / On –line bidding on internet**

(a) At its option BHEL may choose to conduct a Reverse Auction (R/A) or bidding through the Internet for the price, instead of opening the sealed Price-Bids. This will be decided after technical evaluation and

b) In case BHEL decides not to go for Reverse Auction procedure for the tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL's standard practice.

c) BHEL decision regarding this will be final.

5.11 All taxes and duties payable as extra to the quoted price should be specifically stated in offers. Offer from within India shall be submitted along with CST & TIN No. / Tariff No. etc, failing which the purchaser will not be liable for payment of such taxes and duties. Our TIN No. 33243560005, CST No. 239383/11.06.91, BHEL ECC No. AAACB4146PXM008.

5.12 Wherever there is a discrepancy between the figures and the words, the value as indicated by words shall be taken as the “Price” by the Purchaser. Similarly, if there is a discrepancy between the Unit Price and the Value on account of arithmetical error in the computation of Value (Price x Quantity), only the Unit Price would be taken by the Purchaser for consideration. No corrections would be permitted. Error

statements should be completely erased / struck out and fresh values given in the offer, which should be intialled and attested by the tender submitting authority. Offers without the above may become liable for rejection

5.13 If a supplier submits one envelope / cover containing all the bids or combined bids e.g. techno-commercial bid & price bid together, the bid is liable for rejection. The decision to accept such bids shall be the sole discretion of BHEL, which may be done by BHEL after segregating the bids so received.

6. VALIDITY OF OFFER

6.1 The offer shall have a minimum validity period of Four months from Due Date for Tender Opening.

7. LANGUAGE AND CORRECTIONS

7.1 The offer shall be in English only international numerals shall be used.

8. ALTERATIONS, REJECTION OF BID AND OTHER CONDITIONS

8.1 BHEL reserves the right to accept or reject the technical offer at any stage of the tender with proper reasons.

8.2 Any format not properly filled, partially filled or not filled will make the bid liable for rejection. Bidders are requested to note that all columns, rows and spaces provided to fill up the data must be filled with relevant data without fail. In case any bidder fails to do so or fills up irrelevant data, BHEL is not bound to seek clarifications on such items and will be free to reject the tender summarily.

8.3 In case, there is a discrepancy in the term quoted in techno-commercial bid and price bid, the term as per thetechno-commercial bid (Part- I) shall hold good and the commercial term quoted in the Price Bid (Part- II) shall not be considered.

8.4 In their own interest, all Tenderers are advised to double check their prices, applicable duties and taxes.

8.5 In exceptional cases, at the discretion of BHEL, in the event of the named representative (named in the Tender Document) is unable to come due to unavoidable circumstances, then an alternative representative would be allowed, where the alternative representative should carry a revised original authorization certificate. Suppliers are advised to avoid such situations to avoid embarrasments on both sides

8.6 BHEL reserves the right to open the Price Bids, ‘in-camera’. Intimation to this effect would be given to the Supplier by BHEL, before the opening of Price Bids.

8.7 At its option, BHEL may consider extending the due date/s for the tender openings. Sufficient notice would be given by BHEL for such extensions.

8.8 In the event of any change in scope arising out of the discussions, such offerors would be given chance to submit their revised offer. The revised offer shall contain only the price addition/deletion for such change in the scope, over and above the original scope and price quoted. The original price quoted shall not be

changed on account of the technical discussions. In order to arrive at the lowest offer BHEL will include cost of essential spares in the total cost unless specified in Technical Specification/Approved Scope otherwise.

8.9 BHEL reserves the right to conduct negotiations on the "Price" and "Other Commercial Terms and Conditions" with the lowest ranked offeror and

8.10 If so required by BHEL, Supplier may have to share their cost data / costing sheet with BHEL.

8.11 Whereever deviations on Standard Commercial Terms and Conditions of BHEL are quoted by the supplier, such deviations would be loaded with "Load-Factors" by BHEL, to arrive at the landed price to BHEL. These load-factors are provided in the "Standard Terms and Conditions". However, BHEL reserves the right to apply, alter, modify, change, delete some or all the load-factors. The decision of BHEL would be final and binding on the tenderer in this regards. This decision would be communicated to the tenderers before the Price Bid opening. The load-factors, as applicable then will be applied on the Prices, to arrive at the landed price to BHEL.

8.12 With respect to conformance to BHEL's Terms& Conditions, if any Supplier's offer is found to be not conforming to specific Terms & Conditions, BHEL will have the option of loading such offer with the highest quote submitted by other participating Supplier in the tender.

8.13 If required BHEL is entitled to ask for any equipment for evaluation before price bid opening and all bidders are requested to note that they shall provide equipment exactly as per specification without any charge and precondition(s) to BHEL within 72 hours of receiving such notice. Upon completion of such evaluation BHEL shall return the equipment to the bidder.

8.14 Equipment offered must have current certifications as detailed in relevant sections. Future expectations of certification, conditional certifications, variation in certification and certification for equipment different from the make and model offered in the bid is not acceptable.

8.15 No change in specifications, clauses of contract, Terms and Conditions etc shall be entertained by BHEL under any circumstances.

