Annexure–1 (INDENT NO. 51938)

Scope, Specifications, Terms & Conditions for Supply, Implementation and Commissioning LAN at Kaiga Site of NPCIL

NPCIL PROPRIETARY

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

1.   Introduction, background & Scope of work

About present Network: LAN facility at KGS site consists of 3 sub networks catering   to KGS 1&2, KGS 3&4 and Township.   KGS 1&2 LAN was established way back in 2001-2002 with Multi Mode fiber back bone and CAT5e UTP cabling for edge devices. Majority of active components are of Enterasys make with one core switch (Matrix-E5) and 24 port manageable switches (VH series). Few D-link make switches are also being used. LAN facility at KGS 3&4 was established in 2006-2007 with single mode fiber back bone and CAT-6 UTP cabling for distribution.   Active components are of Nortel make with one core switch (ML 8606) and manageable edge switches (5520 series).

Scope

Scope of work comprises of **Supply, Implementation and commissioning of Fault-Tolerant, manageable, resilient and high speed network with support for site redundancy and future scalability to 40G** as a replacement & upgradation for existing LAN network located in various buildings at Kaiga plant-site with replacement of old active network device and support of the network during the currency of the contract. The contractor's scope of work is to provide a solution with responsibility for fully provisioning the Network infrastructure and IT Cabling services including detailed design, supply, installation, configuration, testing, commissioning and extending warranty support during the defects liability period for the following elements and services:

1.1   Implementation of Fault Tolerant & High Speed Network.

1.1.1   Supply of core switches, distribution switches and access switches.

1.1.2   Supply and laying of Passive Components like OFC cables, Optical Fiber (SM/MM) components, CAT6 cable, etc with all accessories.

1.1.3   Supply of equipments as detailed in bill of quantities (line item) and any other component required for the functioning of the switches as per specification.

1.1.4   Configuration of Core in high availability mode with long distance VSS of minimum 1Km and quick resiliency.

1.2   Carrying out study of existing IP scheme and suggest and implement best of industry practices including Dynamic VLAN, DHCP trusted server solution, Network Authentication using 802.1x, Security features like ARP flood control, protection against ARP poisoning etc based on the acceptability to meet NPCIL requirements.

Annexure–1 (INDENT NO. 51938)

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

1.3 All necessary accessories, equipment and furnishings including; conduit, horizontal cabling, wall outlets, patch cables, floor outlets, floor boxes, furniture outlets, backbone cabling; equipment racks, modular angled patch panels, labels and labeling equipment.

1.4 Re-termination of existing Single/Multi mode fiber, re-location of cable / racks to nearby, best suited location, if necessary, for make use of existing Multi-mode fiber backbone.

1.5 Supply of equipment racks, including all PDUs, fans, brush plates and cable management, base plates, glands and all associated sundry equipment

1.6 Connecting with 4 different colors of patch cables inside the racks from patch panel to switches for easy identification & management.

1.7 Ensuring proper closing of all opening in racks to avoid rodent entry inside the enclosure with proper cementation.

1.8 Inspection and tests to meet the requirement of NPCIL set forth in this specification. Details of Testing and Acceptance criteria are narrated in the end of this document.

1.9 Buyback of 48 Nos. of existing Enterasys / D-link switches and racks as detailed in Annexure. The vendor shall quote the price for buyback of switches & racks. The buyback amount **will not be considered** for deriving the lowest bid and NPCIL reserves the right to exercise or not to exercise the buyback option.

1.10 Part replacement and breakdown maintenance of the system during the warranty period shall be carried out without any additional charges.

1.11 Parking of ready-to-use switches / spares to be maintained at KGS plant site during warranty period as per the details given in the end of this document.

1.12 Training of NPCIL technical personnel.

Note: Bidder has to submit detailed proposed plan & design document showing implementation of all features meeting NPCIL requirement. The document should contain details of products, datasheets and implementation plan, without which the tender shall be rejected.

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

1.15 **Implementation Criteria**

1.15.1   A brief draft design has been attached along with this document, for the reference of the tenderer. However, tenderer may consider this as a guideline and carry out detailed study, prepare the implementation plan and provide the items that are meeting minimum specifications mentioned in the tender.

1.15.2   The proposed LAN shall incorporate features like fault tolerance, resiliency, sub-second network convergence, high speed backbone etc.

1.15.3   The proposed LAN shall withstand failure of LAN resources of any single CORE switch in the LAN with implementation of VSS or equivalent technology.

1.15.4   The proposed LAN shall be based on 3 tier architecture model with CORE, Distribution and Access Layer switches.

1.15.5   Connectivity between CORE to distribution switches shall be in 20Gbps using 2*10G and scalable to 40 Gbps. Each distribution switch shall connect to CORE in 10G in high available mode with VSS (Virtual Switch Stack) or equivalent technology.

1.15.6   Active components of the new LAN shall be 100% **IPv6** and **802.1x** compliant.

1.15.7   The networking solution shall be configured for security features like protection against ARP attacks, DHCP trusted server, Dynamic VLAN allocation from RADIUS etc.

1.15.8   In the proposed solution, Access to network shall only be allowed after Authentication from all end devices.

1.15.9   The main CORE switches shall be located in the KGS Administration Building. One core switch may be shifted to alternate Data center, in future, if NPCIL opts for it. Hence long haul VSS (or equivalent) with minimum 1Km distance between COREs shall be supported in the proposed solution.

1.15.10 The diagram provided shows the physical layout of the various building in the campus and not to scale. Hence it may be used only to determine relative position of the building / areas and not for distances & dimensions.

1.15.11 All components like Patch Panel, LIUs, and Switches shall be rack mountable.

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

1.16   **Applicable standards, specifications and drawing:** Following standards are needed to be followed in conjunction with this specification.

Applicable standards:

- IEEE standard criteria for Local area network and Metropolitan area network (IEEE 802).
- RFC standard criteria for internet and networking protocols

Drawing: Typical Layout of proposed Kaiga LAN is attached along with this document.

Material, processes, workmanship

a) Material and Processes: Material, processes and standard parts which are required for the fulfillments of this specification shall be of very good quality and in accordance with the high grade practice pertinent to manufacture of this type of equipments i.e. switches, OFC Cables, UTP Cables, Racks, etc.

b) Workmanship: The workmanship shall be in accordance with the high grade practices and quality to ensure the satisfactory operation and mean time between failures **(MTBF) of all active components shall be greater than 75000 hrs**.

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

2. Vendor Qualification requirements:

2.1 The OEM of offered Active components should be an established vendor with presence in India for the last 5 years. Copy of any one of the certificates – RBI registration/Company incorporations/IT returns/Certificate from Bank shall be submitted with the bid.

2.2 The OEM should have local TAC (Technical assistance center) / Support Center based in India for offering post sales technical support. NPCIL team may decide to visit the TAC support center during the evaluation of the bids. Address and contact details of TAC center shall be submitted along with bid.