8.16 Any clarification pertaining to this tender can be obtained from Dy. General Manager, Purchase, BHEL, Ranipet, TamilNaduwith written request or through email.

8.17 Late bids are not accepted and will be rejected.

8.18 The offer is liable to be rejected, if it is found after the Price Bid Opening that the format of Price Bid (without price values) submitted by the bidder, as a part of Part-I offer, is different from the Price Bidformat quoted in Part-II.

8.19 If the bidder deliberately gives wrong information in his bid, Purchaser/Lessee reserves the right to reject such a bid at any stage or to cancel the Order/Contract.

8.20 If the Prices/Rates of one or more of the enquired equipments have not been quoted, the offer is liable to be rejected.

8.21 Non-compliance with any of the requirements and instructions of the Tender Enquiry may result in the rejection of the bid.

8.22 Successful Bidder, will be issued a firm Letter of Intent (LOI).

Name: Company Seal

Signature: with Date:

9. TENDER EVALUATION

9.1 The offers will be evaluated based on the total cost for the entire scope of the tender.

9.2 Totals /Gross Total of Prices should be indicated both in words as well as in figures. If there is a difference between price quoted in words and figures or if there is any other price discrepancy, higher value(s) will be considered for evaluation and lower values will be considered for ordering.

9.3 Though offer of higher warranty/configuration/rating, than what is required as per tender specifications, may be accepted, no extra weightage or preference will be given for the same.

9.4 The offers shall be evaluated based on the total lease rentals for 5 year for the entire scope of the tender. AMC charges quoted after lease period will not be considered for evaluation.

9.5 Prices of optional items, if any, shall not be considered for Price evaluation and comparison, unless stated otherwise

9.6 Order/contract or any part thereof shall not be sub-contracted, assigned or otherwise transferred without prior written consent of the Purchaser/Lessee.

10. CHECKLIST OF FORMATS

(TO BE ATTACHED WITH TECHNO-COMMERCIAL BID (PART I) DULY FILLED BY THE BIDDER)

S No.	Annexure to be attached	Format attached as per FORM /Annexure	Whether Attached (Yes / No)
1	Technical Prequalification Compliance	Annexure-V	Yes/No
2	Technical Specification duly signed	Annexure-III	Yes/No
3	Scope, Terms and Conditions duly signed	Annexure-II	Yes/No
4	Authorization letter from OEMs for -Network Actives - Network Passives	 FORM-A FORM-B	 Yes / No Yes / No
5	No Deviation Certificate	FORM-C	Yes / No
6	Annual Financial Statement of Bidder	FORM-D	Yes / No
7	Corporate Networks where the bidder is maintaining SLA Details of major Executed projects with Order copies.	 FORM-E	Yes / No
8	Draft Lease agreement	FORM-F	Yes/No
9	Details of Old Equipment to be bought back	FORM-G	Yes/No
10	Confirmation on not black listed	FORM-H	Yes/No
11	Price format without prices, indicating the % of Statutory Levies / Taxes	Annexure VI	Yes / No
12	General Terms and Conditions duly signed	Annexure IV	Yes/No
13	Declaration	FORM-I	Yes/No
14	PBG format, Instructions and Banker Details	FORM-J	Yes/No
15	Plan & methodology of project execution and ATP		Yes / No

Name: Company Seal

Signature: with Date:

FORM-A

(Network Actives)

"LETTER OF AUTHORITY"

Date: _____

To,

_____

_____

Subject: **Letter of Authority**

Tender Ref. No.: _____ **dated _____**

Dear Sir,

We hereby authorize _____ who will fulfill the requirements of the tender enquiry ref. no. _____, dated _____ to quote/ negotiate and service the equipment as required in the above tender enquiry.

This authorization is valid for the following equipment for which we are the OEM:

Our Spares Logistic centers in India are at the following locations:

The authorized agency would ensure reliable service during complete lease period. In case of any default alternative arrangement would be done by us on the same terms and conditions as negotiated and finalized in this tender enquiry.

(Authorized Signatory)

For _____ Place:

Date:

Note: This 'Letter of Authority' should be issued on the letterhead of OEM and enclosed in Part-I.

Name: Company Seal

Signature: with Date:

FORM-B

(Network Passives)

"LETTER OF AUTHORITY"

Date: _____

To,

_____

_____

Subject: **Letter of Authority**

Tender Ref. No.: _____ **dated _____**

Dear Sir,

We hereby authorize _____ who will fulfill the requirements of the tender enquiry ref. no. _____, dated _____ to quote/ negotiate and service the equipment as required in the above tender enquiry.

This authorization is valid for the following equipment for which we are the OEM:

1. _____
2. _____
3. _____
4. _____
5. _____

The authorized agency would ensure reliable service during complete lease period. In case of any default alternative arrangement would be done by us on the same terms and conditions as negotiated and finalized in this tender enquiry.

(Authorized Signatory)

For _____ Place:

Date:

Note: This 'Letter of Authority' should be issued on the letterhead of OEM and enclosed in Part-I.