2.3 Experience of having successfully completed <u>LAN implementation projects involving supply and installation of Active & passive components</u> during last 7 years ending last day of month previous to the one in which applications are invited should be either of the following:-

    a. Three similar completed works costing not less than the amount equal to 30% of the bid amount. OR

    b. Two similar completed works costing not less than the amount equal to 50% of the bid amount. OR

    c. One similar completed work costing not less than the amount equal to 80% of the bid amount.

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

3.   General Information and Conditions:

3.1   The contractor's scope of work is to provide a complete solution with responsibility for fully provisioning the Network infrastructure and services including supply, installation, configuration, testing, training, commissioning and warranty support during the defects liability period for the elements and services.

3.2   The above work & installation is to be done at KAIGA GENERATING STATION, Kaiga P.O., Uttara Kannada-District, Karnataka, situated approximately 55 Kms from Karwar.

3.3   The compliance statement for Active components and security solution, technical specification listed herewith must be provided on the respective OEM's letter heads along with the Manufacturer Authorization letter to each System Integrator (bidder) whom they are supporting.

3.4   All Active components shall be certified for OEM support for minimum 7 years from date of supply. For all the products product launch date and End-of-support dates should be clearly specified in the format given in this document **(Sr. No. 13)** and the documentary proof shall be submitted. Certificate from OEM of Active components to be submitted.

3.5   The Data sheets, reference documents and technical documents for primary components should be available on the main global website of the respective switching / OEM manufacturer and the URL links to the respective documentation should be provided in the compliance statement as detailed in this document **(Sr. No. 12).** Any document which is not available on Primary Global website of the OEM would be treated as invalid document and such offers are liable to be rejected.

3.6   Bidders upon notification from NPCIL-KAIGA should be able to show a PoC complying the technical requirements specified in the RFP, all the required hardware and software should be organized by the bidder / OEM.

3.7   The scope of work involves 3 major parts viz. Part-A: Supply of Active Components, Part-B: Supply of Passive Components, Part-C: installation jobs.   Serial Nos. 1 to 13 are Supply of active components (Part –A), Serial Nos. 14 to 28 & 61 are supply of passive components (Part-B) and Serial Nos. 39 to 55 & 62 to 64 are execution jobs (Part-C).

3.8   The bidder must quote for complete scope of work. Offers not covering complete scope of work will not be accepted.

3.9   The BOM for Part-A, Active components are based on generic requirement. Bidder should carry out detailed analysis and include all the components, cables, any other items required to implement the solution as a whole to meet the design requirements. All such items may be clearly indicated and included in the offer. No claim for any additional item shall be entertained.

3.10   Quantities mentioned under execution jobs (Part-C) are estimated quantities for guidance and the billing will be done on actuals. Probable variation to a maximum of +/- 20% is to be provisioned.

3.11   The bidder has to execute the project by his own strengths and manpower and it should not be outsourced to any 3rd party vendor except for petty works like digging/drilling etc.

3.12   The entire network Switches shall be from the same Original Equipment Manufacturer. All pluggable SFP and SFP+ modules shall also be from same OEM.

3.13   All passive components viz. cables, jack panel, fiber patch panel, patch chords etc. shall be preferably from single OEM

3.14   Bidder should necessarily quote for the optional items which may be ordered based on NPCIL requirement. **Optional items shall not be considered for deriving the lowest eligible bid.**

3.15   CLI (Command Line Interface) commands for all across the proposed switches shall be

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

same.

3.16 Bidder should keep ONE Project Manager on site during the entire project implementation time and should prepare all documents/drawings up to date and finally should submit the documentation in duplicate to NPCIL.

3.17 Any requirement of shifting / moving the KGS materials / furniture etc. during the execution of the work, shall be performed by the contractor himself at his own cost and risk and shall be restored to its original condition, to the satisfaction of the Engineer-in-charge of the work and the custodian agency of the property as soon as the work in the respective area is completed.

3.18 Bidders are advised to visit the site and survey to get acquainted with the actual layout of the site, nature and quantum of work before preparing the detailed workout plan of the network.

3.19 Any type of tools, measuring / test equipment or other items / things such as welding / cutting machines, grinders, fork lifter, safety belt, ropes, rags, cleaning agents, heaters, Laborers, assistance, supports etc. required for execution of this work will not be provided by KGS and Contractor has to arrange at his own cost and risk.

3.20 Accommodation: Contractor shall make his own arrangement for conveyance, boarding / lodging of their staff without any extra charges to the corporation. However, local (i.e. Mallapur residential colony) accommodation for staff stationed at KGS, during the period of the contract, may be provided on chargeable basis subject to the availability of the room, as per the station policy.

3.21 Transportation: NPCIL will provide to and fro transport facility for the Service Engineers between Mallapur Township and Kaiga Site, subject to availability on chargeable basis. Approximate to & fro charge per person per day is Rs. 40/- and subjected to revision from time to time.

3.22 **Insurance:** All the personnel employed for the contract shall be covered by ESI scheme or group insurance or individual workman compensation policy.

3.23 During the work at KGS tenderer and all his staff should adhere to the safety & security guidelines and regulations followed at KGS site.

3.24 Any neglect or failure on the part of the contractor in obtaining necessary and reliable information upon the foregoing or any other matters affecting the contract shall not relieve him from risks or liabilities or the entire responsibility from completion of the work at the schedule rates and in compliance of scope of work.

3.25 No verbal agreements or influence from conversation with any officer either before, during or after the execution of the contract agreement shall in any way affect or modify any of the terms or obligations here in contained.

3.26 Precautionary measures.

3.26.1 The contractor shall take all precautionary measures not to damage any electric poles, cables, water supply or sewage pipelines and any structure, which are close to work site or come in the way during mobilizing the machines etc. If any damage occurs the same shall have to be rectified and made good by the contractor at his own cost.

3.26.2 The contractor shall make necessary paths, diversion, approaches as required for plying of vehicles, machinery etc., at his own cost.

3.26.3 During the execution of the work, to prevent the damage to the KGS materials / equipments from the dust / debris originated from drilling / puncturing /

hammering or similar activities, contractor shall provide adequate covering / protection using PVC / tarpaulin sheets at his own cost.

3.26.4 During the execution of the work, prior permission from the respective section head / concerned officer shall be obtained reasonably in advance, before commencement of the work in the respective section's area.

3.27 <u>INSPECTION OF SITES:</u>

The department has made available the various data in this tender document so as to enable the contractor to get an idea of work as well as working conditions. The bid shall not be deemed to have been based only on such data, but the contractor shall be responsible for his own assessment and interpretation thereof.

The contractor shall also be deemed to have inspected and examined the site and its surroundings and information available in connection therewith and to have satisfied himself fully before submitting his offer, as to the hydro-graphic and climate conditions, the extent and nature of work and materials and equipments necessary for the completion of works, the means of access to the site and the accommodation he may require and in general shall be deemed to have obtained all necessary information on the subjects related to work to take risk, contingencies and all other such circumstances into consideration which may influence or affect his offer.

3.28 240 V AC single-phase electric supply from the existing facility at site shall be available for the work free of cost. Any additional requirement arises shall be met by the tenderer at his own cost & risk.

3.29 ORDERS OF WORKS: The order in which the works are to be carried out shall be as per approval of the Engineer-in-charge and shall be as pre-detailed method of execution adopted by the contractor, as per activity schedule. The activities shall be carefully planned so that there is least disturbance to the live IT services.

3.30 ACTIVITY SCHEDULE:

The contractor shall submit to the Engineer-in-charge a detailed activity schedule showing the probable dates of commencement and completion of the work considering the total working period in which the work is scheduled to be completed and the programme shall be adhered to.

Every tenderer should submit along with his tender, a brief proposal containing the methodology for execution of work.

3.31 Security Rules:

The contractor shall be solely responsible for the safe custody and security of the material issued to them for the subject work and for their own material and equipments.

For station security, the work site is a restricted area and contractor will have to comply with all the rules and regulations made by the competent authority from time to time regarding entry, conduct and exit of personnel, vehicles, materials and other matters related to secrecy and security.

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

3.32 Work permits:

Contractor has to obtain work permit from the control room (For main Plant related areas), Health Physics section (For radiation safety permits) and Industrial safety section (for Industrial safety permits) wherever applicable and as instructed by Engineer-in-Charge. Wherever required the contractor should obtain permission from civil department before breaking the roads, walls, lawns, false-ceilings etc. and should be restored at his cost to the satisfaction of the Engineer-in-charge.

Wherever fire barriers are involved in the cable route, they are to be opened and restored as per the guidelines issued by KGS Industrial Safety Section.

3.33 A point to point compliance with respect to all the points of this specification indicating details of deviation, if any, as mentioned in Sr. No. 4 Specification section of this document, shall be submitted.

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

4. Technical Specifications:

Item No. 1: Core Switches

Sr.	Main Features:	Compliance (Y/N)
0.1	Core switches shall be chassis based with minimum 3 free payload slots after loading the required modules & ports mentioned in the tender	
0.2	Both core switches shall be identical model	
0.3	Should support active-active high availability features with sub-second convergence.	Furnish Details
0.4	All distribution switches shall be physically connected to both the core switches and failure of any one core switch shall not affect normal operation and transparent to end users.	
0.5	Core switch should support implementation of security features like NAC, RADIUS authentication, Dynamic VLAN etc.	
0.6	All switches shall be manageable using centralized management software (NMS) or similar solution for easy field replacement of any failed units at Core, Distribution and Access layers.	
1	**Port Density**	
1.1	Chassis based core switch with following minimum Nos. of Ports: 12 * 10 G SFP+ ports 12 * 1G SFP (SM/MMF) 24 * 1G TX Ports The switch shall be scalable to support minimum 30 Nos. of 10G ports and 7 Nos. of 40G ports.	
1.2	Core Switch should have minimum 3 spare slots excluding Primary and Redundant Supervisory Engine slots for support of 1G & 10G and future scalability to 40G Modules.	
1.3	Should support Active – Active Clustering VSS or equivalent technology for high availability (long distance VSS of minimum 1Km) and quick resiliency. Shall support sub-second convergence.	Furnish details like supported distance between core, convergence time etc
1.4	Considering future scalability and investment protection, the proposed Core switch shall be scalable to support 10 Nos. of 40G in non-blocking & wire speed architecture without replacing the switch.	
1.5	The active-active links between the 2 Chassis should be minimum of 20 Gbps (2 *10G) bandwidth. All the required modules / other related cards shall be loaded.	
1.6	The proposed clustering technology should support high availability for both Layer 2 and Layer 3.	
2	**Performance**	
2.1	Min 700 Mpps or more forwarding rate for IPv4 and IPv6 routing.	Furnish Details
2.2	Extensive wire-speed traffic classification for ACLs and QoS	
2.3	Supports 9KB Jumbo frame size	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

2.4	Switching fabric shall be Min 1.92 Tbps with wire-speed non-blocking bandwidth for all packet sizes.	Furnish Details
2.5	Switching fabric shall provide minimum 160 Gbps switching bandwidth between its inter slot modules.	
2.6	Switching fabric shall provide wire-speed non-blocking bandwidth for minimum 12 ports of 10G ports.	
2.7	Latency should be less than 15 Micro seconds for 1G and 10G @ 64 byte packets.	Furnish Latency data of 1G, 10G and 40G.
2.8	Full environmental monitoring of PSUs, fans, temperature and internal voltages, with SNMP traps to alert network managers in case of any failure	
2.9	1G and 10G line cards should support non-blocking wire-speed performance for Layer 2 and layer 3.	
3	**Reliability**	
3.1	Redundant hot swappable PSUs with N + 1 redundancy.	
4	**General Standards**	
4.1	IEEE 802.1Q Virtual LANs	
4.2	VTP / GVRP or Equivalent technology	
4.3	RADIUS	
4.4	IEEE 802.1p Priority Tagging	
4.5	DiffServ Architecture	
4.6	DHCP	
4.7	VLAN Q-in-Q scalable	
5	Resiliency	
5.1	Resiliency in the Core 10G ring as per the IEEE 802.17 / RPR / ERPS or equivalent technology providing sub-second convergence time.	
5.2	STP, RSTP, MSTP (802.1s)	
5.3	Link Aggregation (802.3ad) groups	
5.4	Loop Protection and Loop Detection.	
5.5	HSRP / VRRP or Equivalent technology	
6	Routing	
6.1	Should support static and RIP routes.	
6.2	IPv6 routing support from day 1 all the necessary software and hardware should be proposed by the bidder.	
6.3	Should support static IPv4 and IPv6 routes, dynamic routing IPv4 & IPv6 protocols like RIPng, OSPFv3, BGP4+.	
6.4	Should support min 8,000 IPv4 routes	
6.5	Should support min 8,000 IPv6 routes	
7	IPv6 Features (Features should be available from day 1)	
7.1	IPv4 and IPv6 Dual/host Stack	
7.2	IPv6 Management via Ping, Trace Route, Telnet and SSH	
7.3	Static Unicast Routes for IPv6	
7.4	DNS Extensions to support IPv6	
7.5	An Architecture for IPv6 Unicast Address Allocation	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