Name: Company Seal

Signature: with Date:

FORM-C

NO DEVIATION CERTIFICATE

This is to certify that our offer is exactly in line with your tender enquiry no._____ _____ **dated _____.** This is to expressly certify that our offer contains **no deviation** either Technical or Commercial in either direct or indirect form.

Signed By:

Name: _____

Designation: _____

Organization: _____

Date & Place: _____

Phone/Fax/Mobile/Email: _____

Stamp & Seal: _____

Place:

Date:

Name: Company Seal

Signature: with Date:

FORM-D

FINANCIAL STATEMENT OF BIDDER

S.No.	Financial Year	Turnover (In Rs. Crores)	Net Profit
1	2007-2008		
2	2008-2009		
3	2009-2010		
4	2010-2011		

Place: Signature with seal

Date:

Name: Company Seal

Signature: with Date:

FORM- E

DETAILS OF ORDERS EXECUTED

(As per Qualification Criteria)

S.No.	Organisation Name & Contact Person details	Type of equipment supplied	Details of Network
1			
2			
3			

Place: Signature with seal

Date:

Name: Company Seal

Signature: with Date:

FORM-G

OLD EQUIPMENT TO BE BOUGHT BACK

Sl. No.	Equipment	Nos.
1.	Cisco 6006 Switch	1
2.	Cisco 4006 Switch	2
3.	Cisco 3548 Switch	10

Place: Signature with seal

Date:

Name: Company Seal

Signature: with Date:

FORM –H

CONFIRMATION OF NOT BLACK LISTED

(As per Qualification Criteria)

With reference to the above tender we confirm that we have not been blacklisted by any Government / Government agency / Banks / Financial Institutions in India till the time of submission of the bid.

Signed By:

Name: _____

Designation: _____

Organization: _____

Date & Place: _____

Phone/Fax/Mobile/Email: _____

Stamp & Seal: _____

Place:

Date:

Name: Company Seal

Signature: with Date:

FORM-F

Contract Ref:

Agreement for LEASE RENTAL AND MAINTENANCE

This agreement made on this day of 2011 between M/s ----------, incorporated under Companies Act, 1956 and having its Registered office at ---------- (hereinafter called the 'Company' which expression shall, unless it be repugnant to the context or meaning thereof, mean and include its successors and assignees) of the one part, and the BHARAT HEAVY ELECTRICALS LTD, Ranipet, TamilNadu – 632406, incorporated under the Companies Act, 1956 and having its Registered Office at BHEL House, Siri Fort, New Delhi (hereinafter called the 'BHEL' which expression shall, unless repugnant to the context or meaning thereof, mean and include its successors and assignees) of the other part.

Whereas 'Company' is in the business of manufacturing and/or selling and renting out equipment(s) and whereas the 'BHEL' has placed an order (No: ----------) on Company for hiring Computer Network Equipment i.e. Network Switches and Peripherals for a period of Five years as per the Lease Rental Contract (No: ----------) and 'Company' has agreed to renting out the said equipment(s) to the 'BHEL' under the following terms and conditions.

Now, therefore, the agreement witnessethas follows:

CONTRACT REFERENCE:

Name: Company Seal

Signature: with Date:

1.1 This Document shall be read along with the Lease Rental Contract '_____'. The Terms & Conditions of the Lease Rental Contract shall be fulfilled along with the clauses of this agreement.

SCOPE of CONTRACT (in Brief):

'Company' will design, supply, install, configure, test, commission and maintain the 10Gigabit/Gigabit backbone Network and DataCentreon Five year lease rental basis in consideration of Lease Rental Payment as per Terms and Conditions of the Lease Rental Contract.

3. DEFINITIONS:

3.1 The following expressions herein used shall, unless repugnant to the subject or context thereof, carry the meaning hereunder respectively assigned to them namely

'CONTRACT' means the Lease Rental Contract referred in the Clause 1.0.

'EQUIPMENT' shall mean all the equipment supplied against the 'CONTRACT'.

'DATE OF INSTALLATION'shall mean the date given in the certificate of acceptance by 'BHEL' after the equipment is installed, commissioned & acceptance testing as per Terms & Conditions of the 'CONTRACT'.

'QURTERLY LEASE RENTAL'means Lease Rental Payment for Three months and payable after completion of the quarter.

'TERMINAL PAYMENT' means the one time fixed charges as specified in 'CONTRACT', bepaid by 'BHEL' at the end of the Lease Rental Contract.

Upon the payment of 'Terminal Payment', the ownership of the entire equipment is transferred to 'BHEL' and 'Company' has no right on the Equipment.

'On site facilities' shall mean suitable dust free accommodation at 'BHEL'premises to house the equipments with power connection, air-conditioning, asrequired.

4. Equipment Supply, Installation, Acceptance Test, etc.:

4.1 'Company' will furnish relevant test certificates, certificate of newness of equipment and any other statutory documents for the all the equipment.

4.2 'Company' will furnish relevant test certificates, certificate of newness of equipment and any other statutory documents for the all the equipment.

4.3 'BHEL' shall at its own cost, provide onsite facilities for the equipment.

4.4 'Company' shall arrange for all statutory clearances at its own cost for executing the contract.