7.6	Neighbor Discovery for IPv6	
7.7	ICMPv6	
7.8	Transmission of IPv6 Packets over Ethernet Networks	
7.9	IPv6 Router Alert Option	
7.10	Connection of IPv6 Domains via IPv4 Clouds	
7.11	IPv6 Addressing Architecture	
7.12	Internet Control Message Protocol (ICMPv6)	
7.13	IPv6 to IPv4 tunneling	
7.14	DHCP V6 , SNMP v6 , Telnet and SSH on IPv6	
8	**Multicast Support**	
8.1	IGMP Snooping	
8.2	MLD Snooping (v1 and v2)	
8.3	Internet Group Management Protocol v2 /v3	
8.4	PIM-SM v4 and v6	
9	**Security**	
9.1	802.1x support	
9.2	Dynamic VLANs	
9.3	Private VLAN/Guest VLAN	
9.4	BPDU Protection	
9.5	STP Root Guard	
9.6	DHCP snooping.	
9.7	Should support MAC address filtering and MAC limiting features.	
9.8	The switch should support detection of Denial of Service (DoS) attack.	
9.9	Radius Accounting	
9.10	Should support min 4000 ACL's in hardware	
10	**Quality of Service**	
10.1	Policy based QoS features	
10.2	Control plane traffic prioritization	
10.3	8 QoS queues per port	
10.4	WRED / SDWRR or equivalent queuing technology	
11	**Management**	
11.1	Out of band Ethernet management port	
11.2	Console management port	
11.3	Port mirroring	
11.4	sFlow or equivalent	
11.5	Secured Shell	
11.6	Optical Digital Diagnostics Monitoring (DDM) in accordance to the open standard specification SFF - 8472 or equivalent	
11.7	Industry Standard CLI	
11.8	Firmware upgradation, comprehensive configuration and management activities of the proposed switch shall be available thru a centralized NMS / removable device / similar platform.	
11.9	NTP and Syslog	
11.10	The switching engine shall have minimum 2GB RAM.	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

12	Electrical Approvals and Compliances	
12.1	Restrictions on Hazardous Substances (RoHS) Compliance	
12.2	Product certification to meet the relevant IEC/EN/CISPR/FCC standards on EMI/EMC by UL/cUL/TUV.	
12.3	IPv6 features shall be certified by TEC / IPv6 Ready Logo / UNH-IOL / USGv6.	
	Make & Model of the offered product	

Item No. 2: Distribution Switches

Sr.	Technical Specifications	Compliance (Y/N)
1	**Port Density**	
1.1	Stackable Layer 3 Gigabit, Fully manageable Switch with minimum 24 nos of 10/100/1000 RJ 45 Copper, Minimum 2 * SFP+ ports and 2 * SFP COMBO ports. In each switch 2 nos of 10G port should be populated from day 1	
1.2	Should support core to distribution Active – Active Clustering VSS or equivalent technology for high availability and quick resiliency.	
1.3	The proposed VSS technology should support high availability for both Layer 2 and Layer 3 applications, between core & distribution switches.	
1.4	Shall be loaded with internal redundant power supply.	
1.5	Stacking bandwidth shall be minimum 48 Gbps.	
1.6	Switch shall be scalable to support 2 x 40G QSFP+ ports.	
2	**Performance**	
2.1	Forwarding Rate: Min 180 Mpps or better	
2.2	Switching Fabric: Min 240 Gbps or better	
2.3	Latency should be less than 15 Micro seconds for 1G and 10G @ 64 byte packets.	Furnish Details
2.4	Wire-speed and non-blocking performance for 1G and 10G - for all packet sizes.	Furnish Details
2.5	Switch should support non-stop Routing and non-stop Forwarding features to ensure no drop in performance during link failover with core switches.	
3	**Resiliency**	
3.1	Resiliency in the Core 10G ring as per the IEEE 802.17 / RPR / ERPS or equivalent technology providing the convergence time as per the standards specified above	Furnish Details
3.2	Dynamic Link fail over	
3.3	Loop Detection and Loop prevention	
3.4	IEEE 802.1D RSTP	
3.5	IEEE 802.1Q MSTP	
4	**Routing**	
4.1	The proposed switch shall be full Layer 3 switch with routing.	
4.2	Shall support IPv6 RIPng.	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

4.3	Shall support OSPFv2 or higher version.	
5	**VLAN**	
5.1	VTP/GVRP or Equivalent	
5.2	LLDP or equivalent	
6	**Security**	
6.1	Private VLAN/Guest VLAN	
6.2	IEEE 802.1X	
6.3	Access control lists	
6.4	Protection against Denial of Service (DoS) attacks.	
6.5	Dynamic ARP Inspection, DHCP snooping inspection	
6.6	Dynamic VLAN assignment	
6.7	MAC Based Authentication	
6.8	BPDU Guard, Root Guard	
6.9	Web – based Authentication	
6.10	Secure Shell	
6.13	RADIUS	
6.14	Should support min 1024 ACL's in hardware	
7	**Quality of service**	
7.1	Policy base QOS based	
8	**IPv6 Features (Features should be available from day 1)**	
8.1	DHCP Relay ver. 6	
8.2	DNS ver. 6	
8.3	ICMP v 6 , Telnet v6 and NTP v6/SNTP v6 , SNMP V6	
8.4	Shall support IPv6 management features.	
9	**Management**	
9.1	sFlow or equivalent	
9.2	SNMP v3	
9.3	Port Mirroring	
9.4	Open standard CLI	
9.5	NTP client and syslog	
9.6	Out of band Ethernet management port.	
9.7	Console management port.	
10	**Compliances**	
10.1	ROHS compliant is must	
10.2	Product certification to meet the relevant IEC/EN/CISPR/FCC standards on EMI/EMC by UL/cUL/TUV.	
10.3	IPv6 features shall be certified by TEC / IPv6 Ready Logo / UNH-IOL / USGv6.	
	Make & Model of the offered product	

Item No. 8 & 9: Edge/Access Switches

Sr.	Technical Specification	
1	**Hardware Specifications**	**Compliance (Y/N), Details**

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

1.1	Gigabit, fully manageable and rack mountable switch with 12 or 24 * 10/100/1000 Tx with Min 2 * SFP COMBO ports with support for populating 1G SMF / MMF optical modules	
2	**Performance Specifications**	
2.1	Minimum switching capacity with wire speed non-blocking performance should be as follows: 24 Gbps for 12 port switches 48 Gbps for 24 Port switches	
2.2	Min 35 Mpps Switching throughput or better for 24 port switches and 20 Mpps for 12 port switches	Furnish Details
3	**Resiliency**	
3.1	Port Loop Detection.	
4	**VLAN**	
4.1	VTP/GVRP or Equivalent	
4.2	LLDP	
5	**Security**	
5.1	Private VLANs /Guest VLANs	
5.2	MAC-based VLANs, Dynamic MAC-based VLAN activation	
5.3	IEEE 802.1x - should seamlessly integrate with the proposed RADIUS server solution.	
5.4	Dynamic ARP inspection and DHCP snooping inspection	
5.5	Should support MAC address filtering functionality.	
6	**Quality of service**	
6.1	Policy based QoS	
7	**Should support IPv6 from day 1**	
7.1	Device / Host functionality management	
7.2	Hardware support for IPv6 packets.	
8	**Management**	
8.1	SNMP v3	
8.2	sFlow or equivalent	
8.3	LLDP / LLDP – MED	
8.4	Support for Syslog Server	
9	**Certifications**	
9.1	ROHS Compliance is must.	
9.2	Product certification to meet the relevant IEC/EN/CISPR/FCC standards on EMI/EMC by UL/cUL/TUV.	
9.3	IPv6 features shall be certified by TEC / IPv6 Ready Logo / UNH-IOL / USGv6.	
	Make & Model of the offered product	