5. MAINTENANCE:

5.1 Maintenance service will cover services, repairs and replacements necessary to keep the equipments in good working order on reasonable use of the equipments during the lease period. Periodic maintenance check should be carried out to keep the equipments in good working conditions. Maintenance will include all plastic and/or rubber parts, UPS, UPS **batteries**, etc.

Name: Company Seal

Signature: with Date:

All UPS batteries to be changed after 2.5 years and also as and when they fail. All the UPS batteries shall be replaced in the last quarter of the lease contract.

5.2 Batteries of all UPS are to be replaced in the last quarter of the lease contract.

5.3 The 'Company' will station Seven qualified and experienced Engineers (OEM Certified) at BHEL site during contract period, for upkeep and maintenance of the network and datacentre.Shall observe BHEL working hours and BHEL holidays. BHEL working hours are 8AM to 4:30PM, 6 days a week. However at least one engineer shall always be available 24x7 hours on call basis in case of exigency. Out of these seven engineers, one engineer should come in general shift (8:00 AM to 4:30 PM) and other six engineers should come in three shifts(First shift 6:00 AM to 2:00 PM, second shift 2:00 PM to 10:00 PM, third shift is 10:00 PM to 6:00 AM)

5.3 'Company' will maintain the required spares to maintain the contractual uptime for the Network.

5.4 'Company' shall arrange a system for registration, monitoring and redress of all network and datacenter complaints during the contract period.

5.5 'Company' will provide 24x7 support for the Network Equipment and Datacentre.

5.6 SHIFTING OF EQUIPMENT FROM A LOCATION TO OTHER

'BHEL' reserves the right to relocate the equipment. 'Company' is responsible for shifting of equipment to the required location and to integrate and configure in to the Network system.

5.7 The Company's maintenance service obligations shall be subject to force-meajure, which shall include circumstances beyond the reasonable control of the Company.

6. PERFORMANCE GUARANTEE & DOWNTIME CALULATION:

6.1 The vendor shall maintain the overall uptime of network to minimum 99% during the lease period.

6.2 A deduction from the overall quarterly rental shall be made at the rate of 1% for each 1% fall of uptime from 99%, e.g. if the uptime is 98%, one percent of quarterly rental for the particular quarter shall be deducted. The calculation for uptime shall be made on monthly basis for network. The downtime calculation shall be based on 24x7 hours.

6.3 There shall be no downtime due to mutually agreed scheduled maintenance of equipment or due to power outage.

6.4 Downtime of network shall be the period (in hours) during which expected connectivity is not available on the network or part of network. The downtime factors for calculation of the penalty shall be as follows:

6.4.1	Category 1	0.5
6.4.2	Category 2	0.2
6.4.3	Category 3	0.02

Category 1 includes core switches, server switches, firewall modules, genset, Precision AC, UPS for data centre.

Category 2 includes distribution switches, Correlation engine, email and web security solution, NMS, 5 & 10 KVA UPSs ,smoke detection system, fire detection system.

Category 3 includes access switches, 1 KVA UPSs, rodent repellent system.

6.5 Downtime calculation will be applicable for non-availability of Network services and data centre equipment arising due of malfunctioning of either switches, fiber, backbone UTP, fiber patch cords, converters, connectors etc.

6.6 If any equipment is down due to fiber/UTP cut, vendor has to repair/replace the faulty fiber/UTP within 48 hours. After 48 hours, downtime shall be assumed till fiber/UTP is repaired/replaced.

6.7 The downtime factor for the network and datacentre shall be assumed to be 1.0 only, even if it exceeds 1.0 (e.g. 6 distribution switches are down at a particular time which amounts to downtime factor to 1.2 however it shall be assumed as 1.0).

6.8 If the uptime of a particular equipment/system falls below 95% continuously for 3 months, the equipment/system shall have to be replaced with the new equipment by the vendor without any extra cost to BHEL.

6.9 Downtime shall be calculated on the basis of NMS reports/log book.

6.10 In the case of any equipment/service being down, the same may be temporarily replaced by the vendor provided there is no loss of functionality/configuration in the network. The equipment/service shall be considered up in this case and no downtime shall be counted. All efforts shall be made by the vendor to limit such temporary replacements to less than 15 days else it shall be counted as down.

6.11 Example of Downtime Calculation

If one core switch remains down for 10 hours (cumulative) in a particular month and total quarterly rental value for network is Rs. A Lakhs.

Acceptable downtime in a month (in hours) = 0.01 * 24 hours * 31 days = 7.44 hours

Downtime factor of core switch = 0.5

Downtime in Rs. Lakhs = (0.5 x A x (10-7.44))/((24x31)x3)

7. TRAINING:

7.1 Training of BHEL personnel shall be part of the contract.

Name: Company Seal

Signature: with Date:

During installation at BHEL, the associated BHEL engineers shall be guided on the configuration being made and usage.

Advanced level training shall be provided by OEM / authorized training partner at OEM Place /OEM certified training centre. BHEL will nominate engineers. Training shall be in two batches. Each batch shall get training for minimum 10 (ten) working days. Each batch shall get training for minimum 10 (ten) working days. Training shall be focused on fundamentals of networking/security in general and supplied equipment in particular. It should be based on standard certification programmes of OEM's equipment.