Item No. 12: NMS Software

Sr.	Technical Specification for Network Management Software	Compliance (YN), Details
1	Automatic topology discovery and creation of network maps for Layer 3	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

	and Layer 2 network , All the available VLANS	
2	Should have high level Network Inventory polling capability for IP Network nodes, All available line cards , Modules , ports , Physical links , VLAN interfaces and all the other SNMP capable devices in the network	
3	Should have powerful administration control	
4	Detailed performance monitoring and management	
5	Should have extensive fault management capabilities with Real time Event and Alarm notifications , System Logs and Audit trials	
6	Creation and management of security and QoS policies	
7	Scheduled Device configuration back-up and restore functionality	
8	Automatic Detection of configuration changes for easy trouble shooting and Isolation	
9	Should support 3rd party devices and end points. Should Support minimum 100 devices from day 1 and scalable to 500 devices.	
10	Should have the functionality of Group provisioning / Scheduled configuration roll out management	
11	Should have the ability to perform / create group of devices for applying same task	
12	Should have extensive Event notification capability	
13	The NMS solution should be preferably from the same Active switching vendor , in case vendors proposing for 3rd party NMS solution should provide all the interop reports certified by both the NMS vendor and Active switching vendor on seamless interoperability	
14	All the required Software licenses for the NMS solution should be proposed by the bidder	
	Make & Model of the offered product	

Item No. 13: RADIUS Authentication Server

Sr.	Technical Specification for RADIUS / AAA Server	Compliance (Y/N), Details
1.	**External** RADIUS servers shall work in high available cluster mode with N + 1 high availability with no single point of failure. All necessary hardware and software should be supplied by the bidder. Each Server/Device shall have minimum redundancy features like RPS, RAID etc. Details of proposed hardware and software should be clearly specified. All hardware devices should be rack mountable with necessary kits.	Furnish Details
2.	Details of RADIUS infrastructure. Clearly give the details.	Furnish Details
3.	Support for 802.1X Based Device Authentication	
4.	Support for MAC Based Authentication	
5.	Captive portal Access	
6.	Support for Certificate based authentication	
7.	Native Data base must support minimum 1600 end points scalable to 3000 end points	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

8.	Should support Encryption based on Digital Signature algorithm or equivalent functional encryption protocols	
9.	Should be on Unix/Linux/BSD based.	
10.	Standards-based and vendor-agnostic, interfacing seamlessly with network access equipment from different vendors	
11.	Should Adhere strictly to Radius/ AAA open standards	
12.	Authentication Protocols to support EAP - TLS , TTLS , PAP and MD5	
13.	Should be compatible and interoperability, supporting current and future network configurations.	
14.	Should seamlessly integrate with the switching solution proposed for AAA and Dynamic VLAN allocation for roaming user profiles	
15.	Should support Dynamic Statistics and reports to track / View all the authentication requests / track the duration of user connection with Radius accounting	
16.	Provide high level visibility to Administrators to track who logged onto or disconnected from the RADIUS server / network	
17.	Should support IPv6 from day 1.	
18.	The Radius server should be proposed in high available mode with no single point of failure. In case of the primary server failure the secondary server should seamlessly take over with zero network disruption	
19.	The RADIUS server solution should be preferably from the same Active switching vendor. In case vendors proposing for 3rd party Radius server solution other than proven OpenSource software products, they shall provide all the interop reports certified by both the RADIUS server vendor and Active switching vendor on seamless interoperability.	
20.	In case of 3rd party Radius solution, other than proven OpenSource software products, the OEM should have local presence in India and also should authorize the bidder for supplying the product to NPCIL.	
21.	The Radius server solution proposed should have been integrated with the same switching OEM in India, preferably in leading business or research institute/ enterprises and reference in this regard should be submitted with appropriate credentials.	
22.	Make & Model of the offered product	

Item No. 14: 42U Floor Standing Rack

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance (Y/N), Details
1.	Casters Set of 4/Tp3 Levelers	
2.	19" Adopter kit / Loops	
3.	Minimum depth of the rack should be 1200 mm and width 605 mm	
4.	Split Rear Doors	
5.	Perforated Door front & back with minimum 75% perforation	
6.	2 Side Panels Vented	
7.	Mechanical Lock / Single Point / Common Key	
8.	2 Nos. of Zero U Vertical Mount Power Distribution unit each with	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

	minimum 8 Sockets	
9.	2 Horizontal Cable Organizer/1U/ Channel On Front	
10.	Fan Module / 4 Fan / Tower Mount / 360CFM	
11.	Sliding shelf and Keyboard shelf	
12.	Mounting Hardware-CR (Pack of 20)	
13.	Should be compatible to mount standard Rack servers	
14.	**Shall have inbuilt compatible retractable keyboard & LED monitor**	
15.	Make of the offered product	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

Item Nos. 15, 16 & 17: 9/12/15U Wall Mount Network Rack

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance (Y/N), Details
1.	Glass Door with lock & key	
2.	1Ph, 230V, 16A, 2U standard rack mount power distribution unit with 6 X Indian Round Pin 5/15A, Inlet Plug type 16A Indian Round Pin, 16A MCB - PDU Rating 3.6KVA	
3.	Horizontal Cable Organizer/1U/Loop	
4.	Fan/90CFM	
5.	Mounting Hardware-CR (Pack of 20)	
6.	Make of the offered product	

Item No. 18: CAT6 UTP Cable

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance (Y/N), Details
1.	Cat 6 UTP cable must fully conform to ANSI/TIA/EIA-568-C.2 Transmission	
2.	Performance Specification for 4 Pair 100W Category 6 Cabling.	
3.	General Features:	
4.	23 AWG conductor	
5.	UL Listed	
6.	Pair Separator: Star filler (No bisector tape)	
7.	Technical Specifications:	
8.	Conductor : Solid Bare Copper 23 AWG	
9.	Conductor Diameter at least 0.574 mm	
10.	Insulation : PE	
11.	Average Thickness : 0.23 mm ± 0.03mm	
	Min. Point Thickness : 0.18mm	
13.	Insulation Diameter : 1.04mm ± 0.05mm	
14.	Twisting Lay length : 30 mm Underneath	
15.	Filler : PE	
16.	Jacket : PVC with FR rated	
17.	Average Thickness of Jacket : 0.5 mm ± 0.05 mm	
18.	Minimum point Thickness : 0.46 mm	
19.	Outer Diameter : 6.1 mm ± 0.15 mm	
20.	Make of the offered product	

Annexure–1 (INDENT NO. 51938)