7.2 Training on Network Management Solution:

'Company' will provide comprehensive training on NMS at BHEL, Ranipet. The training shall cover the installation & configuration, Analysis and Trouble shooting, Traffic analysis, Reports generation and its analysis. Training shall cover all features of the NMS software.

8. LEASE RENTALS & TERMINAL CHARGES:

8.1 The Lease Rentalis inclusive of the following during the lease period and shall remain FIRM without any variation till completion of the lease contract:

Freight, handling and packing charges, transit insurance, installation.

On-site comprehensive maintenance

On-site comprehensive Insurance covering total scope of supply and man power.

Spares & Software/Firmware Updates

All taxes & Duties

8.2 Comprehensive maintenance shall include the following:

Replacement of faulty equipment

Installation charges

Site inspection charges

Cost of Maintenance Engineers

Lease tax/right to use tax / any other statutory levies including service tax.

8.3 On-site Comprehensive insurance covering total scope of supply and man power during the currency of the contract. The beneficiary of the Insurance should be BHEL

8.4 'QUARTERLY LEASE RENTAL'payment shall commence after successful completion and commissioning of the entire system. Quarterly Lease Rental shall be payable to 'Company' after the successful completion of the quarter and submission of invoices in triplicate.Payment will be released within 30 days of submission of invoices.

8.5 The Lease Rentals payable under this Agreement during the Lease period shall be paid by 'BHEL' to financing Agency. The Lease Rental shall be paid through an Account Payee chequefavouring '_____' (Financing Agency). The 'Company' shall submit a discharge

certificate and indemnity bond to 'BHEL' for the lease rentals paid to the '_____'(Financing Agency) by 'BHEL'.

8.6 That these instructions at clause 4.2 are irrevocable. Any request from the 'Company' to change these instructions would come with the attached "No objection Certificate" from '_____' (Financing Agency).

8.7 On payment of terminal charges, the ownership of entire Network system including all the equipment, spares & software will get transferred to 'BHEL' without any further payments. 'BHEL' reserves the right to take possession of the equipment by paying the terminal charges.

In case 'BHEL' decides to surrender the equipment after the expiry of the contract, 'Company' shall remove the equipment from BHEL premises at his own risk and cost after due permission from 'BHEL'.

9. TERMINATION and FORE-CLOSURE:

9.1 Termination: 'BHEL' reserves the right to terminate the order/contract, upon situations arising due to non-compliance of contract Terms & Conditions or non-performance of the equipment/system with downtime above 2% continuously for more than one month.

On termination of the 'Contract', no lease rent shall be payable to 'Company' or the 'Financing Agency' or any other party, for the remaining period from the date of Termination

In case of Termination of the 'Contract', 'Company' shall remove the equipment from BHEL premises at his own risk and cost after due permission from 'BHEL'.

9.2 Fore-closure: In case of fore-closure of the 'Contract' by 'BHEL' for reasons not attributable to 'Company', pro-rata compensation will be payable. Compensation will be equivalent to the basic price component for the remaining quarters of the lease period and the ownership of the equipment will be transferred to 'BHEL'.

10. ANNUAL MAINTENANCE after Lease Period:

10.1 'Company' will extend Annual Maintenance Contract at the rates given the 'CONTRACT', subsequent to the lease rental period if required.

11. PATENTS, TRADEMARKS and INDEMNITY:

11.1 'Company'will at all times indemnify and keep indemnified 'BHEL' against all claims which may be made in respect of the Equipment/System/Software/Services supplied/rendered by 'Company', for infringement of any right protected by patent, registration of designs or trade marks and legality of the Software.

All such claims in this regard will be settled as per Indian Laws.

In the event of any such claims being made against 'BHEL', 'BHEL' will inform 'Company' and 'Company'shall either settle any such dispute or conduct any litigation that may arise there fromat its own cost.

Name: Company Seal

Signature: with Date: 20

12. INSURANCE:

12.1 'Company'will provide Comprehensive insurance cover for all Equipment during the currency of the 'Contract'. Insurance for the complete Systems/Goods shall be arranged by 'Company' at his own risk and cost throughout the period 'Contract.''Company' will submit Evidence of insurance policy 'BHEL'.

13. CONFIDENTIALITY:

13.1 'Company' and its representatives shall, at all times, maintain complete confidentiality of all data, information, software, drawings & documents, etc. belonging to 'BHEL' and also of the Systems, procedures, reports, input documents, manuals, results and any other documents discussed and/or finalized during the course of execution of the 'Contract'.

14. ARBITRATION:

14.1 In all cases of disputes emanating from and in references to this agreement the matter shall be referred to the sole arbitration of the Executive Directorof BHEL, Ranipet or any other person (including an employee of BHEL, even though he had to deal with the matter relating to this agreement in any manner) nominated by the said Executive Director to act as sole arbitrator. The arbitration shall be under 'THE ARBITRATION AND CONCILIATION ACT OF 1996' and the rules there under. The arbitrator may from time to times with the consent of the parties enlarge the time for making and publishing the award. The decision of the sole arbitrator is binding on both the parties.