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

Item No. 20: UTP Information Outlets

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance (Y/N), Details
1.	PCB based, Unshielded Twisted Pair, Category 6, Copper Telecommunication Outlet Connector (I/O Modular) conforming to TIA /EIA 568-C.2 and ISO/IEC11801	
2.	Features & Technical Specifications:	
3.	Modular Jack : 750 Mating cycles	
4.	Wire terminal accessories : 200 termination cycles	
5.	Integrated bend-limiting strain-relief unit for cable entry	
6.	Support cable pair termination process on the jacks at 90 degree angle.	
7.	Should have mechanism to maintain quality of the termination ir-respective of the skill level of the termination staff	
8.	Housing: Polyphenylene oxide, 94V-0 rated.	
9.	110 Block : polycarbonate, 94V-0 rated	
10.	Jack Contacts : Beryllium copper, plated with 1.27 mm [.000050] thick gold in localized area and 3.81 mm [.000150] minimum thick tin-lead in solder area over 1.27 mm [.000050] minimum thick nickel under plate	
11.	Wiring Blocks : Polycarbonate, 94V-0 rated	
12.	Approvals : (a) UL Listed / CSA Approved	
13.	Performance Characteristics to be provided with bid : Attenuation, NEXT, PS NEXT, FEXT and Return Loss	
14.	Make of the offered product	

Item No. 21 & 22: UTP Patch Panel

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance (Y/N), Details
1.	Modular Patch Panel – compatible with CAT 5e & CAT 6 having Rear Cable Manager	
2.	- Panels should accommodate 12/24 CAT 5e/Cat6 jacks in 1U and have a proper shallow angle to minimize interference with cabinet doors.	
3.	- Should be Angular type and suit for Open & close Racks	
4.	- Should Supports Gigabit Ethernet up to 250MHz	
5.	- Should offer modular panels offer complete flexibility and high port density	
6.	- Panel should have Expansive cable management and labeling facilities	
7.	- Should support for both shielded and unshielded solution and Fully interoperable and backwards compatible	
8.	- Supply of around 800 nos of CAT5e keystone jacks and 450 nos of CAT6 keystone jacks for populating the UTP patch panels.	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

9.	Mechanical Characteristics :	
10.	Jack Connector	
11.	- Plastic housing : Polycarbonate, UL94V-0 rated or equivalent	
12.	- Operating Life : Minimum 750 insertion cycles	
13.	- Contact material : Copper Alloy	
14.	- Contact plating : 50µ" Gold/100µ" Nickel	
15.	- Contact Force : 100g minimum	
16.	- Plug retention Force : 11 lb minimum	
17.	IDC Connector	
18.	- Plastic housing : Polycarbonate, UL94V-0 rated or equivalent	
19.	- Operating life : Minimum 200 re-terminations	
20.	- Contact Material : Copper Alloy	
21.	- Contact Force : 100g minimum	
22.	- Wire Accommodation : 22-24 AWG solid	
23.	Electrical Characteristics	
24.	- Interface Resistance : 20M Milliohms	
25.	- Insulation resistance: > 100 Mega ohms	
	Make of the offered product	

Item No. 19, 23, 24, 25, 26: UTP Patch cable

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance (Y/N), Details
1.	1, 2, 5 & 10 Meter Cat6 Patch cords must conform to ANSI/TIA/EIA-568-C-5 Transmission Performance Specifications for 4 pair 100W Category 6.	
2.	- Patch chord should be moulded, boot type.	
3.	- Patch chord should have Pair separator : Star filler (No bisector tape)	
4.	- Jacket should be PVC.	
5.	- UL Verified	
6.	- Should have boot to protect the locking latch on the RJ45 plug	
7.	- Should be available in different colors	
8.	- Operating life: Minimum 750 insertion cycles	
9.	- Contact material: Copper alloy	
10.	- Contact plating: 50µ" Gold/100µ"Nickel	
11.	1m Patch cable Colors (Min 4 colors) - White, Blue, Grey, Yellow, Red, Green 2/5/10m patch cable color – Grey/blue	
12.	Make of the offered product	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

Item No. 27: OFC Patch Cable (SM)

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance (Y/N), Details
1.	Length shall be 3 meters	
2.	All patch cords shall conform to EIA/TIA-568C.3 and ISO/IEC-11801	
3.	Shall be Duplex Single Mode Fiber Optic Patch Cords OS2 9μ	
4.	Shall support network line speeds up to 10 Gbps	
5.	Shall have SC Connector jacks at one end and LC connector on the other end	
6.	All patch cords shall be factory terminated and packed.	
7.	Shall be RoHS Compliant	
8.	Shall be Low-Smoke & Zero-Halogen	
9.	Shall have minimum 20-Year Extended Product Warranty and system warranty	
10.	Make of the offered product	

Item No. 28: OFC Patch Cable (MM)

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance (Y/N), Details
1.	Fiber Optic Patch Cable (SC-LC), 3 Mtrs Long, Multimode, 62.5/125 or 50/125 Micro	
2.	Length shall be 3 meters	
3.	All patch cords shall conform to EIA/TIA-568C.3 and ISO/IEC-11801	
4.	Shall be Duplex Single Mode Fiber Optic Patch Cords OS2 9μ	
5.	Shall support network line speeds up to 1 Gbps	
6.	Shall have SC Connector jacks at one end and LC connector on the other end	
7.	All patch cords shall be factory terminated and packed.	
8.	Shall be RoHS Compliant	
9.	Shall be Low-Smoke & Zero-Halogen	
10.	Shall have minimum 20-Year Extended Product Warranty and system warranty	
11.	Make of the offered product	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

Item No. 29, 30, 31: OFC Patch panel

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance (Y/N), Details
1.	Fiber LIU 6 / 12 / 24 / 48 port Single Mode/Multimode – Loaded with Splice tray and adapter.	
2.	Must conform to EN50173 and ISO/IEC 11801 operating standard.	
3.	6/12/24/48 Port Rack Mount Fiber	
4.	Patch panel should be of Dimensions: 19" (Width) x 1U (Height)	
5.	Should be able accept SC Duplex, SC Simplex, LC Duplex and MTRJ Adaptors.	
6.	Should have snap-in sub modules with six single fiber or 3 dual fiber ports	
7.	Should have a fiber management system molded in to the unit structure to effectively route fibers from an incoming cable through to the connector interface.	
8.	Should have knockouts at the rear to enable termination of loose tube or tight buffered cables as well as blown fiber tubes	
9.	Should be made up of preferably non-metallic, Polycarbonate / ABS / non-corrosive material.	
10.	Should have the option of accommodating at least 6 nos. of splice protection sleeve, each can accommodate 4 connectors.	
11.	Should be slide able and should have tamper proof positive locking mechanism by means of clips supplied as standard with each unit	
12.	Make of the offered product	

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Item 56:- 12 Core Outdoor OFC Cable :

Sr.	Minimum Specifications / Functionalities / Capabilities	Compliance/Details
1	12-core, Single Mode, Corrugated Steel tape Armor, Loose-tube, Fully water blocked core, E glass Yarns, Outdoor fiber cable fully conforming to ITU-TG.652.D And / OR IEC 60793-2-50 C1.3 standard.	
2	**Cable Attributes:**	
3	Number of Cores –6 /12	
4	Armor - Corrugated Steel Tape Armor	
5	Cable Diameter – 10.5 mm ± 1.0 mm	
6	Sheath Thickness _ 2.0 mm	
7	Operating Wavelength at 1310 nm and 1550 nm	
8	**Fiber Attributes:**	
9	Mode Field Diameter at wavelength 1310 nm - 8.6 – 9.5 μm ± 0.6 μm	
10	Cladding Diameter – 125.0 μm ± 1 μm	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