15. JURISDICTION &GOVERNING LAWS:

15.1 In case of any suit or other legal proceedings arising under this contract the courts at Ranipet,TamilNadu. only shall have the jurisdiction. This contract will be governed in all respects by India Laws.

15.2 This agreement and any amendments thereto shall be valid and binding upon 'Company' only if signed by the Authorised signatories of both 'BHEL' and 'Company'.

16. ENTIRE CONTRACT:

16.1 The Lease Rental Contract, No._____ forms part of this Agreement along with the references mentioned therein.

16.2 This agreement and any amendments thereto shall be valid and binding upon 'Company' only if signed by the Authorised signatories of both 'BHEL' and 'Company'.

Name: Company Seal

Signature: with Date:

IN WITNESS WHEREOF, 'BHEL' has caused this agreement to be signed at Ranipet, the day and year first above written, while 'Company' has caused this agreement to be signed at Ranipet through its Authorised Signatory - under their stamp who are the only constituted attorneys for this purpose, the day and year indicated below against the execution on its behalf.

SIGNED & DELIVERED FOR & on behalf of the above named 'BHEL' by

Shri

its

atRanipet this the day of , 2011

SIGNED & DELIVERED FOR & on behalf of the above named 'Company' by

its Authorized Representative

atRanipet this the day of , 2011

Name: Company Seal

Signature: with Date:

FORM –I

DECLARATION

I/We, _____ hereby certify that, all the information and data furnished by me with regard to this Tender Notification …….. dated …….. are true and complete to the best of my knowledge. I have gone through the specification, conditions and stipulations in detail and agree to comply with the same.

I/We, further certify that I am / we are the duly authorized representative(s) of the under mentioned tenderer and a valid power of attorney to this effect is also enclosed.

I/We, hereby declare that I/We shall treat the Tender Documents, drawings, specifications and other records connected with the Project as secret/confidential and shall not communicate information / derived there from to any persons other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the same.

Bidder's Name & Address Name &Signature of the Bidder (Seal)

Name: Company Seal

Signature: with Date:

FORM –J

PERFORMANCE BANK GUARANTEE (PBG) FORMAT

INSTRUCTIONS FOR PBG

AND

LIST OF BHEL BANKERS

Name: Company Seal

Signature: with Date:

Bank Guarantee No._____ Date _____

Banker Name _____ Bank Guarantee Value_____

Please affix Non-Judicial Stamp here as per Stamp Act

BANK GUARANTEE

1. This deed of guarantee made this _____ day of _____ by _____ _____ (Bank's name, branch, place, address) (hereinafter referred to as 'the Bank') in favour of M/s.Bharat Heavy Electricals Limited (A Government of India undertaking, a company incorporated under the Companies Act 1956 having its Registered Office at "BHEL House", SIRI Fort, New Delhi - 110049) through its Boiler Auxiliaries Plant located at Ranipet – 632406, (hereinafter called "the Company").

2. WHEREAS the Company has entered into a contract with M/s._____ _____ (hereinafter called "the said Contractor", which term includes "suppliers" for the purpose of this guarantee), for supply of equipments and/or services by the said Contractor vide Contract No._____, dated _____.

3. WHEREAS under the terms and conditions of the said Contract between the Company and the said Contractor, the said Contractor is to furnish a performance Bank Guarantee for due performance of the equipment to be supplied under the said Contract and for the fulfillment of all the terms and conditions of the said Contract.

4. WHEREAS the said Contractor have requested the Bank to offer a Guarantee and at their request, WE the Bank have agreed to furnish such Guarantee to the said Contractor.

.....2

Sign & Seal of the Issuing Bank

5. NOW, THEREFORE, WE the Bank do hereby undertake to pay the Company an amount not exceeding Rs._____ (Rupees _____ only) against any loss or damage caused to or suffered or would be caused to or suffered by the Company by reason of any breach by the said Contractor of any of the terms and conditions contained in the said Contract.

6. We, the Bank, do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of breach by the said Contractor of any of the terms and conditions contained in the said Contract or by the reason of the said Contractor's failure to perform the said Contract. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, the Bank's liability under this Guarantee shall be restricted to an amount not exceeding Rs._____ (Rupees _____ only).

7. The Bank's liability under this Guarantee is absolute and unequivocal and we, the Bank, undertake to pay unconditionally to the Company any money so demanded notwithstanding any dispute(s) raised by the Contractor in any suit, or proceedings pending before any Court or Tribunal or Arbitration or before any other authority and such payment under this guarantee shall not wait till the disputes, if any, have been decided by any Court or Tribunal or in the arbitration proceedings or by any other authority.

8. This Guarantee comes into force immediately and shall remain in full force and effect up to and including _____ (date) (including a claim period of 3 months after the date of completion of warranty period).

9. We, the Bank, further agree that, subject to Clause-8, the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged or till the Purchase Department of the Company certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said Contractor and accordingly discharges this Guarantee.

.....3

Sign & Seal of the Issuing Bank

Bank Guarantee No._____ Date _____

Banker Name _____ Bank Guarantee Value_____

10. Unless a demand or claim under this Guarantee is made on the Bank in writing on or before the date specified under Clause-8 above, the Bank shall be discharged from the liability under this Guarantee thereafter. But where such claim or demand has been preferred by the Company with the Bank on or before the expiry of the said date, the claim shall be enforceable notwithstanding the fact that the said enforcement is effected after the said date.