11	Core Concentricity error (max) - 0.6 μm	
12	Cladding Non circularity (max) – 1.0 %	
13	Cable cut off wave length (max) - 1260 nm	
14	Chromatic Dispersion @ 1310 nm – <=3.5 ps/(nm.Km)	
15	@ 1550 nm - <=18.0 ps/(nm.Km)	
16	Macrobend loss at Radius 30mm with 100 turns at 1625 nm (max) – 0.1 dB	
17	Attenuation coefficient Max at 1310-1625 nm - >_ 0.4 dB/Km	
18	Max at 1383 nm ± 3 nm - >_ 0.4 dB/Km	
19	Max at 1550 nm - >_ 0.3 dB/Km	
20	**Mechanical Attributes:**	
21	Tensile Rating – 1250N	
22	Maximum Bend Radius – 220 mm	
23	Maximum Crush Resistance – 3000 N	
24	**Environmental Attributes:**	
25	Operating Temperature - -20 ° C to + 70 ° C	
26	Induced attenuation at 1310 and 1550 @ -60 Degree C to +85 Degree C -<=0.05db/Km	
27	Make offered:	

Item No. 55: Documentation

The **successful bidder** shall provide comprehensive documentation for the Communications Network solution, including the network, NMS, services and processes, as outlined in the other sections of this document, as required for the ongoing engineering, operation, maintenance and upgrade of the system.

All technical descriptions, operations, and installation manuals shall be provided in the English language. Documentation shall include, but not be limited to, the following:

a.   system architecture diagrams
b.   functional and schematic Network and system diagrams
c.   detailed technical specifications
d.   commissioning forms with specifications
e.   equipment and system acceptance test procedures and test results
f.   operation and maintenance manuals
g.   system description and operational and maintenance manuals for any 3rd party hardware
h.   software incorporated into the system
i.   as-installed drawings
j.   interface diagrams
k.   system and rack/cabinet layout diagrams

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

l.   spare parts lists

m.   configuration procedures

Unless stated otherwise within the Agreement, the Supplier shall provide TWO printed sets, and two soft copies of all written documents. The structure and content of the documents to be prepared shall be the Supplier's responsibility, provided they meet KGS 1-4's minimum requirements as described in this document. The filing and storage requirements shall be defined and agreed between the parties. Soft copy technical documentation shall be provided in one or more of the following formats, unless otherwise agreed by KGS 1-4:

a.   Microsoft Word for Windows (DOCX)

b.   Adobe Portable Document Format (PDF)

c.   Drawings included separately in the Technical Documentation in AutoCAD / VISIO / PDF formats

Other soft copy documentation, such as reports, schedules, and charts are to be provided in one or more of the following formats, unless otherwise agreed by KGS 1-4:

a.   Microsoft Word for Windows (DOCX)

b.   Microsoft PowerPoint (PPT)

c.   Microsoft Excel (XLS)

d.   Microsoft Project

e.   Microsoft Visio

f.   Adobe Portable Document Format (PDF)

Item No 56: Installation and Commissioning & Training

The plant site of Kaiga is constructed with high quality construction material and heavy concrete structures. Bidder may conduct survey of locations wherever the installation of racks, laying of cables, etc required, and may execute complete study to quantify the quantum of job & complexity involved before submission of proposal.

The supplier shall be responsible for installation and commissioning of laying of cables, switches and all accessories. Supplier shall ensure that trained and qualified personnel are involved in installation and commissioning.

Personnel engaged in the installation and commissioning work will have to follow the security procedures controlling entry and movement. These personnel have to strictly follow the safety regulation (industrial safety) of site. In such a matter, purchaser's instruction wherever given will be binding.

Training

The supplier shall provide two sessions of training modules with minimum one week duration to purchaser's engineers and staff (8-10 employees). One session of training will be conducted prior to deployment of proposed active components and one will be conducted after commissioning of the LAN project. Supplier shall provide all the facilities and documents or manuals for training. Hands on training on all major features of the supplied switches shall be included in the training program.

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

The training should cover:

a) Configuration of CORE switches.
b) Configuration of IPv6 for layer 2/ Layer 3 switches
c) Active-Active Failover Convergence
d) NAC, RADIUS, Dynamic VLAN and Authentication.
e) Dual stacking/tunneling of IPV4 and IPV6
f) VLAN creation
g) Port mapping and traffic segregation
h) NMS & Network Monitoring and management
i) Troubleshooting
j) Overall administration of switches

Item No. 57: Warranty

The network switches shall carry a comprehensive, on site, maintenance **warranty of 3 (three) years from the date of commissioning.** Option for additional 24 months warranty with cost breakup with payment terms should be mandatorily specified. NPCIL reserves the right to exercise the additional warranty option. Documentary proof regarding back to back agreement with OEM for support of the all active components during the period shall be submitted. The scope of warranty shall include replacement of the defective part, breakdown maintenance etc. during this period. The faulty units shall be replaced/repaired free of cost at site by the supplier.

Response Time during warranty period:

Response time means the time taken to restore network back to original condition by replacing the defective equipment with new one from the principal or with a standby as substitute from the vendor.

a) Response time for all network active components shall be 48 hours.
b) Response time for software related and passive complaints shall be 48 hours.

Preventive Maintenance:

a) Minimum one yearly visit by the expert service engineer as part of PM and any number of visits in case of break down calls within specified response time defined. Review the status of IOS / OS, security patches other updates loaded in the active components and if any modification required shall be carry out. This shall be carried out by a professional from the principal.

Item No. 58, 59, 60 & 61: List of Switches & racks for buy back (on as-is-where-is basis)

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

Make	Model No	Type of switch	No of Ports	Qty
Enterasys / D-Link	VH 2402S/D-link Models	L2 Manageable / Un-manageable	24	45 Nos.
Linksys / Cisco			12/24	3 Nos.
Enterasys Core switch – E5	E5	Manageable L3 (Dual RPS)	6 * 1 Gbps Tx, 6 * 1 Gbps SX/LX, 8 * 100 Mbps MTRJ 48 * 100 Mbps tx,	1 No.
Rack – 6U & 9U	6/9U Glass door			25 Nos.