11. For the purpose of Clause-10, any letter making claim or demand on the Bank by the Company lodged in person or dispatched by Registered Post or by Fax or by Telegram or by any Electronic media addressed to the above mentioned address of the Bank on or before the date specified under Clause-8 above, shall be deemed to be the claim/demand in writing referred to above irrespective of the fact as to whether and when the said communication reaches the Bank.

12. We, the Bank, further agree that the Company shall have the fullest liberty, without our consent and without affecting in any manner our obligations hereunder, to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the said Contractor and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by virtue of any such variation or extension being granted to the said Contractor or for any forbearance, act or omission on the part of the Company or any indulgence by the Company to the said Contractor or by any such matter or thing whatsoever which under the law relating would, but for this provision, have effect of so relieving us.

13. This Guarantee shall not become void due to any change in the constitution of the said Bank or the said Contractor.

14. The Guarantee herein contained shall not be determined or affected by the liquidation or winding up or insolvency of or change in the constitution of the said Contractor, but shall in all respects and for all purpose be binding and operative until all payments of all moneys due or that may hereafter become due to the said Company are settled irrespective of any liability or obligation of the said Contractor under the said Contract.

15. It shall not be necessary for the said Company to proceed against the said Contractor before proceeding against the guarantor bank and the Guarantee herein contained shall be enforceable against the said Bank notwithstanding any security, which the said Company may have obtained or obtain from the said Contractor.

.....4

Sign & Seal of the Issuing Bank.

Bank Guarantee No._____ Date _____

Banker Name _____ Bank Guarantee Value_____

16. Any claim or dispute arising under the terms of this document shall be subject to the jurisdiction of the Courts at Ranipet, Tamilnadu.

17. The said Bank declares that it has powers to issue this Guarantee under the Bank's Memorandum and Articles of Association and the undersigned has full powers to do so on its behalf under the powers granted to him by the proper authorities of the said Bank.

18. We, the Bank hereby undertake not to revoke this Guarantee during its currency except with the previous consent of the said Company in writing.

In witness whereof we _____ (name of the Bank) have hereunto setout Bank Seal the _____ day of _____ month _____ year.

SIGN & SEAL OF THE ISSUING BANK

BHEL BAP RANIPET

INSTRUCTIONS FOR BANK GUARANTEE

1.1 Bank Guarantee shall be issued by any one of BHEL's Bankers or any Nationalized Bank. Please refer to List of BHEL's Bankers enclosed.

1.2 If it is not possible, then BG can be issued by a Scheduled Commercial Bank with the prior approval of BHEL.

1.3 BG from Co-operative Banks is not acceptable.

2.1 Pre-printed BG Form of BHEL only shall be used.

2.2 Only the relevant information like Supplier Name, BG Value, Contract No., Validity etc. shall be typed in the pre-printed form and executed by Bank.

2.3 Special adhesive stamp of the required value shall be affixed on the 1st Page of the Form.

2.4 If Special Adhesive stamps are not available, then applicable stamp duty shall be paid at the Bank / Agency nominated by the concerned State Government to collect stamp duty, who will affix their signature, date and seal in the first page of the BG Form clearly marking it as "SPECIAL ADHESIVE" & "STAMP DUTY".

2.5 Stamp Duty for the BG shall be at the rate as applicable in the State where the BG is executed.

2.6 Bank seal shall be affixed on the special adhesive stamp.

3.1 The executing officer of the Bank shall indicate his name, designation and power of attorney number / signing power number etc. on the BG.

3.2 Any correction / overwriting on the BG shall be duly authenticated under the Seal and signature of the executing officer of the Bank.

3.3 Each page of the BG shall be duly signed/initialed by the executing officer of the Bank and the last page is to be signed with full particulars under the seal of the Bank.

3.4 Fax number, e-mail Address, contact person, phone number and complete postal address shall be indicated in the covering letter of the BG from Bank.

4.1 The validity of the BG shall cover a period of 18 months (or such other period as per purchase Order, if otherwise specified) from the last date of dispatch as per Purchase Order or actual date of last dispatch under the Purchase Order, whichever is later.

4.2 The BG shall have a claim period of 3 months. If no separate claim period is indicated in the BG, then the validity shall be 18 months (or such other period as per Purchase Order, if otherwise specified) plus 3 months.

5.1 No clause of the BHEL BG Form shall be altered, deleted or new clauses added by the Issuing Bank under any circumstances. Bank Guarantees with altered/ deleted/added clauses will not be accepted by BHEL under any circumstances.

5.2 If the Issuing bank wants to add any additional clauses, it shall be intimated to BHEL well in advance with exact text of clause, which shall be subject to approval by BHEL Law Department. Those clauses specifically accepted by BHEL Law Dept. can be added in the last page of the BG Form and excuted by Bank.

6.1 Bank Guarantee shall be forwarded by Issuing Bank directly to Accounts Officer/ Stores Bills, BHEL/BAP, Ranipet-632406.