5. **Installation Requirements.**
   5.1 Optic Cable Laying –
   5.1.1   Excavation of trenches up to Depth 92 Cm & reinstatement as per construction Practice & specifications having mixed soil i.e. combination of Ordinary soil, Soft rock and Hard rock. Backfilling and dressing of the trench
   5.1.2   Laying with leveling & fixing of GI Pipes/HDPE pipes in the trench including transportation wherever required.
   5.1.3   Mounting of OFC markers for easy identification of the route of fiber.
   5.2 OFC Termination
   5.1.1.   Termination of Single mode Fiber cores
   5.1.2.   Termination of all Multimode Fiber segments of existing OFC MM backbone.
   5.1.3.   Splicing of fiber cores (SM/MM) wherever required.
   5.3 UTP laying and related jobs
   5.2.1.   Laying of CAT 6 UTP cable to end user location, wherever required. Bidder shall arrange all necessary sundry items like screws, guttas etc for laying & fixing of Casing & Cables.
   5.2.2.   Laying of 2 uplinks of CAT 6 for Switch to Switch Uplinks.
   5.2.3.   Installation / Replacement of existing UTP patch panel & termination, if required
   5.2.4.   Neat arrangement of cables using tags & cable managers.
   5.2.5.   UTP patch panel to switch connection (inside rack) - with 3feet patch cords in 4 sets of colors, for proper identification.
   5.2.6.   Providing and use of unique color for patch cord for uplink.
   5.2.7.   Labeling & numbering of IOs including existing LAN points.
   5.4 Rack installation
   5.3.1.   Replacement of existing Racks or new installation of 9U/12U/15U racks wherever applicable.
   5.3.2.   Proper cleaning of existing racks and proper painting of walls, if required, before installation of new components.
   5.3.3.   Labeling & numbering of racks.
   5.3.4.   Extension of Power supply connection from nearby power source, if required.
   5.3.5.   Proper closure of open entry areas with steel mesh / cement etc. to avoid rodent entry.
   5.5 Active Component installation:
   5.4.1.   Ensure latest patch updation for all active components before installation.
   5.4.2.   Prepare the detailed implementation scheme in consultation with NPCIL representative.
   5.4.3.   Create subnets, VLANs, security zones, radius configuration, ACLs, NMS

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

configurations, IPv6 implementation etc.

5.4.4. Prepare performance monitoring scheme, monitor the performance of the individual component, subnet and total network as a whole for minimum period of one week and submit the report. Carryout the analysis and implement required performance tuning plan.

6. **Documents.**

6.1 Operation and Maintenance Manual: The Successful bidder has to supply operating and maintenance manual for all types of switches.

6.2 Technical description: All the technical details of the switches has to be provided in details. It may include technical data sheets, system architecture, parts catalogue etc.

6.3 Troubleshooting and Maintenance Instructions: The detailed troubleshooting methods, routine and periodic maintenance procedures, Manufacturers operating and maintenance manual and one soft copy in PDF of MS word for each type of switches shall be supplied to the purchaser.

7. **INSPECTION AND TESTING**

7.1 Trial Run testing: After the successful installation and commissioning of all the network switches, the overall Local area network at Kaiga should function satisfactorily and as per the requirement of purchaser. Trial Run should be carried out for seven days after the successful installation and commissioning of all the network switches.

7.2 Test Reports: Copies of the inspection and test reports signed by the authorized representative of the supplier shall be submitted to purchaser

7.3   Network Auditing: The contractor has to perform the auditing of the entire network to determine the overall network capability right from the Input of the main / primary switch to the outlets /desktops with the aid of specific auditing devices. This auditing is to be done after the network and the computers are put to normal operation and auditing is to be carried out for about one week period to find out the average performance. The auditing results are to be submitted to KGS as a part of documentation.

8. **Items to maintained at site as standby for replacement during warranty period:**

1.	Access switch	2 Nos.
2.	Fiber Tran receiver (Transition)	2 Nos.
3.	Power Unit of Distribution switches (RPS)	2 Nos.

9. **Payment Terms**

 Refer GCC for terms and conditions.

10. **Preferred completion time including delivery period:**

Five months from the date of Purchase order. Bidder should clearly mention the plan of action with detailed milestone chart.

11. **Testing and Acceptance Criteria.**

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

sl		Test Description	Results (Y/N)
1.		**Demonstration of following features at Kaiga site:**	
2.	Core switch	High Availability & resiliency features of - 　　(a) Core Switches 　　(b) Links between core & Distribution switches.	
3.		IPv6 Features – Management	
4.		802.1x & RADIUS based authentication	
5.		RPS features	
6.		VLAN & Dynamic VLAN configuration	
7.		Loop detection and prevention	
8.	Distribution switch	High availability features of links between core & distribution at distribution switch level.	
9.	(One test per model)	IPv6 Features – Management	
10.		802.1x & radius based authentication	
11.		RPS feature	
12.		VLAN & Dynamic VLAN configuration	
13.		Loop detection and prevention	
14.	Access switch	802.1x & radius based authentication	
15.	(One test per model)	IPv6 Features – Management	
16.		VLAN & Dynamic VLAN configuration	
17.		Loop detection and prevention	
18.	Radius Server	High availability feature of systems & databases.	
19.		Support for IPv6 feature in Radius server	
20.		Setup for user & password / Dynamic VLAN / static MAC	
21.	NMS	Demonstration of NMS features:	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

		a) Configuration of VLAN b) Monitoring c) Report generation	
22.	OFC termination	Shall maintain Symmetric core connection between two end terminations. Each terminated fiber cores will be tested for connectivity.	
23.	UTP	Random testing based on submitted UTP test report.	
24.	Racks	**Visual inspection of following:** a) Labelling of Racks & patch panel. b) Systematic cabling c) Systematic closure of rack opening - to avoid rodent entry.	
25.	Others parameters of Switches & Softwares	Following documents are acceptable for those parameters which are not possible to test and demonstrate at Kaiga site: a) Data sheets of the product b) User Manuals / product manuals.	

12. Supporting Documents and URL reference to web site of OEM.

The bidder shall provide details of URL links of all documents listed. If the OEM has hosted region-wise websites, the bidder shall furnish details of URL hosted in primary site and also in regional website. **NOTE: The bidder shall upload only datasheets.** Other product related documents and manuals **need not** to be uploaded in the Tendering site**.**

Sr.	Item	URL link in OEM's Global Web Site
1	Core Switch - Product Manual	
2	Core Switch - Latency Data	
3	Core Switch - User Manuals	
4	Core Switch - VSS Implementation manual	
5	Core Switch - Configuration/Setup Manuals	
6	Distribution Switch – Product & user Manuals	
7	Distribution Switch - high Available implementation - user manuals	
8	Distribution Switch - Latency data documents	
9	Access Layer Switch - Product manuals	
10	Access Layer Switch - Latency data documents	
11	RADIUS Solution - Configuration & user manuals	
12	RADIUS Solution - AAA User manuals	
13	NMS - Product Manual	
14	NMS - User Manual	
15	Active components Certification UL/cUL /TUV	

Scope, Specifications, Terms & Conditions for Supply, Implementation and commissioning LAN at Kaiga Site of NPCIL

13. **Active Components - Launch Date & other info. Bidder should furnish following details.**

Sr.	Type	Make & Model	Year - Launch	Year-End of Life	Year-End of support	OS & CLI Version	OS - Launch Date
1	Core						
2	Distribution Switch						
3	Access Layer Switch						
4	RADIUS						
5	NMS						