6.2 If it is not directly forwarded to BHEL due to unavoidable circumstances, then the Issuing Bank shall send a letter directly to BHEL confirming the issue of the BG enclosing a photocopy of the Original BG.

6.3 The Bank Guarantee should not be routed through Bank along with other dispatch documents under any circumstances.

7.1 In case of any extension of a BG the same shall be executed on non-judicial stamp paper of the required value.

7.2 Only the due date and claim period shall be extended.

7.3 The extension should not result in alteration of any material facts of the BG.

Bank Guarantees executed as per the above instructions only shall be accepted at our end. Hence kindly ensure compliance with the above instructions for early processing of the bills and to avoid hold up of the bills.

LIST OF BHEL'S BANKERS FROM WHOM BANK GUARANTEE IS TO BE OBTAINED

Sl. No.	Name of the Bank
1.	State Bank of India
2.	ABN AMRO Bank N.V.
3.	Bank of Baroda
4.	Canara Bank
5.	CITI Bank N.A.
6.	Duestche Bank AG
7.	HDFC Bank Ltd.
8.	ICICI Bank Ltd.
9.	IDBI Bank Ltd.
10.	Punjab National Bank
11.	Standard Chartered Bank
12.	State Bank of Hyderabad
13.	State Bank of Travancore
14.	The Hongkong and Shanghai Banking Corporation Ltd.

Technical Pre-Qualification Criteria - Compliance Sheet

Note

- The vendor shall state in the "Compliance" column Y (yes) or N (no).
- **Wherever specific documents / proofs are required, the same shall be given by the vendor without fail.**

		Compliance (Y/N)	Remarks
Technical Pre qualification Criteria			
Sr. No	**Description**		
1.	The bidder should be either OEM of network Active Components who is willing to undertake total scope of work or an authorized system integrator of the active OEM having direct purchase and support agreement with OEM for last 3 years. The system Integrator shall submit a letter of Authorization from OEM (NAC) for this specific tender. The Certificate / Authorization Letter specific to this tender must be enclosed with the Technical Bid, without which the offer shall be liable for rejection**. Authorization certificate from OEM for this specific tender to be submitted along with the bid.**		
2.	Bidder shall be an existing network & security integrator of similar enterprise network setups for last 5 years.		
3.	The bidder should have implemented similar switching and security as part of the previous tenders. **At least one proof should be submitted along with bid.**		
4.	The bidder should be the highest status of partnership with the OEM. **Attach the proof.**		
5.	The Bidder should have experience in executing Enterprise Networks. The Bidder should have successfully executed Enterprise networks during the last 3 years in any one of the following: a. Three Enterprise Networks, each order value of not less than the 4 Crores on Lease Rental or 2.5 Crores on outright purchase basis, Or b. Two Enterprise Networks, each order value of not less than 5 Crores on Lease Rental / 3.5 Crores on outright purchase basis, Or c. One Enterprise Network order value of not less than 8 Crores on Lease Rental / 5 Crores on outright purchase basis. The implementation should be of the same OEM whose product is being quoted. The executed work under consideration should be of total Solution and Infrastructure Setup, which consists Fiber optic cable laying, High end Chassis switches, Distribution switches etc, along with Network monitoring		

Name: Company Seal

Signature: with Date:

	systems.In addition Bidder should have a minimum of 3 years of experience of Annual Maintenance/Lease rental contract for Enterprise Network in government or public sector. **Order copies of works Executed and annual AMC/Lease Rental contract should be provided by Bidder along with the Techno-commercial Bid.**		
6.	The bidder should be ISO 27001 or ISO 20000 certified as per Global Standards. **Attach the relevant certificate.**		
7.	Bidder shall have a 24 x 7 operational, Network Operations & Technical Assistance Center of its own. No tie-ups for NOC with third parties/signed partners would be acceptable. **Proof should be submitted along with bid.**		
8.	Bidder should have professionals with expert level certification from the OEM of the quoted products and also having experience of implementing / maintaining Enterprise Network Solution/ Data Centre certified professionals. **List of certified professionals to be submitted.**		
9.	The bidder should provide all the switches, NMS, AAA server, email and web security solution and desktop video conferencing solution from a single OEM.		
10.	The bidder shall provide all the passive cabling components from single OEM		
11.	The Bidder should be able to provide the support for quoted network actives technology and the equipment for a minimum period of 8 years. **Bidder shall give commitment letter in this regard.**		
12.	All Software Updates of active components shall be provided during the entire 5 year lease period at no extra cost. **Bidder shall give commitment letter in this regard.**		
13.	Bidder should have PF no./ESI no./Medical policy for executing the contract.		
14.	OEM shall have Technical Assistance Center (TAC) operating in India.		
15.	Bidder and OEM should have sound financial position in the market, should be earning profit since last three years and should not be involved in any bankruptcy issues. **(Refer Annexure-IV Form D)**		
16.	Bidder should not be black listed by any Government/Government agency/PSU/Financial institution in India till the time of submission of Bid. Bidder should give undertaking in the prescribed format**. (Refer Annexure-IV Form H)**		

Name: Company Seal

Signature: with Date: