

# ANNEXURE – 1

## ROUTER Type “A”

Description		Compliance YES / NO	Remarks
<b>Router</b>			
10 Gbps Scalability			
4 GB DRAM			
1 GB Flash Memory			
Wired Connectivity Technology			
Modular 2U Enclosure			
SNMP, Telnet, SSH, Remote Management Protocol Must be support			
3 x Shared port adapters			
1 x Embedded services processor slots			
Integrated Route processor slots			
Integrated SPA interface processors (SIPs)			
4 x SFP built-in GE ports			
Redundant power supply			
Front-to-back Air flow			
Applies Modular QoS CLI (MQC) policies on VLANs or tunnels			
<b>Capacity</b>	Concurrent L2TP VPN tunnels : 12000		
	Concurrent sessions : 24000		
	IPv4 routes : 1000000		
	IPv6 routes : 500000		
<b>Performance Bandwidth 10 Gbps</b>			
<b>Compliant Standards</b>	CISPR 24, EN55022, VCCI Class A ITE, EN55024, CISPR 22, EN50082-1, CSA 22.2 No. 60950, EN 61000-6-1, AS/NZS 60950-1, AS/NZ 3548 Class A, ICES-003 Class A, FCC CFR47 Part 15, EN300-386, UL 60950-1, IEC 60950-1, EN 60950-1		
<b>Features</b>	Firewall protection, NAT support, VPN support, MPLS support, IPv6 support, Stateful switchover (SSO), Access Control List (ACL) support, Quality of Service (QoS), MPLS VPN, software redundancy		
<b>Interfaces</b>	Management : 1 x 10Base-T/100Base-TX - RJ-45		
	Management : 1 x console - RJ-45		
	Management : 1 x auxiliary - RJ-45		
	4 x SFP (mini-GBIC With loaded)		
<b>Expansion Slot(s)</b>	3 (total) / 2 free (1 expansion slot Loaded with 2SFP Port and 2 10g Ethernet Port		
<b>Voltage Required</b>	AC 120/230 V ( 50/60 Hz )		
<b>Nominal operating temperature</b>	41° to 104° F		
	5° to 40° C		
<b>Nominal operating humidity</b>	10% to 85%		
<b>Power consumption</b>	Maximum DC: 590W		
	Maximum AC: 560W		
	Maximum (Out): 470W		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>			
<b>Warranty 3 years</b>			

## ROUTER Type "B"

Description		Compliance YES / NO	Remarks
<b>Router</b>			
Embedded hardware-based crypto acceleration (IPSec + SSL)	Yes		
Total Onboard LAN 10/100/1000	2		
RJ-45-Based Ports	2		
EHWIC Slots	2		
Double-Wide EHWIC slots	1		
Dual ports HWIC-2T Card (supports 2 Mbps)	required		
One Console Port with console cable	required		
Two nos. of smart serial Cable	required		
Two nos. of UTP Patch Cable	required		
ISM Slots	1		
Memory (DDR2 Error Correction Code [ECC] ECC DRAM) – Default	512 MB		
Memory (DDR2 ECC DRAM) – Maximum	2.0 GB		
Compact Flash (external) – Default	slot 0: 256 MB		
	slot 1: none		
Compact Flash (external) – Maximum	slot 0: 4 GB		
	slot 1: 4 GB		
External USB flash memory slots (Type A)	2		
USB Console Port (Type B) (up to 115.2 kbps)	1		
Serial Console Port (up to 115.2 kbps)	1		
Serial Auxiliary Port (up to 115.2 kbps)	1		
Power Supply Options	AC, POE		
Maximum PoE device power capacity with PoE power supply	80 W		
Chassis	2 RU		
Rack-mount 19in. (48.3 cm) EIA	Included		
Wall-mount	Yes		
Airflow	required		
Safety	UL 60950-1		
	CAN/CSA C22.2 No. 60950-1		
	EN 60950-1		
	AS/NZS 60950-1		
	IEC 60950-1		
EMC	47 CFR, Part 15		
	ICES-003 Class A		
	EN55022 Class A		
	CISPR22 Class A		
	AS/NZS 3548 Class A		
	VCCI V-3		
	CNS 13438		
	EN 300-386		
	EN 61000 (Immunity)		
	EN 55024, CISPR 24		
	EN50082-1		

Telecom	TIA/EIA/IS-968		
	CS-03		
	ANSI T1.101		
	ITU-T G.823, G.824		
	IEEE 802.3		
	RTTE Directive		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>			
<b>Warranty 3 years</b>			

## ISP LINK LOAD BALANCER

Specification	Compliance YES / NO	Remarks
<b>Appliance</b>		
Should provide minimum 2 Gbps load balancing throughput and should be scalable to 4 Gbps with license key without changing the hardware		
Memory 4 GB or higher		
Customized OS with no open vulnerabilities		
Appliance form factor		
Processor		
Should have minimum 6 Copper Gig ports and option for 2 Fiber ports		
Green Compliant		
Layer 7 Requests per Second		
Max Concurrent Connections should be 1,000,000 & scalable upto 3,000,000		
IPV6 Support		
<b>Link Load Balancing Methods</b>		
<b>Outbound Load Balancing Methods</b>		
Round Robin		
Weighted Round Robin		
Shortest Response Time		
Dynamic Detect (proximity)		
<b>Inbound Load Balancing Methods</b>		
Round Robin		
DNS proximity		
Weighted Round Robin		
<b>Bandwidth Management and Traffic Shaping</b>		
Assured Application Performance and Availability		
QOS		
Application prioritization		
Port based Qos		
<b>Reporting</b>		
Inbuilt reporting		
Need reporting server		
Graphical reporting with export feature		
<b>Device Security</b>		
Firewall		
Permit and Deny policies		
Filters TCP, UDP, ICMP Packets		
Statefull Packet Inspection		
Attack Packet Filters for TCP,UDP and ICMP (Can monitor for unwanted application traffic)		
<b>Dos and Ddos</b>		
SynFlood		
Fragmentation attacks		
Blocked flood attacks with stateful inspection		
TCP SYN floods		

TCP Push, Fin and Reset floods		
UDP and DNS floods		
ICMP and IGMP floods		
<b>Application Smart Routing (Policy Based Routing)</b>		
Outbound and Inbound		
Classification Engine (eRoute Kind of Functionality)		
Physical Port or Vlan Interface based		
eRoute based on Source/Destination IP address or network		
eRoute based on Protocols – IP, TCP, UDP and port ranges		
Flow Manager		
IP Flow - Connection Persistence to a link for a given source and destination IP.once the connection is established		
<b>Optional Modules</b>		
SSL Offloader as Separate Hardware in same appliance		
Bulk SSL Throughput should be 1 Gbps or higher		
SSL TPS/ CEC SSL connections should be 9000 or higher		
End to End SSL Support		
Server/Client certificate System		
Compression on the same appliance		
Compression throughput should be 500 Mbps or higher		
Selective use of compression for Wan users only		
GSLB on the same appliance		
GSLB to support Active Active and Active Passive sites		
Full DNS Function Support		
IANA Import		
Caching on the same appliance		
Request/Response Cache Control Override		
Cache Object Management Policy		
Multiplexing and TCP buffering		
Reverse Proxy firewall		
Application Intelligent L7 firewall		
Support for Transparent, Reverse and Triangular mode		
X-forward-for for Client IP to Server		
Customizable HTTP Error Messages/Pages		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>On Site Warranty 3 years</b>		

## **FIREWALL**

Description	Compliance YES / NO	Remarks
The vendor/ OEM must attain ISO 9001:2000 certification that covers scope of the Quality Management System which includes the design, development and manufacturing of network security products and the delivery of associated security services and support		
OEM should be at least in Leaders quadrant of Gartner's – in either UTM Magic Quadrant or Network firewalls magic quadrant for the last one year.		
Appliance shall be ICSA certified for Firewall, VPN, SSL VPN, IPS, AV security functionalities		
The device should belong to a family of products that attains NSS Approved (UTM) Certification		
Firewall Operating system should be EAL4+ certified.		
If product supports Layer-7 based UTM/Firewall virtualization,that would be an added advantage and all UTM features are supported in each virtual firewall AV, IPS, Web filter etc.		
Firewall Operating system should be EAL4+ certified.		
Product OEM should have its own Technical assistance centre (should not be outsourced).		
The Firewall Appliance should be rack mountable and shall not exceeding 1U		
<b>Networking &amp; System Performance Requirements</b>		
Firewall Throughput: Minimum 20 Gbps for both small & large packets.		
Concurrent session per second: 7 Million or better		
New sessions per second: 190,000 or better		
IPS Throughput: 6 Gbps minimum.		
Should support and GAV throughput: 3.1 Gbps or better.		
Number of IPv4 & IPv6 Firewall security policies support required: 10,000 or higher.		
The Firewall should support a minimum of 2x10GbE SFP+ interface,12 x 10/100/1000 interfaces with auto sensing capacity and 8x 1GbE SFP Ports		
Number of Dedicated Management Ports required: minimum 2 no.		
Minimum of 64 GB Internal Storage		
<b>The proposed solution must have following features inbuilt</b>		
Firewall should support RIP1 & 2, OSPF, OSPFv3, BGP4, ISIS, RIPng		
The Firewall should support minimum 250 Policy-based Routes.		
Should support LADP, RADIUS, Windows AD,PKI based Authentication		
Should have integrated 2-Factor Authentication server support.		
Should also support Local User database creation & Number of Local users creation support required – 5,000. & User-Group creation support required - 800.		
Should support DHCP server & DHCP Agent functionality		
Firewall should support first level of WAN optimization functionality integrated within firewall		
The proposed system should have integrated Web Content Filtering solution with database which should have atleast 40 million + sites and 75 + categories. without external solution, devices or hardware modules.		
The proposed solution should be able to enable or disable Web Filtering per firewall policy or based on firewall authenticated user groups for both HTTP and HTTPS traffic.		
The proposed system should be able to block, allow or monitor only using AV signatures and file blocking based on per firewall policy based or based on firewall authenticated user groups with configurable selection of the following services: HTTP, SMTP, POP3, IMAP, Instant Messenger (AIM, YAHOO!, MSN, ICQ, SIMPLE), NNTP as well as all SSL based protocols like SMTPs, IMAPs, POP3s, etc		
The proposed system shall provide ability to allow, block and intercept (allow but quarantine) attachments or downloads according to file extensions and/or file types, including: Executables (.com, .exe, .elf), HTTP (.html, .hta), Java (.jad, .class, .cod, javascript), Microsoft Office Packer (.fsg, upx, petite, aspack), PalmOS applications (.prc), Symbian Installer system file (.sis), Windows Help file (.hlp), Activemime, Batch		

File (.bat), Archive (.arj, .cab, .lzh, .rar, .tar, .zip, .bzip, .gzip, .bzip2), Common Console Document (msc), Encoded Data (.uue, mime, Base64, binhex)		
Should have integrated Application control solution & Should have identification support for at least 1000+ applications and the identification should be regardless of ports. The applications need to be predefined on the box.		
The administrator shall be able to set the Session TTL of the selected application/group.		
The proposed system shall have the ability to identify, block or rate limit the following common P2P applications:Gnutella (Napshare, iMesh, Mldonkey, morph, Xolox, BearShare, FOXY), Bittorrent, Kaaza, WinY, eDonkey		
The proposed system shall have the ability to manage and control Instant messaging usage by identifying various IM applications such as AIM, MSN, YAHOO, SIMPLE, ICQ		
The proposed system should support Traffic shaping & Traffic quota management on per IP address and Per user group basis without the need of any client utility to be either manually installed on hosts or pushed through Directory servers		
Should support both explicit proxy and implicit proxy functionality integrated within firewall appliance.		
The proposed system should allow multiple OS firmware image for booting options and Firmwares should be upgradeable via Web UI or TFTP		
Should support Active-Active & Active-Passive HA with negligible downtime during upgrade		
<b>VPN support</b>		
The Firewall should be integrated solution and there should be no user based licensing for SSL VPN & IPSec VPN as well.		
IPSec VPN throughput: 8 Gbps or higher		
SSL VPN Throughput: 1.3 Gbps or higher.		
Total Number of Gateway-to-Gateway IPSec VPN tunnels to be supported by default: 2,000.		
Total Number of Client-to-Gateway IPSec VPN tunnels to be supported by default: 50,000.		
IPSec VPN should support Extended Authentication		
IPSec VPN should support DDNS.		
Should support IPSec Standards like Des, 3DES, AES, DH group 1,2,5,14		
Should support SSL traffic scanning transparently		
Support : Support & Maintenance Support 3 years by Certified Engineer		
Warranty : 3 years		

## USER & DEVICE IDENTITY MANAGEMENT

Description	Compliance YES / NO	Remarks
The Solution should provide a highly powerful and flexible attribute-based access control solution that combines authentication, authorization, and accounting (AAA); posture; profiling; and guest management services on a single platform.		
It should allow enterprises to authenticate and authorize users and endpoints via wired, wireless, and VPN with consistent policy throughout the enterprise.		
Provides complete guest lifecycle management by empowering sponsors to on-board guests.		
Delivers customizable self-service portals as well as the ability to host custom web pages to ease device and guest on-boarding, automate endpoint secure access and service provisioning, and enhance the overall end-user experience inside business-defined workflows		
Offers comprehensive visibility of the network by automatically discovering, classifying, and controlling endpoints connected to the network to enable the appropriate services per endpoint		
Addresses vulnerabilities on user machines through periodic evaluation and remediation to help proactively mitigate network threats such as viruses, worms, and spyware		
Enforces security policies by blocking, isolating, and repairing noncompliant machines in a quarantine area without requiring administrator attention		
Offers a built-in monitoring, reporting, and troubleshooting console to assist helpdesk operators and administrators streamline operations		
Allows you to get finer granularity while identifying devices on your network with Active Endpoint Scanning		
Augments network-based profiling by targeting specific endpoints (based on policy) for specific attribute device scans, resulting in higher accuracy and comprehensive visibility of what is on your network		
Manages endpoint access to the network with the Endpoint Protection Service, which enables administrators to specify an endpoint and select an action - for example, move to a new VLAN, return to the original VLAN, or isolate the endpoint from the network entirely - all in a simple interface		
Utilizes standard RADIUS protocol for authentication, authorization, and accounting (AAA).		
Supports a wide range of authentication protocols, including PAP, MS-CHAP, Extensible Authentication Protocol (EAP)-MD5, Protected EAP (PEAP), EAP-Flexible Authentication via Secure Tunneling (FAST), and EAP-Transport Layer Security (TLS).		
Offers a rules-based, attribute-driven policy model for creating flexible and business-relevant access control policies. Provides the ability to create fine-grained policies by pulling attributes from predefined dictionaries that include information about user and endpoint identity, posture validation, authentication protocols, profiling identity, or other external attribute sources. Attributes can also be created dynamically and saved for later use		
Provides a wide range of access control mechanisms, including downloadable access control lists (dACLs), VLAN assignments, URL redirect, and Security Group Access (SGA) tagging using the advanced capabilities of network devices.		
Should have predefined device templates for a wide range of endpoints, such as IP phones, printers, IP cameras, smartphones, and tablets.		
It should allow Administrators to create their own device templates. These templates can be used to automatically detect, classify, and associate administrative-defined identities when endpoints connect to the network. Administrators can also associate endpoint-specific authorization policies based on device type.		
The Solution should have capability to collect endpoint attribute data via passive network telemetry, querying the actual endpoints, or alternatively from the infrastructure via device sensors on network switches.		
Solution should allow end users to interact with a self-service portal for device on-boarding, providing a registration vehicle for all types of devices as well as automatic supplicant provisioning and certificate enrolment for standard PC and mobile		



computing platforms.		
Should support full guest lifecycle management, whereby guest users can access the network for a limited time, either through administrator sponsorship or by self-signing via a guest portal. Allows administrators to customize portals and policies based on specific needs of the enterprise.		
Verifies endpoint posture assessment for PCs connecting to the network. Works via either a persistent client-based agent or a temporal web agent to validate that an endpoint is conforming to a company's posture policies. Provides the ability to create powerful policies that include but are not limited to checks for the latest OS patches, antivirus and antispyware software packages with current definition file variables (version, date, etc.), registries (key, value, etc), and applications. Solution should support auto-remediation of PC clients as well as periodic reassessment to make sure the endpoint is not in violation of company policies.		
Allows administrators to quickly take corrective action (Quarantine, Un-Quarantine, or Shutdown) on risk-compromised endpoints within the network. This helps to reduce risk and increase security in the network.		
Enables administrators to centrally configure and manage profiler, posture, guest, authentication, and authorization services in a single web-based GUI console, greatly simplifying administration by providing consistency in managing all these services.		
Includes a built-in web console for monitoring, reporting, and troubleshooting to assist help-desk and network operators in quickly identifying and resolving issues. Offers comprehensive historical and real-time reporting for all services, logging of all activities, and real-time dashboard metrics of all users and endpoints connecting to the network.		
Should be available as a physical or virtual appliance.		
Should support consistent policy in centralized and distributed deployments that allows services to be delivered where they are needed		
Employs advanced enforcement capabilities including security group access (SGA) through the use of security group tags (SGTs) and security group access control lists (SGACLs)		
Solution should have capability to determine whether users are accessing the network on an authorized, policy-compliant device.		
Solution should have capability to established user identity, location, and access history, which can be used for compliance and reporting.		
Solution should have capability to assign services based on the assigned user role, group, and associated policy (job role, location, device type, and so on).		
Solution should have capability to grant authenticated users with access to specific segments of the network, or specific applications and services, or both, based on authentication results.		
Solution should support Federal Information Processing Standard (FIPS) 140-2 Common Criteria EAL2 compliance		
Solution should have capability which allows users to add a device on a portal (My Devices Portal), where the device goes through a registration process for network access. Should allow users to mark as lost any device that you have registered in the network, and blacklist the device on the network, which prevents others from unauthorized network access when using the blacklisted device. Should have capability to reinstate a blacklisted device to its previous status in the My Devices Portal, and regain network access without having to register the device again in the My Devices Portal. Should also support removing any device in the enterprise network temporarily, then register the device for network access again later.		
The portal used for Device registration (MY device Portal) should be customizable, allowing to customize portal theme by changing text, banners, background color, and images		
Should provide a Registered Endpoints Report which provides information about a list of endpoints that are registered through the device registration portal by a specific user for a selected period of time. The report should provide the following details		
<ul style="list-style-type: none"> <li>● <b>Logged in Date and Time</b></li> </ul>		
<ul style="list-style-type: none"> <li>● <b>Portal User (who registered the device)</b></li> </ul>		
<ul style="list-style-type: none"> <li>● <b>MAC Address</b></li> </ul>		
<ul style="list-style-type: none"> <li>● <b>Identity Group</b></li> </ul>		

• <b>Endpoint Policy</b>		
• <b>Static Assignment</b>		
• <b>Static Group Assignment</b>		
• <b>Endpoint Policy ID</b>		
• <b>NMAP Subnet Scan ID</b>		
• <b>Device Registration Status</b>		
Solution should have capability to look at various elements when classifying the type of login session through which users access the internal network, including the following:		
- <b>Client machine operating system and version</b>		
- <b>Client machine browser type and version</b>		
- <b>Group to which the user belongs</b>		
- <b>Condition evaluation results (based on applied dictionary attributes)</b>		
Solution should classify a client machine, and should support client provisioning resource policies to ensure that the client machine is set up with an appropriate agent version, up-to-date compliance modules for antivirus and antispymware vendor support, and correct agent customization packages and profiles, if necessary		
Should support native supplicant profiles to enable users to bring their own devices into the security network. When the user logs in, based on the profile that you associate with that user's authorization requirements, solution should provide the necessary supplicant provisioning wizard needed to set up the user's personal device to access the network. This should be supported over Microsoft windows, Apple Mac and iOS and Android devices.		
Should support an endpoint identity group which is used to group all the identified endpoints on your network according to their profiles. Solution should create the following four identity groups in the system: Registered Devices, Blacklist, Profiled, and Unknown.		
When endpoints are discovered on the network, they can be profiled dynamically based on the configured endpoint profiling policies, and assigned to the matching endpoint identity groups depending on their profiles.		
Should support using a simple filter that you can use to filter endpoints. The quick filter filters endpoints based on field descriptions, such as the endpoint profile, MAC address, and the static status that is assigned to endpoints when they are created in the Endpoints page.		
Should support an advanced filter that you can preset for use later and retrieve, along with the filtering results, The advanced filter filters endpoints based on a specific value associated with the field description. You can add or remove filters, as well as combine a set of filters into a single advanced filter.		
Should support importing endpoints from a comma-separated values (CSV) file in which the list of endpoints appears with the MAC address and the endpoint profiling policy details separated by a comma. The CSV file contains a header row that has two columns that list the MAC address of endpoints in one column, and endpoint profiling policies assigned to those endpoints in the next column.		
Support for importing endpoints from LDAP server. Should allow to import MAC addresses and the associated profiles of endpoints securely from an LDAP server. Should support an LDAP server to import endpoints and the associated profiles, by using either the default port 389, or securely over SSL, by using the default port 636.		
Should support multiple Admin Group Roles and responsibilities like Help Desk Admin, Identity Admin, Monitoring Admin, Network Device Admin, Policy Admin, RBAC Admin, Super Admin and System Admin		
Should support Role-based access policies which are access control policies which allow you to restrict the network access privileges for any user or group. Role-based access policies are defined when you configure specific access control policies and permissions. These admin access policies allow you to customize the amount and type of access on a per-user or per-group basis using specified role-based access permission settings that apply to a group or an individual user.		
<b>Should support Identity source sequences which defines the order in which the solution will look for user credentials in the different databases. Solution should support the following databases :</b>		
<b>Internal Users</b>		

<b>Internal Endpoints</b>		
<b>Active Directory</b>		
<b>LDAP</b>		
<b>RSA</b>		
<b>RADIUS Token Servers</b>		
<b>Certificate Authentication Profiles</b>		
<b>Should Support the following Authentication Protocols</b>		
Extensible Authentication Protocol-Flexible Authentication via Secure Tunneling (EAP-FAST) and Protected Extensible Authentication Protocol (PEAP)—support for user and machine authentication and change password against Active Directory using EAP-FAST and PEAP with an inner method of Microsoft Challenge Handshake Authentication Protocol version 2 (MS-CHAPv2) and Extensible Authentication Protocol-Generic Token Card (EAP-GTC).		
Password Authentication Protocol (PAP)—support for authenticating against Active Directory using PAP and also allows you to change Active Directory user passwords.		
Microsoft Challenge Handshake Authentication Protocol version 1 (MS-CHAPv1)—support for user and machine authentication against Active Directory using MS-CHAPv1.		
MS-CHAPv2—support for user and machine authentication against Active Directory using EAP-MSCHAPv2.		
EAP-GTC—support for user and machine authentication against Active Directory using EAP-GTC.		
Extensible Authentication Protocol-Transport Layer Security (EAP-TLS)—Should use the certificate retrieval option to support user and machine authentication against Active Directory using EAP-TLS.		
Protected Extensible Authentication Protocol-Transport Layer Security (PEAP-TLS)—support for user and machine authentication against Active Directory using PEAP-TLS.		
LEAP—support for user authentication against Active Directory using LEAP.		
Must be able to differentiate policy based on device type + authentication		
Should have Ability to authenticate at least one phone and multiple users on the same switch port without interrupting service		
Solution should support MAB and can further utilize identity of the endpoint to apply the proper rules for access. Mac Address Bypass is typically used for devices which do not support 802.1x		
Solution must support Non 802.1x technology on assigned ports and 802.1x technology on open use ports		
Solution should provide support policy enforcement through VPN gateways		
Solution must allow users access to the network in a worst case scenario in case of AAA server outages or any other reasons like WAN failure.		
Should support authenticating Machines and users connected to the same port on the switch in a single authentication flow		
Should support authenticating IP phones and users connected behind IP phones on the same physical port.		
Solution should have profiling capabilities integrated into the solution in order to detect headless host. The profiling features leverage the existing infrastructure for device discovery. Should support the use of attributes from the following sources or sensors:		
<b>Profiling using MAC OUIs</b>		
<b>Profiling using DHCP information</b>		
<b>Profiling using RADIUS information</b>		
<b>Profiling using HTTP information</b>		
<b>Profiling using DNS information</b>		
<b>Profiling using Net Flow information</b>		
<b>Profiling using SPAN/Mirrored traffic</b>		
Should be able to classify endpoints based on information like DHCP, CDP, and LLDP attributes using OS sensor capabilities enabled on switches		
Should support centralized licensing and allow to add licenses as you grow.		

<b>Hardware Specifications Necessary Qtys should be proposed by the bidders :</b>		
<b>a. Processor - At least 2 x Quad Core Intel Xeon CPU E5504 @ 2.00 GHz</b>		
<b>b. RAM – At least 4 GB</b>		
<b>c. Ethernet – 4*10/100/1000</b>		
<b>d. Enough USB Ports (At least 2)</b>		
The solution should be quoted with 5000 license which will enable Authentication and authorization, Guest services, Monitoring and troubleshooting, Posture assessment, Profile etc. The solution should be integrable with existing Wireless Controller and switches. All the functionalities mentioned above will be used from day 1 and should be available with the proposed network admission control solution so that customer can use those functionalities.		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		

## **NETWORK MANAGEMENT SYSTEM**

Description	Compliance YES / NO	Remarks
The EMS Software should be provided for:		
Total Network Elements : 200 nos of Network equipment, 10 nos of Security equipment, 120 nos of WAPs and 15 nos of Servers		
Intel Processors should be covered.		
O/S: Will be Linux as well Microsoft.		
Solution should provide for future scalability of the whole system without major architectural changes.		
Should be SNMP v1, v2, v3 and MIB-II compliant.		
Filtering of events should be possible, with advance sort option based on components, type of message, time etc.		
Should support Web /Administration Interface.		
Should provide accessibility to internal built-in database via the Application GUI.		
Solution should be open, distributed, and scalable and open to third party integration.		
Should be able to provide secured windows based consoles as well as secured web-based consoles for accessibility to EMS.		
Should have web browser interface with user name and Password Authentication.		
Administrator/ Manager should have privilege to create/modify/delete user.		
Should have event suppression complex policy profiler to provide intelligence.		
Support discriminated polling.		
Should be able to update device configuration changes such as re-indexing of ports.		
Should be able to get fault information in real time and present the same in alarm window with description, affected component, time stamp etc.		
Should be able to get fault information from heterogeneous devices –routers, switches, servers etc.		
Event related to Servers should go to a common enterprise event console where a set of automated tasks can be defined based on the policy.		
Should have ability to correlate events across the entire infrastructure components.		
Should support automatic event correlation in order to reduce events occurring.		
Should support advanced filtering to eliminate extraneous data / alarms in Web browser and GUI.		
Should be configurable to suppress events for key systems/devices that are down for routine maintenance or planned outage.		
Should be able to monitor on user-defined thresholds for warning / critical states and escalate events to event console of enterprise management system.		
Should be able to document connectivity changes that were discovered since the last update.		
Should provide out of the box root cause analysis with multiple root cause algorithms inbuilt for root cause analysis.		
Should have self-certification capabilities so that it can easily add support for new traps and automatically generate alarms.		
Should provide sufficient reports pertaining to asset and change management, alarms and availability of critical network resources as well as network response times for critical links		
The tool shall integrate network, server and database performance information and alarms in a single console and provide a reporting interface for network and system components. The current performance state of the entire network and system infrastructure shall be visible in an integrated console.		
Should provide an integrated performance view for all the managed systems and networks along with the various threshold violations alarms in them. It should be possible to drill-down into the performance view to execute context specific reports.		
Should provide the following reports for troubleshooting, diagnosis, analysis and resolution purposes: Trend Reports, At-A-Glance Reports, Top N Utilization reports &What if capacity prediction reports		
Should be able to auto-calculate resource utilization baselines for the entire managed		

systems and networks and allow user to set corresponding upper and lower threshold limits		
Should provide accurate discovery of layer 3 and heterogeneous layer 2 switched networks for Ethernet, LAN and Servers etc.		
Manual discovery can be done for identified network segment, single or multiple devices.		
Should be able to discover links with proper color status propagation for complete network visualization.		
Should support dynamic object collections and auto discovery. The topology of the entire Network should be available in a single map.		
All modules of the EMS should be of same OEM.		
Should give user option to create his /or her map based on certain group of devices or region.		
Should provide custom visual mapping of L2 and L3 devices connectivity and relationships.		
Should monitor various operating system parameters such as processors, memory, files, processes, file systems etc. Where applicable using agents on the servers to be monitored.		
Provide performance threshold configuration for all the agents to be done from a central GUI based console that provide a common look and feel across various platforms in the enterprise. These agents could then dynamically reconfigure them to use these threshold profiles they receive.		
Should be able to monitor/ manage large heterogeneous systems environment continuously.		
<b>Network Management</b>		
Provide tools for configuring, managing, monitoring and troubleshooting of the Network as a whole (all proposed switches and routers management from a single platform).		
Automatic discovery process for networked devices that create a network topology map using a color-coded, hierarchical view of the network for IP networks.		
Tools to simplify Device configuration and management for Routers and Switches		
Have tools for creating, deleting and editing VLANs. The package supports for automated fault detection that recognizes common problems in the network without forcing the user to define and set up their own set of rules, etc.		
Threshold management features that can be set for many performance variables to generate an alarm or event notification if threshold are exceeded		
The path-analysis tool should perform path analysis for Layer 2 and Layer 3 devices		
Capable to intelligently monitor and analyse the performance monitoring of device statistics, including device characteristics, CPU utilization, interface activity, errors and protocol information.		
It should interpret fault conditions at the LAN devices.		
Provide basic auditing tools to monitor, alert, and report network device activity.		
The Network Management function must monitor performance across heterogeneous networks from one end of the enterprise to the other. It should proactively analyse problems to improve network performance.		
The Network Management function should create a graphical display of all discovered resources.		
The Network Management function should have extensive reporting facility, providing the ability to format and present data in a graphical and tabular display.		
The Network Management function should collect and analyse the data. Once collected, it should automatically store data gathered by the NMS system in a database. This enterprise-wide data should be easily accessed from a central location and used to help with capacity planning, reporting and analysis.		
The Network Management function should also collect traffic statistics on client/server sessions, which cross the LAN on which it is running.		
The Network Management function should also provide information on performance of Ethernet segments, including capacity utilization and error statistics for the segment and the top contributing hosts, WAN links and routers.		
Alerts should be shown on the Event Management map when thresholds are		

exceeded and should subsequently be able to inform Network Operations Centre (NOC) and notify concerned authority using different methods such as pagers, emails, etc. It should be able to automatically generate a notification in the event of a link failure to ensure proper handling of link related issues.		
The Systems and Distributed Monitoring (Operating Systems) of EMS should be able to monitor:		
Processors: Each processor in the system should be monitored for CPU utilization. Current utilization should be compared against user specified warning and critical thresholds.		
File Systems: Each file system should be monitored for the amount of file system space used, which is compared to user-defined warning and critical thresholds.		
Log Files: Logs should be monitored to detect faults in the operating system, the communication subsystem and in applications. The function should also analyse the files residing on the host for specified string patterns.		
System Processes: The System Management function should provide real-time collection of data from all system processes. This should identify whether or not an important process has stopped unexpectedly. Critical processes should be automatically restarted using the System Management processes should be automatically restarted using the System Management function.		
Memory: The System Management function should monitor memory utilization and available swap space.		
Event Log: User-defined events in the security, system, and application event logs must be monitored		
<b>Server Monitoring</b>		
For Windows OS it Should monitor / manage following:		
i. Event log monitoring		
ii. Virtual and physical memory statistics		
iii. Paging and swap statistics		
iv. Operating System		
v. Memory		
vi. Logical disk		
vii. Physical disk		
viii. Process		
ix. Processor		
x. Paging file		
xi. IP statistics		
xii. ICMP statistics		
xiii. Network interface traffic		
xiv. Cache		
xv. Active Directory Services		
Should be capable of view/start/stop the services on windows servers		
For Unix / Linux it Should monitor with statistics:		
i. CPU Utilization, CPU Load Averages		
ii. System virtual memory (includes swapping and paging)		
iii. Disk Usage		
iv. No. of nodes in each file system		
v. Network interface traffic		
vi. Critical System log integration		
Infrastructure Services		
IIS / Tomcat / Web server statistics		
HTTP service		
HTTPS service		
FTP server statistics		
POP/ SMTP Services		
ICMP services		

Database Services – Monitor various critical relational database management system (RDBMS) parameters such as database tables / table spaces, logs etc.			
<b>Reports</b>			
Should be able to generate reports on predefined / customized hours.			
Should be able to present the reports through web and also generate pdf / CSV / ASCII reports of the same.			
Should provide user flexibility to create his /or her custom reports on the basis of time duration, group of elements, custom elements etc.			
Should provide information regarding interface utilization and error statistics for physical and logical links.			
Should create historical performance and trend analysis for capacity planning.			
Should be capable to send the reports through e-mail to predefined user with predefined interval.			
Should have capability to exclude the planned-downtimes or downtime outside SLA.			
Should be able to generate all sorts of SLA Reports.			
Should be able to generate web-based reports, historical data for the systems and network devices and Near Real Time reports on the local management console.			
Should be able to generate the reports for Server, Application, infrastructure services and Network devices.			
Should be able to receive and process SNMP traps from infrastructure components such as router, switch, servers etc.			
Should be able integrate with Helpdesk system for incidents.			
Should be able to send e-mail or Mobile –SMS to pre-defined users for pre-defined faults.			
Should trigger automated actions based on incoming events / traps. These actions can be automated scripts/batch files.			
<b>Security Management</b>			
Firewall Management :			
i	Powerful object and rule sharing capabilities to enable administrators to efficiently and consistently maintain their firewall estate		
ii	Innovative policy query feature displays which rules match a specific source, destination, and service flow, wildcards; this feature allows the administrator to define policies more efficiently including		
iii	To ease configuration, device information should be imported from a device repository or configuration file, or added in the software; additionally, firewall policies can be discovered from the device itself - this feature simplifies initial security management setup		
iv	Consumption of Firewall syslog events		
v	System-generated and customized reports, including firewall traffic and botnet reports		
<b>IPS Management :</b>			
i	Incremental provisioning of new and updated signatures		
ii	Insight into OEM recommended defaults allows customers to tune their environment before distributing the signature update		
iii	IPS signature policies and event action filters should be inherited and assigned to any device - all other IPS policies can be assigned to and shared with other IPS devices; IPS management also includes policy rollback, a configuration archive, and cloning or creation of signatures		
iv	IPS update administration and IPS subscription licensing updates should allow users to manage IPS software, signature updates, and licensing based on local and shared policies		
v	Consumption and viewing of IPS SDEE events		
vi	System and custom IPS reports, including top attackers, top signatures		
<b>Site-to-Site VPN Management :</b>			
i	Easy configuration of site-to-site, hub-and-spoke, full-mesh, and extranet VPNs		
ii	Support for Group Encrypted Transport VPN (GET VPN), Dynamic Multipoint VPN (DMVPN), and Generic Routing Encapsulation (GRE)		



iii	Support for a variety of site-to-site IPsec VPN configurations, including dynamic IP, hierarchical certificates, and pre-shared keys		
iv	Extranet IPsec VPN support for establishing tunnels to partner networks and third-party devices		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>			
<b>Warranty Support in Inside Campus 3 Years</b>			

## BANDWIDTH MANAGEMENT

Description	Compliance YES / NO	Remarks
<b>Features</b>		
Bandwidth Management can be done as follows:- <ul style="list-style-type: none"> <li>✓ Based on IP, User &amp; Group Base.</li> <li>✓ Based on Services &amp; Application.</li> <li>✓ Scheduling On Week Days &amp; Time.</li> <li>✓ Bandwidth Utilization Graphs &amp; reports</li> </ul>		
Policy management can be done as follows:- <ul style="list-style-type: none"> <li>✓ Surfing Policy Based on Total Days &amp; hours.</li> <li>✓ Time Based policy based on Week Days / Time / User / Group.</li> <li>✓ Access Based policy</li> <li>✓ Security Policy based on site, Domain &amp; services.</li> </ul>		
Report Generation can be done as follows:- <ul style="list-style-type: none"> <li>✓ Reports of users connected to internet.</li> <li>✓ Internet usage report on time, Data Transfer &amp; Bandwidth Utilization.</li> <li>✓ Based on user &amp; IP online bandwidth monitoring &amp; graphs.</li> <li>✓ Total upload &amp; download Date Report on user / group.</li> </ul>		
MIS Reporting can be done as follows:- <ul style="list-style-type: none"> <li>✓ Top 10 Site Visited</li> <li>✓ Top 10 site date transfer</li> <li>✓ Top content type</li> <li>✓ Average Hit per hour for particular duration</li> <li>✓ Top 10 users</li> </ul>		

## ANTI-VIRUS

Description	Compliance YES / NO	Remarks
250 User license		
<b>Security</b>		
Network : Stops malware as it travels over the network through protocol aware IPS and browser protection.		
File : Looks for and eradicates malware on a system to protects against viruses, worms, Trojans, spyware, bots and root kits.		
Reputation : The Insight uses the collective wisdom of 200 + million systems and over 3.1 billion files to block new and unknown malware – providing zero-day protection.		
Behaviour : SONAR monitors nearly 1,400 unique behaviours as they execute in real-time and removes malicious applications before they can damage the client.		
Repair : Automatically removes malware and offers aggressive tools and heuristics, including Eraser, for hard to remove infections.		
<b>Features</b>		
Flexibility : Unmatched scalability and granular policy enforcement provides a solution that adapts to your business.		
Reduced overhead : Reduce downtime, management cost and complexity by utilizing a single solution that provides the most effective security available.		
Improved productivity : Optimized scan performance and resource utilization in both physical and virtual environments enable your employees to work smarter and faster.		
Advanced reporting and analytics : IT Analytics expands traditional reporting by incorporating multi-dimensional analysis and robust graphical reporting in an easy to use dashboard.		
<b>Management</b>		
Streamlined deployment with automated 3rd party removal, enhanced wizards, and more deployment options.		
Powerful central console includes an optimized database to increase visibility, identify emerging threats and accelerate time to protection based on relevant, actionable intelligence.		
Flexible policy creation that leverages best practices and can be customized to enforce unique security policies.		
Smarter scheduling provides peace of mind by performing non-critical security tasks when computers are idle.		
Easy updates through an enhanced Group Update Provider and by pushing Sylink to retrieve orphaned clients.		
Multi-platform management in a single solution for Windows, Mac, Linux® and virtual platforms. Including Windows® 8 and Mac® 10.8 (Mountain Lion).		
<b>Insight</b>		
Insight correlates tens of billions of linkages between users, files, and websites to identify rapidly mutating threats that may only exist on a few systems and be missed by other systems.		
The Insight, malware creators are caught in a Catch-22 – mutate too little and get caught by signature based protection, mutate too much and get caught by Insight.		
Insight also improves performance. By only scanning at-risk files, scan overhead is reduced by as much as 70 percent.		
<b>Sonar</b>		
SONAR leverages artificial intelligence to provide zero-day protection.		
It examines nearly 1,400 behaviours, identifies malicious behaviour, and then effectively stops threats that are new and previously unknown—providing zero-day protection.		
<b>Application and Device Control</b>		
Prevents internal security breaches by controlling what information an application is allowed to access and by controlling the type of device that information can be written to.		
<b>System Lockdown</b>		
Enhanced protection for business critical systems by only allowing white listed		

applications, known to be good, to run or by blocking black listed applications, known to be bad, from running.		
<b>Firewall &amp; Browser Protection</b>		
Rules-based firewall engine, browser protection and intrusion prevention shields systems from drive-by downloads and from network based attacks.		
<b>Intelligent, Integrated Management Console</b>		
Simplified security management by consolidating antivirus, antispysware, desktop firewall, intrusion prevention, application and device control, and network access control into a single, high performance agent with a single management console that integrates with 3rd party applications.		
Centralized management and process automation increases threat visibility and accelerates threat response time.		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		

## **SWITCH TYPE – A**

<b>Description</b>		<b>Compliance YES / NO</b>	<b>Remarks</b>
Chassis based Architecture, with minimum 11 payload slots for accommodating line-cards / modules.			
Should have 2 Tbps switch fabric, scaling to 4-Terabit capacity with Switch Virtualization and 80 Gbps per slot bandwidth. Support for up to 1056 ports of 1Gbps and 352 ports of 10Gbps systems deployed with Switch Virtualization. The switch should provide 1Gbps/10Gbps and 40Gbps interface support to address future NIT Mizoram’s bandwidth growth requirements.			
Packet forwarding rate for 64-byte packets required at least 700 million packets per second forwarding rate at Layer 2, 3			
The Switch should have distributed/local switching on each Module. All relevant hardware required distributed forwarding should be provided from Day1			
The Switch should have the following interfaces from Day 1:			
48 x 10/100/1000 BaseTx interfaces (distributed in one line cards)			
1 no of 8 port 10G SFP+ interfaces (should be populated with 6 nos of 10G-Base-LR SFP+ modules and 2 nos of 10G-Base-SR SFP+ modules)			
1 nos of 24 port 1 Gig SMF interfaces (should be populated with 10 nos of 1000Base-LX modules)			
Hot swappable chassis Components such as power supply and interface modules			
Redundant CPU, power supplies and fans from day 1 and failure of any one of the CPU, PSU and fans should not affect the performance of the switch			
Should support following protocols:			
I	802.1s, 802.1d, 802.1w		
ii	802.3ad		
iii	802.1p & 802.1q		
iv	802.1x		
Redundant Management Modules with stateful failover. Failure of one CPU should not affect the performance of the switch. The switch should support Virtual Switching allowing the clustering of two or more physical chassis together into a single logical managed entity. The Switch Virtualization should allow for the centralized management of all network and device resources, including Layer 3 protocols (Open Shortest Path First [OSPF], Enhanced Interior Gateway Routing Protocol [EIGRP], Border Gateway Protocol [BGP], and so on) and Layer 2 protocols (Spanning Tree Protocol, Unidirectional Link Detection Protocol [UDLD], Flow Control, LACP, and so on). The switch virtualization should be supported to deploy with full Layer 3 features.			
Support for 4000 Active VLANs.			
Layer 3 features, VRRP or equivalent to create redundant, fail-safe routing topologies,			
Should support service modules to port network as well as business applications like Firewall, Server Load Balancing, Wireless LAN Controller etc.			
Should have in-skin, integrated firewall module supporting upto 20 Gbps of maximum firewall throughput in the chassis , and should support 80K ACLs, 10 security context licenses and 1000 VLANs			
The firewall module should support maximum 1,000,000 concurrent connections,			
Should have in-skin server load balancing module from day 1. Should provide load-balancing and content-switching functions with granular traffic control based on customizable Layer 4 through 7 rules with support for both IPv4 and IPv6 addresses, VIPs, and server farms. Should have a performance of 8 Gbps, SSL Throughput of 6Gbps, 30K SSL TPS, 250 Virtual contexts and 4 Mill concurrent connections.			
Static IP routing, RIPv1&2, OSPF, BGP4.			
Should support SSHv2, and SNMPv3 allowing secure access to the switch			
Should support DHCP protection blocking DHCP packets from unauthorized DHCP servers			
Standard and extended ACLs on all ports			
Should support 802.1x user authentication, Web-based authentication and MAC-based authentication			

Should have support for Ipv6		
CoS: Should support port-based COS assignment and CoS trust		
Queue per port: Should have minimum 8 hardware queues per port		
Mac address table size of 128,000 entries and 256K IPv4 Route entries and 128K IPv6 route entries		
Support for MacSec encryption and Role-Based ACL. The switch should provide control plane policing to address denial of service attacks.		
Native support for VPLS, as well as enhancements such as VPN-aware NAT, VPN statistics, and VPN netflow as important features needed for deployment of network virtualization.		
The Processing Engine should support enhanced application monitoring such as Flexible and Sampled Netflow for intelligent and scalable application monitoring.		
Maximum resiliency with redundant components, Nonstop Forwarding/Stateful Switchover, and In-Service Software Upgrade support		
In-Service Software Upgrade should allow you to upgrade or downgrade complete OS Software images with minimal (10msec) to no disruption to the network when using a redundant system with dual processing engines. Facilitating rapid, nondisruptive software upgrade for new line cards, new power supplies, new features, or bug fixes, this feature should offer continuous packet forwarding during the processing engine switchover running different OS Software releases.		
Layer-3 classification and marking access control entries (ACEs), 64K shared for QoS / Security.		
<b>Support for Additional Advanced Modules in the CORE Switch Chassis (In-Skin):</b>		
Firewall Module		
Network Analysis Module		
Content Switch Module - (For Server Load balancing)		
Wireless LAN Controller/Services module for wireless management		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		

## SWITCH TYPE - B

Description		Compliance YES / NO	Remarks
<b>Hardware &amp; Performance Requirements</b>			
<b>Architecture</b>	Gigabit Layer-3 modular fixed configuration Switch		
<b>Required Port Density</b>	24 x 10Gig SFP+ ports		
	The switch should support GE SFP and 10 GE SFP+ on any 24 ports (should be populated with 2 nos 10 Gig LR/SMF SFP+ modules)		
<b>Switching Bandwidth</b>	Switching bandwidth should be minimum 800 Gbps		
<b>Performance</b>	Forwarding Rate based on 64 Byte packet should be min 245 Mpps		
	The switch should Scales system bandwidth capacity to 1.6 Tbps with clustering of two switches.		
	MAC Address table size of 55000 entries, and Flexible NetFlow entries of 128,000		
	The switch should have 4 Gb On board Memory (SRAM DDR - II) and Dual Core 1.5 GHz CPU		
<b>Functionality</b>	All Functionality at half duplex and Full Duplex speed		
	The switch should support Virtual Switching in future as and when required by NIT Mizoram. Two Switches should share a single point of management, single gateway IP address, and single routing instance and Eliminates the dependence on First Hop Redundancy Protocols (FHRP) and Spanning Tree Protocol		
	The switch should support Hot-Swappable dual redundant power supplies and five individual fans		
	The switch should support In Service Software Upgrade and Nonstop Forwarding/Stateful Switchover to achieve maximum resiliency with redundant component.		
	The switch should support Network virtualization through Multi-VRF technology for Layer 3 segmentation.		
	The switch should support Automation through Embedded Event Manager, AutoQoS, and Auto SmartPorts for fast provisioning, diagnosis, and reporting		
	The switch should support Optimized application performance through deep visibility with Flexible NetFlow supporting rich Layer 2/3/4 information (MAC, VLAN, TCP Flags) and synthetic traffic monitoring with IP SLA.		
	Enhanced Energy management feature for operational cost optimization by measuring actual power consumption of the PoE devices, reporting, and reducing energy consumption across the network. The Energy management feature should enable NIT Mizoram to measure the power consumption of network infrastructure and network-attached devices and manage power consumption with specific policies, reducing power consumption to realize increased cost savings, potentially affecting any powered device. The switch should have support capabilities to support energy consumption, energy reports and energy management.		
	Media-aware: Capable of detecting and optimizing different media and application types (telepresence, video surveillance, desktop collaboration, and streaming media) to deliver the best experience		
	Endpoint-aware: Detects and configures media endpoints automatically		
	Network-aware: Can detect and respond to changes in device, connection, and service availability		
	The Switch should support IEEE 802.1AE MACsec with pre standard 802.1X-REV Key management: industry's first fixed switches with pre standard 802.1X-Rev key management. MACsec should provide Layer 2, line rate Ethernet data confidentiality and integrity on host facing ports, protecting against man-in-the-middle attacks		

	(snooping, tampering, and replay).		
<b>VLAN</b>	IEEE 802.1Q VLAN support for at least 4094 active VLANs		
<b>Standards Supported</b>	• IEEE 802.1p prioritization		
	• IEEE 802.3x Flow control		
	• IEEE 802.3ad Link aggregation		
	• IEEE 802.1AB Link Layer Discovery Protocol		
	• IEEE 802.1D STP		
	• IEEE 802.1w Rapid Reconfiguration of Spanning Tree		
<b>Others Features</b>	Rack Mountable with rack mounting hardware		
	The switch should be provided with redundant power supply from day 1		
<b>Routing</b>	• Static, RIP-1 , RIPV-2 and RIPng		
	• OSPF, OSPFv3, BGP4		
	• Routing Table size of at least 64000 IPv4 entries and 32000 IPv6 entries		
	• The switch should have full IPv6 support		
	• Policy Based Routing and Virtual Routing and Forwarding		
<b>Quality Service of</b>	Should support Eight Egress queues per port		
	Traffic Prioritization		
	802.1p support		
	DSCP recognition		
<b>Manageability</b>	• Telnet / Console / Web View		
	• SNMP v1, v2 & v3		
	• Remote Configuration and Management through secure Web Browser and CLI		
	• Embedded RMON: 4 groups of RMON (Statistics, Alarm, Events, History)		
	• Device Link Detection Protocol		
<b>Security</b>	Security: 802.1x, MAC-based Authentication, Port Mirroring, RADIUS, ACL (Access Control List)		
	The switch should have capabilities to simplify video quality of service, monitoring, and security. In addition, multicast features such as Protocol Independent Multicast (PIM) and Source-Specific Multicast (SSM) should provide NITS the additional scalability to support multimedia applications.		
	The switch should have optimized application performance through deep visibility supporting rich Layer 2/3/4 information (MAC, VLAN, TCP Flags) and synthetic traffic monitoring		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>			
<b>Warranty Support in Inside Campus 3 Years</b>			



## SWITCH TYPE - C

Description	Compliance YES / NO	Remarks
<b>Architecture</b>		
The switch should have 24 x 10/100/1000 BaseT PoE ports with 4 GE SFP uplink ports		
The Switch should support Stacking from day 1. The stacking port should be separate from that of uplink GE SFP ports.		
Should support 1000 Base- SX, LX, LH and T ports		
Should have at least 176 Gbps switching bandwidth		
Should have switching throughput of up to 41.7 million pps		
MAC Address table size of 8000 entries		
The Switch should be 19" Rack-Mountable / 1 rack unit (RU)		
<b>Resiliency and high availability</b>		
Should support IEEE 802.3ad Link Aggregation Control Protocol (LACP)		
Should support IEEE 802.1s Multiple Spanning Tree Protocol		
Should support Redundant Power Supply		
<b>Layer 2 and Layer-3 features</b>		
Should support IEEE 802.1Q (4000 VLAN IDs) and 255 VLANs simultaneously		
Should support GARP VLAN Registration Protocol / VLAN Trunking Protocol allowing automatic learning and dynamic assignment of VLANs and dynamic trunk configurations across all switches		
Should support Jumbo frames		
Should support Static IP routing		
Should be IPv6 Capable supporting IPv6 host, Dual stack (IPv4/IPv6) and MLD snooping		
<b>Security</b>		
Should support Port security and MAC address lockout		
Should support Access control lists (ACLs) to provide IP Layer 3 filtering based on source/destination IP address/subnet and source/destination TCP/UDP port number		
Should support IEEE 802.1X user authentication, Web-based authentication and MAC-based authentication		
Should support DHCP Snooping		
Should support Dynamic ARP protection to block ARP broadcasts from unauthorized hosts, preventing eavesdropping or theft of network data		
DHCP protection to block DHCP packets from unauthorized DHCP servers, preventing denial-of-service attacks		
Should support Secure FTP for secure file transfer to/from the switch		
Should support Source Port Filtering allowing only specified ports to communicate with each other		
Should support TACACS+ and RADIUS authentication for secure switch CLI logon		
Should support SSHv2 and SSL allowing secure access to the switch		
<b>Convergence and QoS</b>		
Should support IP multicast Snooping (data-driven IGMP)		
Should support IEEE 802.1AB Link Layer Discovery Protocol (LLDP)		
Should support LLDP-MED (Media Endpoint Discovery)		
Should support IEEE 802.1p Traffic prioritization allowing real-time traffic classification into 4 priority levels mapped to 4 queues		
Should be able to set the IEEE 802.1p priority tag based on IP address, IP Type of Service (ToS), TCP/UDP port number, source port, and DiffServ		
Should support per-port Rate Limiting setting ingress enforced maximums		
The switch should support 4 queues and one of them should be strict priority queue which helps ensure that the highest-priority packets are serviced ahead of all other traffic.		
<b>Advance Features</b>		
Enhanced Energy management feature for operational cost optimization by measuring actual power consumption of the PoE devices, reporting, and reducing energy		

consumption across the network. The Energy management feature should enable NIT Mizoram to measure the power consumption of network infrastructure and network-attached devices and manage power consumption with specific policies, reducing power consumption to realize increased cost savings, potentially affecting any powered device. The switch should have support capabilities to support energy consumption, energy reports and energy management.		
The switch should have feature to provide real-time network event detection and onboard automation		
The switch should support Multicast VLAN Registration		
The Switch should support IEEE 802.1AE MACsec with pre standard 802.1X-REV Key management: industry's first fixed switches with pre standard 802.1X-Rev key management. MACsec should provide Layer 2, line rate Ethernet data confidentiality and integrity on host facing ports, protecting against man-in-the-middle attacks (snooping, tampering, and replay).		
The switch should support stacking for minimum 4 switch stack and support a stacking bandwidth of 20 Gbps		
The switch should support Unidirectional Link Detection Protocol (UDLD) and Aggressive UDLD allowing unidirectional links caused by incorrect fibre-optic wiring or port faults to be detected and disabled on fibre-optic interfaces.		
The switch should have Auto Smart ports feature to provide automatic configuration as devices connect to the switch port, allowing auto detection and plug and play of the device onto the network.		
The switch should support Smart Install which should be a transparent plug-and-play technology to configure the OS Software image and switch configuration without user intervention. Smart Install should utilize dynamic IP address allocation and the assistance of other switches to facilitate installation providing transparent network plug and play.		
The switch should support Smart Configuration provides a single point of management for a group of switches and in addition adds the ability archive and backup configuration files to a file server or switch allowing seamless zero touch switch replacement.		
The switch should support Automatic QoS (AutoQoS) which should simplify QoS configuration in voice over IP (VoIP) networks by issuing interface and global switch commands to detect IP phones, classify traffic, and help enable egress queue configuration.		
<b>Manageability</b>		
Should support Port mirroring		
Should support command authorization leveraging RADIUS to link a custom list of CLI commands to individual network administrator's login		
Should support Multiple configuration files		
Should support DLDAP / UDLD		
Should support SNMP v1, v2 & v3		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		

## SWITCH TYPE – D

	Description	Compliance YES / NO	Remarks
General Features	24 Ethernet 10/100/1000 ports and 4x1Gig SFP uplinks.		
	Dual redundant, modular power supplies and three modular fans providing redundancy		
Performance	The switch should have both wired and wireless feature from day 1		
	88 Gbps Switch fabric		
	Forwarding rate - 65.47 Mpps		
	Stacking Bandwidth - 480 Gbps, also should provide power stacking among stack members for power redundancy		
	MAC Address support - 32,000		
	IPv4 Route support - 24,000		
	VLAN IDs - 4K		
	Routed ports per stack - 208		
	The switch should have an integrated Wireless LAN Controller capability with -		
	Up to 20Gbps of wireless capacity per switch		
	Support for up to 50 access points and 2000 wireless clients on each switching entity (switch or stack)		
	Total 64 no of Wireless LANs per switch		
Layer-3 Features	Basic IP unicast routing protocols (static, RIPv1, and RIPv2) should be available from day 1		
	IPv6 routing capability (RIP, and OSPF protocols) with IPv6 traffic through configured interfaces should be supported		
	Advanced Layer 3 features such as Enhanced Interior Gateway Routing Protocol (EIGRP), Open Shortest Path First (OSPF), Border Gateway Protocol (BGP) should be supported		
	Policy-Based Routing should be supported.		
	Inter-VLAN IP routing should be supported for full Layer 3 routing between two or more VLANs.		
	Equal-cost routing facilitates Layer 3 load balancing and redundancy should be supported		
	Protocol Independent Multicast (PIM) for IP Multicast routing should be supported from day 1		
Layer-2 Features	IEEE 802.1Q VLAN encapsulation. Upto 1000 VLANs should be supported. Support for 4000 VLAN IDs.		
	Centralized VLAN Management. VLANs created on the Core Switches should be propagated automatically.		
	Spanning-tree Enhancements for fast convergence		
	IEEE 802.1d, 802.1s, 802.1w, 802.3ad		
	Spanning-tree feature to prevent other edge switches becoming the root bridge.		
	IGMP snooping, IGMP filtering.		
	Link Aggregation Protocol (LACP)		
Layer-2 Features	Support for Detection of Unidirectional Links (in case of fiber cut) and to disable them to avoid problems such as spanning-tree loops.		
	The Switch should be able to discover the neighboring device giving the details about the platform, IP Address, Link connected through etc, thus helping in troubleshooting connectivity problems.		
	Local Proxy Address Resolution Protocol (ARP) to work in conjunction with Private VLAN Edge to minimize broadcasts and maximize available bandwidth.		
	Multicast VLAN registration (MVR) to continuously send multicast streams in a multicast VLAN while isolating the streams from		

	subscriber VLANs for bandwidth and security reasons.		
<b>Network security features</b>	Support for mechanisms to improve the network's ability to automatically identify, prevent, and respond to security threats and also to enable the switches to collaborate with third-party solutions for security-policy compliance and enforcement before a host is permitted to access the network. Thus preventing the spread of Viruses & worms.		
	IEEE 802.1x to allow dynamic, port-based security, providing user authentication.		
	Port-based ACLs for Layer 2 interfaces to allow application of security policies on individual switch ports.		
	SSH and SNMPv3 to provide network security by encrypting administrator traffic during Telnet and SNMP sessions.		
	Bidirectional data support on the Mirrored port to allow the intrusion detection system (IDS) to take action when an intruder is detected.		
	RADIUS authentication to enable centralized control of the switch and restrict unauthorized users from altering the configuration.		
	MAC address notification to allow administrators to be notified of users added to or removed from the network.		
	DHCP snooping to allow administrators to ensure consistent mapping of IP to MAC addresses. This can be used to prevent attacks that attempt to poison the DHCP binding database, and to rate-limit the amount of DHCP traffic that enters a switch port.		
	Port security to secure the access to an access or trunk port based on MAC address.		
	Multilevel security on console access to prevent unauthorized users from altering the switch configuration using local database or through an external AAA Server.		
Spanning tree feature to shut down Spanning Tree Protocol enabled interfaces when BPDU's are received to avoid accidental topology loops.			
<b>Quality of Service (QoS) &amp; Control</b>	Standard 802.1p CoS and DSCP		
	Control- and Data-plane QoS ACLs		
	Eight egress queues per port to enable differentiated management		
	Weighted tail drop (WTD) or equivalent to provide congestion avoidance		
	Strict priority queuing mechanisms		
	The committed information rate function should provide bandwidth in increments as low as 8 Kbps		
<b>Quality of Service (QoS) &amp; Control</b>	Rate limiting should be provided based on source and destination IP address, source and destination MAC address, Layer 4 TCP and UDP information, or any combination of these fields, using QoS ACLs (IP ACLs or MAC ACLs), class maps, and policy maps.		
	Granular wireless bandwidth management and fair sharing to provide hierarchical bandwidth management at line rate (per access point, per radio, per SSID, per client-based policies). Fair sharing across the users within an SSID makes sure that no single user is starved because of other heavy-hitting users. Fair sharing is automatically enabled for wireless at user level as well as SSID level.		
<b>Management</b>	Superior manageability Features		
	Command Line Interface (CLI) support for configuration & troubleshooting purposes.		
	For enhanced traffic management, monitoring, and analysis, upto four RMON groups (history, statistics, alarms, and events) must be supported.		
	Layer 2 trace route to ease troubleshooting by identifying the physical path that a packet takes from source to destination.		

	Trivial File Transfer Protocol (TFTP) to reduce the cost of administering software upgrades by downloading from a centralized location.		
	Network Timing Protocol (NTP) to provide an accurate and consistent timestamp to all intranet switches.		
	SNMP v1, v2c, and v3 and Telnet interface support delivers comprehensive in-band management, and a CLI-based management console provides detailed out-of-band management.		
	RMON I and II standards		
	SNMPv1, SNMPv2c, and SNMPv3		
	Should have support for Virtual routing and forwarding (VRF)-Lite or equivalent which enables a service provider to support two or more VPNs, with overlapping IP addresses.		
<b>Advanced Features</b>	Media-aware: Capable of detecting and optimizing different media and application types (telepresence, video surveillance, desktop collaboration, and streaming media) to deliver the best experience		
	Endpoint-aware: Detects and configures media endpoints automatically		
	Network-aware: Can detect and respond to changes in device, connection, and service availability		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>			
<b>Warranty Support in Inside Campus 3 Years</b>			

## WEB SECURITY

Description		Compliance YES / NO	Remarks
<b>TECHNICAL SPECIFICATIONS FOR WEB SECURITY SERVER</b>			
Appliance Requirement and Functionality	Functionality Required in the Appliance Solution. The Appliance should support HTTP, HTTPS and FTP traffic.		
	The solution should be appliance based for Web Proxy, Caching, Web based Reputation filtering, URL filtering, Antivirus and Antimalware. All the functionalities should be in a single appliance only.		
<b>Proxy &amp; Caching Deployment Options</b>			
Forward proxy mode	The solution should support explicit forward proxy mode deployment		
Forward proxy mode - Single and Dual IP configuration	The forward proxy mode deployment should support single IP proxy configuration and dual IP proxy configuration where one IP will be of local LAN and another IP will be of DMZ		
Transparent mode	The solution should also support transparent mode deployment using WCCP v2 and L4 switches/PBR (Policy-based Routing)		
Support multiple deployment options	The solution should allow to deploy the appliance in explicit proxy as well as transparent mode together		
Proxy Chaining	The solution should support proxy configuration in a Chain. The Lower end proxies at spoke locations should be able to forward the request to an Higher end proxies at Hub Location forming a Chain of Proxies		
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)		
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.		
High Availability	Provision of High Availability is required		
<b>HTTP processing rate</b>			
HTTP requests per second	The unburdened performance of the appliance should be at least 600 HTTP request per second considering 5 or 10 % user count & 150 http requests per second under burdened environment. Mention the exact number of HTTP request supported per second.		
Average Latency	5-15 milliseconds		
Concurrent TCP connections	Should be able to handle more than 50,000 Simultaneous TCP Connections. Mention the exact number of simultaneous TCP connections handled.		
<b>Proxy Requirements</b>			
Proxy support	The proposed solution should be a Fast Web Proxy and should support HTTP, FTP and HTTPS proxy. The solution should also support HTTPS decryption and scanning		
Protocol Tunnelling	The solution should support to tunnel certain ports via HTTP e.g. Tunnelling FTP via HTTP		
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 to certain types or sizes.		

File download and size restrictions	The solution should be capable of blocking specific files downloads and based on size and per user group basis. It should also provide option to block object using MIME File types.		
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		
User based Access Control	The solution should support integration with active directory and/or LDAP. This should allow administrator to define user or group based access policies to Internet		
Multiple Authentication Server Support	The solution should support Multiple Authentication Servers / Authentication Failover using Multi Scheme Authentication (NTLM and LDAP). It should also support authentication exemption.		
Application and Protocol Control	The solution should support granular application control such as blocking specific version of Internet Explorer, etc. Protocol blocking option should also be available.		
Layer 4 Traffic Monitoring	Should detect Phone Home attempts occurring from the entire Network. It should also detect the PC's that are already infected with Malware in the Network		
HTTPS decryption	Should support policy based HTTPS decryption based on URL Categories and/or Web Reputation scores in order to enforce acceptable use and security policies on decrypted data.		
<b>Caching Requirements</b>			
Caching Capacity	Should Have Inbuilt Caching Mechanism. The appliance should do Caching with 50 GB of Caching capacity. Mention the exact Caching capacity of the appliance.		
Object caching	Should Cache upto 1GB of a single object. Mention the exact cache of a single object.		
<b>Security</b>			
Anti Malware	The appliance should have an inbuilt Anti Malware engine that can scan HTTP, HTTPS and FTP traffic for web based threats, that can range from adware, browser hijackers, phishing and pharming attacks to more malicious threats such as rootkits, Trojans, worms, system monitors and Key loggers and as defined by the organizations policy. Please mention the antimalware engine.		
Antivirus	The appliance should have an inbuilt Antivirus engine that can scan HTTP, HTTPS and FTP traffic for viruses, etc. Please mention the antivirus engine.		
Web Reputation	The solution should provide Web Reputation Filters that examine every request made by the browser (from the initial HTML request to all subsequent data requests) – including live data, which may be fed from different domains.		
	The Reputation system should provide the following:		
	- Bot site protection		
	- URL outbreak detection		
	- Exploit filtering		
	The Reputation Filters should protect users from exploits delivered through:		
	- Cross-site scripting (XSS)		
	- Cross-site request forgery		
- SQL injections			
- Invisible iFrames			
Web Reputation parameters	The Web Reputation Filters should have capability to analyse more than 200 different web traffic and network-		

		related parameters to accurately evaluate the trustworthiness of a URL or IP address		
Customizable Reputation	Web	The Appliance should have customizable setting in the Web Based Reputation Services, like Allow, Scan and Block based on the scoring settings by the Administrator.		
Incoming/Outgoing Traffic scanning		The solution should scan for Incoming and outgoing traffic.		
Outbound connection control on all ports and protocols		The solution shall provide option to scan all ports at wire speed, detecting and blocking spyware activity trying to connect to the outside Internet. By tracking all 65,535 network ports and all protocols, the solution shall effectively mitigate malware that attempts to bypass Port 80		
URL filtering		The solution should have an inbuilt URL filtering functionality with multiple pre-defined categories.		
Custom URL filtering		The solution should support creation of custom URL categories for allowing/blocking specific destinations as required by the organisation		
Dynamic Categorization		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		
Reporting Mis-categorization		The solution should have facility for End User to report Mis-categorization in URL Category.		
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		
URL check & submission		Support portal should give facility to end user to check URL category and submit new URL for categorization		
<b>Data Security and data loss prevention</b>				
On Box Data security		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.		
Off Box Data Loss Prevention integration		Provision should be available in order to integrate the solution with dedicated off-box Data Loss Prevention (DLP) solutions for deep content inspection for regulatory compliance and intellectual property (IP) protection, incident severity definition, case management and performance optimization.		
<b>Technical Support</b>				
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.		
Secure Remote Access		The Support Engineers should be able to login to appliance using secure tunnelling methods such as SSH for troubleshooting purposes		
Diagnostic Tools		The appliance should have diagnostic network utilities like telnet, trace route, nslookup and tcp dump/packet capture.		
Updates and Upgrades		The appliance should provide seamless version upgrades and updates.		
<b>Appliance Administration and Management</b>				
Secure Web Based management		The appliance should be manageable via HTTP or HTTPS		
CLI based management		The appliance should be manageable via command line using SSH		
Serial Console access		For emergency, the appliance should have serial console access		



Ethernet Management	Should have provision for separate Ethernet for managing the appliance		
<b>Logging and Reporting</b>			
Web Logs	The Proxy Log should be scalable. The log formats shall include Apache, Squid and W3C.		
Retention Period	The retention period should be customizable. Options should be provided to transfer the logs to an FTP server using FTP or SCP.		
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)		
Bandwidth Reports	Reports on Bandwidth Consumed / Bandwidth Saved		
Detailed logging	Product to maintain detailed proxy 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		
Off Box Reporting	Solution should provide for off box reporting software for detailed reporting activity		
L4 traffic reports	Detailed report on an IP basis should be provided on the L4 traffic monitoring / Network Layer Malware Detection.		
<b>Hardware details</b>			
Users	1500 - 6000 (approx)		
Rack Units	2 RU		
CPUs	1 Quad Core, upgradable to 4		
Speed	2.26 GHz		
Memory	4 GB		
Disk Space	1.8 TB (4 x 450 GB SAS)		
Raid Mirroring	Yes (RAID 10)		
Redundant PS	Yes		
Hot Swappable HD	Yes		
<b>Warranty</b>			
Updates and Upgrades	Support should cover all upgrades for the time period the licenses and support purchased from principal vendor		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>			
<b>Warranty Support in Inside Campus 3 Years</b>			

## EMAIL SECURITY

Description		Compliance YES / NO	Remarks
<b>SECURE MESSAGING GATEWAY SERVER</b>			
<b>Email Gateway Solution</b>	The solution should be appliance based		
<b>Operating System Threading Model</b>	The operating system should use stack less threads to use less system resources in order to deliver more concurrency and leave more RAM available for caching file system data and eliminates the risk of security holes and system crashes from stack overflows.		
<b>Operating System and MTA</b>	The solution should use their own operating system and MTA on appliance and not open source operating system and MTA.		
<b>File System</b>	The file system should be proprietary built and optimized for Messaging Queuing. The messages should be not be stored as individual files but should be stored in batches to improve I/O read/write performance.		
<b>File System Redundancy</b>	The file system on the appliance should provide Data Integrity During Failure		
<b>Inbound and Outbound Traffic Control</b>	The solution support both inbound and outbound traffic control on single appliance		
<b>MTA</b>	The MTA should be proprietary and not send mail, qmail or postfix.		
<b>MTA Vulnerability</b>	There should not be any known vulnerability of MTA.		
<b>MTA Design</b>	The MTA should have been built by stack less programming language that helps to improve the overall performance of the MTA by opening more threads resulting in more number of concurrent TCP connections.		
<b>Mail Queue Handling</b>	The MTA should maintain separate queues for each destination to avoid single queue issues.		
<b>MTA Retry Schedule</b>	The MTA should have the ability to set the retry schedule per domain basis.		
<b>MTA connection capabilities</b>	The MTA should be able to send multiple messages per connection and be able to open multiple connections per host.		
<b>MTA RFC Support</b>	The MTA should support RFC 2821 compliant Simple Mail Transfer Protocol (SMTP) to accept and deliver messages.		
<b>MTA performance (burdened)</b>	Each appliance provisioned should be able deliver burdened (all engines like AV/Antispam/End User quarantine enabled) performance of at least 40000 messages per hour of 15 KB message size.		
<b>Concurrent SMTP sessions</b>	10,000 concurrent SMTP sessions		
<b>Denial of Service Defence</b>	The solution should have ability to perform SMTP session control and traffic rate limiting (down to per recipient) according to sender's IP address/range, domain or email reputation. The solution should be able to assign maximum SMTP sessions per IP address on appliance		
<b>Directory Harvest Attack Prevention</b>	The solution should integrate with Open LDAP, Active Directory or other LDAP servers to identify invalid recipients		
	The solution should perform SMTP conversational bounce for invalid recipients (prevent Non-Delivery Report Attack)		
	The Directory harvest prevention should control the maximum number of bounces per hour due to invalid email recipients according to sender's IP address/range, domain and email reputation		
	The directory harvest attack prevention should allow administrator to define limit on no. of invalid recipient requests that can be accepted.		
<b>Reputation Based Filtering</b>	The reputation based filtering should have one of the		

<b>at SMTP conversation level</b>	biggest web and email traffic monitoring network for sender reputation		
	The reputation filtering should be used by majority of largest ISP's in the world		
<b>Manual Whitelist/Blacklist/Suspect List</b>	The reputation filtering should assign score to every connecting IP/Domain identifying bad, suspected and good senders		
	The solution should allow administrator to apply policies such as blocking known bad senders, throttling suspicious senders and allowing trusted senders based on reputation score assigned from reputation database		
	The reputation based scoring architecture should function at SMTP conversation level and not after acceptance of email to increase the overall performance & availability of the messaging infrastructure		
	The reputation score for every sender should be arrived after analysing at least 120 SMTP & web parameters for complete & accurate understanding of senders		
	The solution should support creation of customized sender groups and apply customized mail flow policies to each sender group.		
	Blacklists (IP, Domain, Reputation)		
	Whitelists (IP, Domain, Reputation)		
	Third party RBLs/ORBLs		
	Sender and Recipient address whitelist and blacklist		
<b>Email Throttling</b>	The solution should be able to block, accept, throttle, reject and TCP refuse based on:-		
	- Sender IP, IP range		
	- Domain		
	- Email Reputation score from reputation filtering		
	- DNS List		
	- Connecting host PTR record		
	- Connecting host PTR record lookup fails due to temporary DNS failure		
- Connecting host reverse DNS lookup (PTR) does not match the forward DNS lookup (A)			
<b>Traffic Rate Control</b>	Rate limit control by IP address, domain and sender's reputation		
	- Maximum Recipients per period traffic control		
	- Ability to define traffic flow based on time period down to minutes (say 15 minutes)		
<b>Email Traffic Monitor and Attack Detection</b>	Real-Time Mail Flow Monitoring		
	(provide details of traffic flow down to per domain and IP address)		
<b>Bounce Verification (Misdirected Bounce Handling)</b>	Real-Time Statistics on Invalid Recipients, Stopped by Reputation, Spams and Viruses Detected, and Cleaned Messages (Per Domain and IP address)		
	Could provide real-time last hour, last day, last week and last month statistics on blocked messages by rate limit, rejected connection, spams and virus messages detected, and also received byte count according to IP address or domain		
	To combat misdirected bounce attacks, the solution should support bounce verification tag to replace envelope sender for all outgoing messages; if a bounce arrives that doesn't contain the tag then it is discarded. Legimate bounces should be delivered.		
<b>Multiple Host Identities</b>	The solution should support assigning 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)		
	Each IP address should be able to respond with different SMTP response and banner (e.g. 220 mx.itd.university.edu for IP address A, 220 mx.lawdept.university.edu)		
<b>Maximum Supported Domains</b>	The solution should support customized SMTP banner, hostname and response code per IP address or sender group		
	The solution should support multiple domains per IP address or multiple domains using different IP address on single appliance		
<b>User Policy Management</b>	The solution should support 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)		
	Should have single view of all user policies for easier management		
<b>Fine-grained Mail Policies</b>	The policy at SMTP conversation level should be able to perform reverse DNS domain lookup and assign policy per sender basis.		
	Per Sender Policy settings on:-		
<b>Attachment Filtering</b>	o Maximum Messages per connection		
	o Maximum Recipients per message		
	o Maximum message size		
	o Maximum Concurrent sessions per IP address		
	o TLS enforcement and preferred option		
	o SMTP Authentication enforcement and preferred option		
	File attachment detection by true file type, file size, file name, file extension and MIME type		
	Ability to quarantine, duplicate and quarantine, strip attachment, BCC or redirection of email to another host or another recipient, replacing the whole message or just attachment with predefined message notification template		
<b>Sender Verification</b>	Sender Verification based on connecting IP address DNS PTR record and also envelope sender address		
<b>LDAP</b>	Should support LDAP routing, masquerading, recipient address verification and SMTPAUTH over LDAP. LDAP should be query based and not synchronization based for better performance. The solution should support chain LDAP queries. The solution should support chained LDAP queries that will run in succession. The solution should support LDAP referrals i.e. When using LDAP referral's, the original query gets referred to another LDAP server. The solution should support LDAP caching on the appliance.		
<b>Quarantine Access Control</b>	Per quarantine area access control and ability to control user name and password of quarantine areas so that some quarantine areas can only access by authorized personnel (e.g. "Confidential" Quarantine Area for Security Administrator, HR, etc.)		
<b>Content Filters</b>	The solution should support both command line and GUI content filters to allow complex policy control requirements. The solution should support content filtering at global and per user level along with weighted content dictionaries for intelligent key word scanning in message body.		
<b>Trusted Relay</b>	The solution should support trusted relay so that original senders' IP address can be identified from "Received"		

	headers or other email headers (when appliance is not first layer mail gateway)		
<b>Localized End User Interface</b>	End User Quarantine interface can be localized into other languages in addition to English		
<b>Multi-layer Antispam filter</b>	Reputation Filtering (Sender IP/domain)		
	Reactive Antispam Filtering		
	context-sensitive detection technology		
	email and web reputation technology		
<b>Antispam Filter</b>	Adaptive learning technique		
	Integrated antispam filter within the appliance		
<b>Spam Rules Configuration &amp; Management</b>	Allow per user or user group to use different antispam vendor engines		
	The spam rules should be automatically updated every 5 minutes		
<b>Real Time Attack Detection and Policy Change</b>	Real-Time Mail Policy Change on Possible Spammers and Hackers (by Per Domain and IP address) so as to change the policy to block/throttle those bad senders		
<b>Quarantine</b>	On-box quarantine for administrator		
	Individual User/Password Access Control per Quarantine Area		
<b>Hardware Appliance for End User Quarantine and Management</b>	End User Quarantine Support with LDAP/AD/IMAP/POP authentication support		
	On-box and off-box End User Quarantine option		
	Management Appliance option for End User Quarantine		
<b>Plugin Support</b>	Outlook Plugin support for reporting missing spams, false positives, phishing and virus emails		
<b>Virus scanning</b>	The solution should have dual virus scanning available and should be Integrated within the appliance		
<b>Virus Outbreak Filter</b>	The solution should provide virus outbreak prevention on abnormal increase of emails with specific email attachments		
<b>Outbreak Quarantine</b>	Automatic quarantine and release of quarantined messages not falling into new virus/worm characteristics upon outbreak rule update and before virus signature update)		
<b>Signature/Rules Update Period</b>	Configurable update period down to every 5min		
<b>File scanning</b>	The solution should support attachment and Compressed File scanning		
<b>Reports and logs</b>	Graphical monitor of both incoming and outgoing email flow for last hour, last day, last week and last month		
<b>Multiple DNS Servers</b>	Log of Each Email's Processing		
	Mail Flow Report (e.g. able to list out all messages to a specific recipients within certain time period, with details how the messages are received, processed and delivered/dropped)		
	Mail statistics and throughput		
	Support both Internet Root DNS servers or local DNS servers		
	Support multiple DNS servers according to destination domain(s), i.e. DNS A server for Domain A, and DNS B server for Domain B		
<b>Message Tracking</b>	Centralized message tracking based on sender and/or recipient address/domain, subject, time period, message event for multiple appliances		
<b>Centralized Reporting</b>	Centralized report support for multiple appliances		
	Report for all messages or per domain group		
	Report on user volume (top senders or recipients on virus, spam, email volume, email size)		
	Report on domain volume (top inbound and outbound		

	domains for email volume, spams and viruses)		
	Report on policy violation or content filter		
	Report on Virus Outbreak Efficacy		
	Report on Top Inbound and Outbound Virus		
<b>System monitoring</b>	The solution should support following for system monitoring:-		
	SNMP v2/v3 support		
	MIB-II		
	XML		
	Syslog		
<b>Report API support</b>	The solution should support API to build customized reports		
<b>Alerts</b>	Email-based		
	SNMP Trap		
<b>Configuration Interfaces</b>	WebUI (HTTP and HTTPS)		
	CLI (SSH and Telnet)		
	File transfer (SCP or FTP)		
<b>Configuration files</b>	XML/text based files archived or transfer		
<b>Centralized management</b>	The solution should support centralized management for managing and configuring multiple appliance without the need for additional dedicated management console		
	The solution should allow policies to apply based on cluster, group or per machine		
<b>Remote Support</b>	The solution should have support for:		
	Built-in command to consolidate diagnostic information and configuration and send to customer support		
	Ability to enable remote tunnel support for remote diagnosis		
<b>Support</b>	Remote support from parent company should be available. The parent company should provide Toll Free Support, Email Support and should also provide Support Portal access.		
<b>Updates</b>	System updates (able to upgrade and restore email service within 5 minutes)		
	Automatic Spam definition updates		
	Automatic Virus definition updates		
<b>Outbound Mail Monitoring</b>	Real-Time Outbound Mail Flow per IP/Domain		
	Distinct Message Queue Per Destination Domain		
<b>Destination Domain Rate Control</b>	The solution should support domain-based Delivery Rate and Session Control		
<b>Footer or Disclaimer</b>	The solution should support addition of different footers or disclaimers based on sender domain or sender email address/group		
<b>Outbound TLS Support</b>	The solution should support outbound SMTP over TLS based on destination domains or system wide		
<b>Outbound SMTP Authentication Support</b>	The solution should support outbound SMTP authentication		
<b>Multiple IP Address Delivery Support</b>	Multiple IP address support (up to 32 IP addresses)		
	Allow emails to be sent by different IP addresses based on email sender, subject, size, recipient, etc.		
<b>Domain Key Signing</b>	The solution should support policies to sign outgoing emails based on domain key and allow to sign by different domain keys based on sender domain		
<b>Bounce Management</b>	The administrator should be able to define different bounce profiles for destination domains (retry frequency, maximum retry period, etc.) to minimize bandwidth for non-important emails		

<b>End user Safe list and Block list</b>	The solution should have support for end user to create block and safe lists. Safe lists allow a user to ensure that certain users or domains are never scanned with anti-spam scanning engines, while block lists ensure that certain users or domains are rejected or quarantined.		
<b>External Authentication</b>	The solution should have provision to authenticate users using RADIUS or LDAP for logging into appliance for management purpose		
<b>Outbound Spoof verification</b>	If SMTP authentication is used to send messages, the solution should have facility to check messages with spoofed headers.		
<b>No of users (mailbox) per appliance</b>	Up to 10,000		
<b>Clustering support</b>	Yes		
<b>Chassis Form Factor</b>	2 RU		
<b>CPUs</b>	1 quad core		
<b>Memory</b>	4 GB		
<b>Disk Space and count</b>	600 GB (300 x 2)		
<b>Hot-swappable hard disk</b>	Yes		
<b>RAID level and controller</b>	RAID 1, hardware		
<b>Interfaces</b>	4 x 10/100/1000 Mbps, Optional 2 x 1000Base-SX ports		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>			
<b>Warranty Support in Inside Campus 3 Years</b>			

## ACCESS POINT TYPE - A

Description	Compliance YES / NO	Remarks
<b>802.11n Version 2.0 (and Related) Capabilities</b>		
3x4 multiple-input multiple-output (MIMO) with three spatial streams		
Maximal ratio combining (MRC)		
802.11n and 802.11a/g beam forming		
20- and 40-MHz channels		
PHY data rates up to 450 Mbps (40-MHz with 5 GHz)		
Packet aggregation: Aggregated MAC Protocol Data Unit (A-MPDU) (Tx/Rx), Aggregated MAC Protocol Service Unit (A-MSDU) (Tx/Rx)		
802.11 dynamic frequency selection (DFS)		
Cyclic shift diversity (CSD) support		
<b>Data Rates supported</b>		
802.11a: 6, 9, 12, 18, 24, 36, 48, and 54 Mbps		
802.11g: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps		
802.11n data rates (2.4 GHz and 5 GHz): 360 Mbps @ 40 MHz Rate		
<b>N (N regulatory domain - Non FCC):</b>		
2.412 to 2.462 GHz; 11 channels 5.180 to 5.320 GHz; 8 channels 5.745 to 5.825 GHz; 5 channels		
<b>Maximum Number of No overlapping Channels</b>		
2.4 GHz 802.11b/g : 20 MHz : 3 802.11n: 20 MHz : 3		
5 GHz 802.11a : 20 MHz : 21 802.11n : 20 MHz : 21 / 40 MHz: 9		
<b>Maximum Transmit Power</b>		
2.4 GHz 802.11b : 22 dBm : 3 Antennas 802.11g : 22 dBm : 3 Antennas 802.11n (HT20) : 22 dBm : 3 Antennas		
5 GHz 802.11a : 23 dBm : 4 Antennas 802.11n (HT20) : 23 dBm : 4 Antennas 802.11n (HT40) : 23 dBm : 4 Antennas		
<b>Available Transmit Power Settings</b>		
2.4 GHz 22 dBm (160 mW) 19 dBm (80 mW) 16 dBm (40 mW) 13 dBm (20 mW) 10 dBm (10 mW) 07 dBm (5 mW) 04 dBm (2.5 mW)		
5 GHz 23 dBm (200 mW) 20 dBm (100 mW) 17 dBm (50 mW) 14 dBm (25 mW) 11 dBm (12.5 mW) 08 dBm (6.25 mW) 05 dBm (3.13 mW)		
<b>Integrated Antenna</b> - 2.4 GHz, Gain 4 dBi, internal omnidirectional, horizontal beamwidth 360° and 5 GHz, Gain 4 dBi, internal omnidirectional, horizontal beamwidth 360°		



<b>Interfaces –</b> 10/100/1000BASE-T autosensing (RJ-45) Management console port (RJ-45)		
<b>Environmental :</b>		
Non-operating (storage) temperature: -22 to 158°F (-3 0 to 70°C) Non-operating (storage) Altitude Test: 25°C, 15,000 ft. Operating temperature: -4 to 131°F (-20 to 55°C) Operating humidity: 10 to 90 % (noncondensing) Operating Altitude Test: 40°C, 9843 ft.		
<b>System Memory</b>		
256 MB DRAM		
32 MB flash		
<b>Input Power Requirements</b>		
44 to 57 VDC		
Power Supply and Power Injector: 100 to 240 VAC; 50 to 60 Hz		
<b>Advanced Features :</b>		
Faster mobile client connections		
Support for all client types without any client requirements or dependencies		
More efficient use of mobile device batteries		
Accelerates one-, two-, and three spatial stream devices		
The Wireless AP should have Spectrum Intelligence		
Classifies over 20 different types of interference, including non-Wi-Fi interference, within 5 to 30 seconds		
Automatic remedial action and less manual inter intervention		
24/7 monitoring with remote access reduces travel and speeds resolution		
Locates and visualizes interference and zone of impact		
Historic interference information for back-in-time analysis and faster problem solving		
Air Quality Index provides a snapshot of network performance and the impact of interference		
Efficient multicast-to-unicast conversion		
Video call admission control to prevent oversubscription		
Queue prioritization to ensure best user experience for corporate videos		
Perfect 5.0 mean opinion scores (MOS scores) in testing		
Double the client session scalability of competitors		
<b>Compliance Standards</b>		
UL 60950-1		
CAN/CSA-C22.2 No. 60950-1		
UL 2043		
IEC 60950-1		
EN 60950-1		
EN 50155		
<b>Radio approvals:</b>		
FCC Part 15.247, 15.407		
RSS-210 (Canada)		
EN 300.328, EN 301.893 (Europe)		
ARIB-STD 66 (Japan)		
ARIB-STD T71 (Japan)		
EMI and susceptibility (Class B)		
FCC Part 15.107 and 15.109		
ICES-003 (Canada)		
VCCI (Japan)		
EN 301.489-1 and -17 (Europe)		
EN 60601-1-2 EMC requirements for the Medical Directive 93/42/EEC		

<b>IEEE Standard:</b>		
IEEE 802.11a/b/g, IEEE 802.11n, IEEE 802.11h, IEEE 802.11d		
<b>Security:</b>		
802.11i, Wi-Fi Protected Access 2 (WPA2), WPA		
802.1X		
Advanced Encryption Standards (AES), Temporal Key Integrity Protocol (TKIP)		
<b>EAP Type(s):</b>		
Extensible Authentication Protocol-Transport Layer Security (EAP-TLS)		
EAP-Tunnelled TLS (TTLS) or Microsoft Challenge Handshake Authentication Protocol Version 2 (MSCHAPv2)		
Protected EAP (PEAP) v0 or EAP-MSCHAPv2		
Extensible Authentication Protocol-Flexible Authentication via Secure Tunnelling (EAP-FAST)		
PEAPv1 or EAP-Generic Token Card (GTC)		
EAP-Subscriber Identity Module (SIM)		
<b>Multimedia:</b>		
Wi-Fi Multimedia (WMM)		
<b>Other:</b>		
FCC Bulletin OET-65C		
RSS-102		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		

## **ACCESS POINT TYPE – B**

Description	Compliance YES / NO	Remarks
The Access Points should provide industry-leading RF capabilities with the widest breadth of deployment options for maximum wireless LAN performance, security, reliability, and ease of use.		
They should provide dual band support for both 802.11a, 802.11b and 802.11g, simultaneous air monitoring for dynamic, real time RF management and should handle time-sensitive functions, such as Layer 2 encryption, that enable wireless LANs to securely support various user applications.		
Access points should automatically detect the centralized management/control stations and download appropriate policies and configuration information with no hands-on intervention.		
Must provide separate antenna elements for both the 2.4GHz and 5GHz spectrum.		
Must support simultaneous 802.11n on both the 2.4 GHz and 5 GHz radios.		
Access Points should have been tested and certified through the WiFi Alliance 802.11n certification		
4x4 multiple-input multiple-output (MIMO) with three spatial streams		
The Wireless AP should have the technology to improve downlink performance to all mobile devices including one-, two-, and three spatial stream devices on 802.11n. The technology should use advanced signal processing techniques and multiple transmit paths to optimize the signal received by 802.11 a/g clients in the downlink direction without requiring feedback and should work with all existing 802.11a/g clients.		
Access Point hardware must support legacy beam forming.		
Must support Multiple In Multiple Out (MIMO).		
Must support 40 MHz wide channels in 5 GHz.		
Must operate as a sensor for wireless IPS		
Wireless Access Point must support IDS/IPS function during local or remote mode.		
Must support the ability to serve clients and monitor the RF environment concurrently.		
AP model proposed must be able to be both a client-serving AP and a monitor-only AP for Intrusion Prevention services.		
Access Point should support sniffer mode deployment to capture and forward all the packets from the clients on that channel to a remote machine that runs packet analyzer software.		
Access Point should support remote AP mode where the Controller and AP are separated over WAN.		
Access Point should support operating as a rogue detector, which allows it to be placed on a trunk port so that it can hear all wired-side connected VLANs		
Access Points must support a distributed encryption/decryption model.		
Should support 802.11e, WMM and WMM power save		
Must support 16 WLANs per AP for SSID deployment flexibility.		
While doing multicast of video streams, the AP should have a provision to convert multicast to unicast so that a single multicast stream traverses the network and the access point replicates the multicast frame and converts it to 802.11 unicast frames.		
Must support Power over Ethernet, local power, and power injectors.		
The wireless system should have the capability to control the spread of viruses and worms and keep end stations up-to-date with OS patches & hot-fixes.		
The wireless system should support AAA protocols for authentication authorization, accounting, encryption and web-based authentication.		
Capability for Integrated, accurate, location tracking services to track the wireless enabled devices in the network as they move around from one place to another.		
The Wireless system should support SNMP v1, v2c, v3 Management protocol and should have Web-based HTTP/HTTPS Management Interfaces and Telnet, SSH, etc.		
Should have custom chipset to detect and classify non-Wi-Fi wireless transmissions while simultaneously serving network traffic		
Should support configuring the access point as network connected sensor to access any network location covered by the access point to get real-time Spectrum analysis data.		

The Wireless AP should have Integrated spectrum intelligence to detect, classify, and mitigate RF interference from unauthorized wireless bridges or malicious devices. The Wireless AP should provide the highest-performance 802.11n connectivity for mission-critical outdoor networks by detecting interference from unauthorized devices, as well as common outdoor interference sources and wireless bridging products. The Wireless AP should use chip-level intelligence to create a spectrum-aware, self-healing, and self-optimizing wireless network that mitigates the impact of wireless interference.			
Should support 23 dBm Transmit Power with 2 antennas for 802.11b at 2.4GHz			
<b>2.4 GHz Dipole Antenna Specifications :</b>			
Antenna type	Dipole		
Operating frequency range	2402-2495 MHz		
Nominal input impedance	50 W		
2:1 VSWR bandwidth	2385 - 2515 Mhz		
Peak gain	2 dBi		
Polarization	Linear, vertical		
E-Plane 3-dB beamwidth	70 °		
H-Plane 3-dB beamwidth	Omnidirectional		
Dimensions	5.5 in. (13 cm)		
Weight	1 oz.		
Connector type	RP-TNC plug		
Environment	Indoor		
Operating temperature range	32 °F to 140 °F (0 °C to 60 °C)		
<b>5 GHz Omnidirectional Antenna Specifications :</b>			
Antenna type	Omnidirectional.		
Operating frequency range	5150–5850 MHz		
VSWR	2:1 or less		
Peak gain	3.5 dBi		
Polarization	Linear		
Elevation plane (3 dB beamwidth)	40°		
Length	1.7 in. (4.3 cm)		
Diameter	0.75 in. (1.9 cm)		
Connector	RP-TNC jack		
Environment	Indoor only		
Operating temperature	32° F to 131° F (0° C to 55° C)		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>			
<b>Warranty Support in Inside Campus 3 Years</b>			

## ACCESS POINT TYPE – C

Description	Compliance YES / NO	Remarks
<b>802.11n Capabilities</b>		
3x3 multiple-input multiple-output (MIMO) with three spatial streams		
Maximal ratio combining (MRC)		
20- and 40-MHz channels		
PHY data rates up to 300 Mbps		
Packet aggregation: A-MPDU (Tx/Rx), A-MSDU (Tx/Rx)		
802.11 dynamic frequency selection (DFS) (Bin 5)		
Cyclic shift diversity (CSD) support		
<b>Data Rates supported</b>		
802.11a: 6, 9, 12, 18, 24, 36, 48, and 54 Mbps		
802.11b/g: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps		
802.11n data rates (2.4 GHz and 5 GHz): 300 Mbps @ 40 MHz Rate		
<b>N regulatory domain :</b>		
2.412 to 2.462 GHz; 11 channels 5.180 to 5.320 GHz; 8 channels 5.745 to 5.825 GHz; 5 channels		
<b>Maximum Number of Nonoverlapping Channels</b>		
2.4 GHz 802.11b/g: ◦ 20 MHz: 3 802.11n: ◦ 20 MHz: 3		
5 GHz 802.11a: ◦ 20 MHz: 24 802.11n: ◦ 20 MHz: 24 40 MHz: 11		
<b>Maximum Transmit Power</b>		
2.4 GHz 802.11b ◦ 22 dBm: 3 Antennas 802.11g ◦ 22 dBm: 3 Antennas 802.11n (HT20) ◦ 22 dBm: 3 Antennas		
5 GHz 802.11a ◦ 22 dBm: 3 Antennas 802.11n (HT20) ◦ 22 dBm: 3 Antennas 802.11n (HT40) ◦ 22 dBm: 3 Antennas		
<b>External Antenna - 2.4 GHz 2 dBi/5 GHz 4 dBi Dipole Ant. With RP-TNC connector</b>		
<b>Interfaces :</b>		
10/100/1000BASE-T autosensing (RJ-45), Management console port (RJ-45)		
<b>Environmental :</b>		
Nonoperating (storage) temperature: -22 to 158°F (-30 to 70°C) Nonoperating (storage) Altitude Test: 25°C, 15,000 ft. Operating temperature: -4 to 122°F (-20 to 50°C) Operating humidity: 10 to 90 % (noncondensing) Operating Altitude Test: 40°C, 9843 ft.		
<b>System Memory</b>		
256 MB DRAM		
32 MB flash		
<b>Input Power Requirements</b>		
44 to 57 VDC		
Power Supply and Power Injector: 100 to 240 VAC; 50 to 60 Hz		
<b>Advanced Features :</b>		
Faster mobile client connections		
Support for all client types without any client requirements or dependencies		

More efficient use of mobile device batteries		
Automated self-healing optimizes the unpredictability of RF to reduce dead spots and help ensure high-availability client connections. Effectively detects RF interference and provides basic spectrum analysis capability while simplifying ongoing operations		
Improves downlink performance to all mobile devices including 802.11n while improving battery life on mobile devices such as smartphones and tablets		
Improves 5-GHz client connections in mixed-client environments, Uses multicast to improve rich-media applications		
Identifies, classifies and provides automatic remedial actions for different types of interference		
Locates and visualizes sources of interference		
Efficient multicast-to-unicast conversion		
Video call admission control to prevent oversubscription		
Queue prioritization to help ensure best user experience for corporate videos		
<b>Compliance Standards</b>		
UL 60950-1		
CAN/CSA-C22.2 No. 60950-1		
UL 2043		
IEC 60950-1		
EN 60950-1		
<b>Radio approvals:</b>		
FCC Part 15.247, 15.407		
RSS-210 (Canada)		
EN 300.328, EN 301.893 (Europe)		
ARIB-STD 66 (Japan)		
ARIB-STD T71 (Japan)		
EMI and susceptibility (Class B)		
FCC Part 15.107 and 15.109		
ICES-003 (Canada)		
VCCI (Japan)		
EN 301.489-1 and -17 (Europe)		
EN 60601-1-2 EMC requirements for the Medical Directive 93/42/EEC		
<b>IEEE Standard:</b>		
IEEE 802.11a/b/g, IEEE 802.11n, IEEE 802.11h, IEEE 802.11d		
<b>Security:</b>		
802.11i, Wi-Fi Protected Access 2 (WPA2), WPA		
802.1X		
Advanced Encryption Standards (AES), Temporal Key Integrity Protocol (TKIP)		
<b>EAP Type(s):</b>		
Extensible Authentication Protocol-Transport Layer Security (EAP-TLS)		
EAP-Tunneled TLS (TTLS) or Microsoft Challenge Handshake Authentication Protocol Version 2 (MSCHAPv2)		
Protected EAP (PEAP) v0 or EAP-MSCHAPv2		
Extensible Authentication Protocol-Flexible Authentication via Secure Tunneling (EAP-FAST)		
PEAPv1 or EAP-Generic Token Card (GTC)		
EAP-Subscriber Identity Module (SIM)		
<b>Multimedia:</b>		
Wi-Fi Multimedia (WMM)		
FCC Bulletin OET-65C		
RSS-102		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		

## **WLAN CONTROLLER**

Description	Compliance YES / NO	Remarks
Should support maximum 500 Access points / Bridges; Support for 250 Access Points required from Day 1.		
Should support to deliver centralized security policies		
Should support wireless intrusion prevention system (IPS) capabilities		
Should support quality of service (QoS), and mobility		
Should support RF management		
<b>Wireless</b>		
IEEE 802.11a, 802.11b, 802.11g, 802.11d, WMM/802.11e, 802.11h, 802.11n		
<b>Redundant Power supply</b>		
Should support optional Internal Redundant Power Supply		
<b>Wired/Switching/Routing</b>		
IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX specification, IEEE IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX specification, 1000BASE-T. 1000BASE-SX, 1000-BASE-LH, IEEE 802.1Q V tagging, and IEEE 802.1AX Link Aggregation		
Wire speed, non-blocking performance for 802.11n networks		
<b>Security Standards</b>		
WPA		
IEEE 802.11i (WPA2, RSN)		
RFC 1321 MD5 Message-Digest Algorithm		
RFC 1851 The ESP Triple DES Transform		
RFC 2104 HMAC: Keyed Hashing for Message Authentication		
RFC 2246 TLS Protocol Version 1.0		
RFC 2401 Security Architecture for the Internet Protocol		
RFC 2403 HMAC-MD5-96 within ESP and AH		
RFC 2404 HMAC-SHA-1-96 within ESP and AH		
RFC 2405 ESP DES-CBC Cipher Algorithm with Explicit IV		
RFC 2406 IPsec		
RFC 2407 Interpretation for ISAKMP		
RFC 2408 ISAKMP		
RFC 2409 IKE		
RFC 2451 ESP CBC-Mode Cipher Algorithms		
RFC 3280 Internet X.509 PKI Certificate and CRL Profile		
RFC 3602 The AES-CBC Cipher Algorithm and Its Use with IPsec		
RFC 3686 Using AES Counter Mode with IPsec ESP		
RFC 4347 Datagram Transport Layer Security		
RFC 4346 TLS Protocol Version 1.1		
<b>Encryption</b>		
WEP and TKIP-MIC: RC4 40, 104 and 128 bits (both static and shared keys)		
SSL and TLS: RC4 128-bit and RSA 1024- and 2048-bit		
AES: CCM, CCMP		
IPSec: DES-CBC, 3DES, AES-CBC		
<b>Authentication, Authorization, and Accounting (AAA)</b>		
IEEE 802.1X		
RFC 2548 Microsoft Vendor-Specific RADIUS Attributes		
Web-based authentication		
RFC 2716 PPP EAP-TLS		
RFC 2865 RADIUS Authentication		
RFC 2866 RADIUS Accounting		
RFC 2867 RADIUS Tunnel Accounting		

RFC 2869 RADIUS Extensions		
RFC 3576 Dynamic Authorization Extensions to RADIUS		
RFC 3579 RADIUS Support for EAP		
RFC 3748 Extensible Authentication Protocol		
<b>Management Interfaces</b>		
Web-based: HTTP/HTTPS		
Command-line interface: Telnet, SSH, serial port		
<b>Interfaces and Indicators</b>		
Uplink: 8 x 1000BaseT, 1000Base-SX and 1000Base-LH transceiver slots		
Small Form-Factor Pluggable (SFP) options		
LED indicators: link		
Service Port: 10/100/1000 Mbps Ethernet (RJ45).		
Service Port : 10/100/1000 Mbps Ethernet (RJ45) For High Availability for future use		
LED indicators: link,		
Utility Port: 10/100/1000 Mbps Ethernet (RJ45)		
LED indicators: link		
Expansion Slots: 1		
Console Port: RS232 (DB-9 male/RJ-45 connector included), mini-USB		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		



## IP - PBX

Description	Compliance YES / NO	Remarks
<b>Architecture:</b>		
Should be modular architecture for scalability and should be a single box configuration for call control and audio conference.		
The IP voice switch implements the PBX switching function. The IP voice switch performs operations such as call control, media gateway access control, resource allocation, protocol processing, routing, authentication.		
Should support at least 7 analog access interface slots to accommodate the current requirement as well as for the future expansion.		
The IP voice switch shall work with IP network. 1+1 backup of network ports shall be supported.		
The IP voice switch system shall support connection to PSTN with FXO , E1 Trunk: PRA, R2, or SS7 (ISUP and TUP), T1 Trunk: PRI.		
Router should support AC/DC power supply. 1+1 power module redundancy		
<b>Interface Requirements:</b>		
should provide 2FE Service network port, supports two network ports :1:1 backup mode		
should support E1, or FXO port to connect with PSTN.		
32 FXS ports Interface card is required to support analog phone or FAX access.		
The PBX should be equipped with audio ports license.		
The PBX should support built-in voice mail function.		
<b>Function Requirements:</b>		
The IP voice switch shall support to receive, store and forward at least 32 digits of a number. And at least 32 of it can be analyzed.		
The IP voice switch shall support T.30 and T.38 for fax.		
The IP voice switch shall support embedded Voicemail function.		
The IP voice switch shall support simply web management function.		
The system shall support built-in voice conference without any additional resource and equipment. Any peripheral equipment for voice conference will not be accepted. Each conference shall support 3 to 12 parties. The following functions shall be supported:		
1. Telephone conference shall be managed easily through web browser, for example Internet Explorer.		
2. Conference shall be accessed through access code.		
3. Conference convening on time or by chairman should also be supported.		
4. Instant call conference should be supported.		

The IP voice switch shall support ONLY (One Number Link You) service, Each user of the IP voice switch shall have only one number. Multiple extensions can be bound with it, including internal extension, PSTN number and cell phone number.		
The IP voice switch shall support automatic attendant.		
The IP voice switch shall support Intelligent Routing function.The following functions shall be supported:		
1. Time segment- based routing		
2. Charging rate-based routing		
3. Load sharing of routing		
4. Percentage-based polling routing		
5. Rerouting		
6. Subscriber Level-based routing		
7. Trunk balance routing		
The IP voice switch shall support the DTMF (RFC2833) transmission of the RTP extended payload to improve the reliability of collecting the digits of the VoIP system.		
The IP voice switch shall support synchronization of network time through SNTP protocol.		
The IP voice switch shall provide the local accounting function (including outgoing and incoming calls). It can generate CDRs and supply them to billing server.		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		

## TELEPHONY SERVER

Description	Compliance YES / NO	Remarks
<b>Processors</b>		
2 Intel Xeon E5 2680 Series processors / 2 Intel Xeon 5640 series processors (2.66GHz Xeon E5640 80W CPU/12MB cache/DDR3 1066MHz)		
<b>Memory</b>		
24 DIMM slots for up to 192 GB of 1600-MHz memory for optimal performance		
The system should be loaded with 32GB DRAM (4GB x 8) and 64GB DRAM (8GB x 8)		
Support for DDR3 registered DIMMs		
Advanced ECC support		
Mirroring option		
<b>PCIe slots</b>		
5 PCIe Gen 3 slots should be available		
2 PCIe Generation 3, x16 slots: both full height, 3/4 length (10.5-in); 2 PCIe Generation 3, x8 slots: one full height, 1/2 length and one full height 3/4 length; 1 PCIe Generation 3, x8 slots: 1/2 height and 1/2 length		
16GB SD Card Module and 2-Socket 32GB vRAM		
MegaRAID 9266-8i + battery backup		
<b>Hard drives</b>		
Up to 24 front-accessible, hot-swappable, 2.5-inch SAS, SATA or SSD drives OR up to 12 front-accessible, hot-swappable, 3.5-inch SAS, SATA drives		
<b>Hard disk options</b>		
16 X 300GB 6Gb SAS 15K RPM SFF HDD/hot plug/drive sled mounted		
<b>Optical drive</b>		
Should support USB DVD Drive / 24x CD-R/RW DVD±R/RW read/write optical drive		
<b>Integrated Management</b>		
Integrated Emulex Pilot-3 Baseboard Management Controller (BMC)		
IPMI 2.0 compliant for management and control		
One 10/100BASE-T out-of-band management interface		
CLI and Web GUI management tool for automated, lights-out management		
<b>KVM support</b>		
Front-panel connector		
Ease of access to front-panel video, 2 USB ports, and serial console		
Front-panel locator LED		
Indicator to help direct administrators to specific servers in large data centre environments		
<b>Additional rear connectors</b>		
Additional interfaces including a VGA video port, 2 USB 2.0 ports, 1 Gigabit Ethernet dedicated management port, quad 1 Gigabit Ethernet ports, and an RJ-45 serial port		
Physical dimensions (HxWxD) 2RU: 3.4 x 17.5 x 28.0 in. (8.7 x 44.5 x 71.2 cm)		
Temperature: Operating 41 to 104° F (5 to 40° C)		
The server should be loaded with quad-port Gigabit Ethernet and Dual Power Supply		
The server should be loaded with VMware vSphere 5 Standard for 1 Processor and 3 Year Support		
<b>Operating System</b>		
The Server should be installed with latest Windows Operating System		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		

## **PHONE TYPE - A**

<b>Description</b>	<b>Compliance YES / NO</b>	<b>Remarks</b>
Integral Switch 2*10/100M		
7"Color touch screen, 800x480 pixels, 16.7M colors		
Touchscreen		
6 Softkey on LCD		
Speakerphone		
Supports local video preview, full-screen display for the other, and Picture in picture (PIP)		
Supports importing files of ring tones in format MP3 by USB and SD card.		
local address book support 2000 contacts.		
300,000 pixels CMOS video sensor camera (640x480) Adjustable in the vertical direction		
Power budget - 15W		
Signalling Protocols - SIP for signalling and H.264 for video		
Should be well integrated with IP Voice Switch current version of software		
Audio Codec support -G.711a/G.711μ/G.729AB		
Video Codec support - H.263/h.264BP		
Support & Maintenance Support 3 years by Certified Engineer		
Warranty Support in Inside Campus 3 Years		

## **PHONE TYPE – B**

Description	Compliance YES / NO	Remarks
320x240 pixels with color LCD		
At least 2 lines and 2 line buttons		
Provide 4 fixed function buttons(with LED), Speaker/Headset/Mute/		
Call History		
Provide 2 GE ports(10/100/1000)		
Support POE(class 1)		
Support G.711a, G.711μ, G.729, G.729a, and G.729ab.		
Support fullband voice, AAC-LD, 48kHz sample rate		
Support ACLP(Anti-clipping)/ AEC(Acoustic Echo Cancellation)/ AGC(Automatic Gain Control)/ AJB(Adaptive Jitter Buffer)/ ANR(Automatic Noise Reduction)/ CNG(Comfort Noise Generation)/ HAC(Hearing Aid Compatibility)/ PLC(Packet Loss Concealment)/ VAD(Voice Activity Detection)/ Side Tone Cancellation/VQM(Voice Quality Monitor)/ Buzz Cancellation		
Contacts can support 1000 records.		
Support local conference of 6 parties.		
Support TLS/SRTP(AES 128)/HTTPS/X.509/802.1X(MD5)		
Support voice quality upload to eSpace EMS		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>		
<b>Warranty Support in Inside Campus 3 Years</b>		

**NETWORK RACK TYPE – A**

Description	Compliance YES / NO	Remarks
Uni-Wall mounted enclosure		
Dimension 575W X 6U X 500D		
Front sheet steel glass door		
Top and Bottom with vents on sides with 4 nos		
50 dia rubber grommets at top and bottom		
6U RACK		
Side walls Mount		
2 pair of 19" angles with wall mounting provision		
Captive hardware		
230V AC Fan 90 cfm with 1 mts long cable		
1U cantilever shelf of 250MM deep of 1MM thick		
19" mountable socket Strips with 6 nos of 5A universal sockets with 2 mts long power		
Tube light		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>Warranty 3 years</b>		

**NETWORK RACK TYPE – B**

Description	Compliance YES / NO	Remarks
Enclosure of Dimension 800 X 1400 (29U) X 800 with front sheet steel Glazed door Rear Perforated door with standard top cover and bottom gland plate		
Captive hardware		
Earth Straps, 4Sqmm,170mm In length		
Cable Tie/lock		
Outlet Filter		
Floor Stand Rack		
24U RACK		
Set of side Panel Screw Fixed		
19" Mounting angle		
Installation bracket		
1U 19" Horizontal cable Manager (Zinc blue plated)		
230V.AC,90 cfm fan x 4. Fully Wired		
2 x 5/15A Socket Strip 10 Sockets Indicator switch with 2.5 Mtr Power chord with 16A plug.		
Front Castor Wheels With Brake		
Rear Castor Wheels Without Brake		
1 x Full Length 29" fixed depth, black Vented Shelf		
Tube light Front & Rear		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>Warranty 3 years</b>		

## **NETWORK RACK TYPE – C**

Description	Compliance YES / NO	Remarks
Frame, 600W x 2000H x 1000D		
Three Point Locking System		
Top cover with 4 x cutout of Dia 112		
2 x cutout of Dia 112 for cable entry		
Bottom cover with 4 x cutout		
Dia 112 for cable entry		
All cutouts blanked with Plastic caps 2 pairs		
42U 19" L type angle		
Front & Rear on 6 x punched section		
Color : Black or White		
Side Panel 2000H X 1000D Screw Fixed,		
Front Perforated door, 2000H x 600W, RAL		
Rear Perforated door, 2000H x 600W, RAL		
1U 19" Horizontal cable Manager Zinc blue plated		
230V.AC, 90 cfm fan x 4 Fully Wired		
5/15A Socket Strip 10 Sockets Indicator switch with		
2.5 Mtr Power chord with 16A plug		
Front Castor Wheels With Brake		
Rear Castor Wheels Without Brake		
Earth Straps, 4Sqmm, 170mm In length		
Cable Tie/lock		
2 x Full Length 29" fixed depth, black Vented Shelf		
Tube light Front & Rear		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>Warranty 3 years</b>		

## UTP PATCH PANEL

Description	Compliance YES / NO	Remarks
Modular, Keystone type Unshielded Twisted pair, category 6A, EIA/TIA 568-C.2-10		
The keystone modules are fire-retardant, moulded plastic modules UL94 VO rated, consisting of horizontal index strips for ease of re-termination		
IDC Termination 180 degree Punch, allowing wires between 22 – 26 AWG sizes		
Meets or Exceeds EIA/TIA – 568-C.2-10 Category 6A connecting hardware specification		
RJ45 (8P8C) T568A/T568B colour coding termination		
Cable Guide way to guide the cable on the rear side		
1U size for 6/12/24 Ports and 2U for 48 Ports.		
UL and ETL verified to ANSI/TIA/ EIA-568-C-2.10 specifications		
All Passive product must be from same OEM		

## PATCH CORD TYPE – A

Description	Compliance YES / NO	Remarks
Patch cords shall be of multi strand copper cable		
Category 6A - 1M		
With Matching colored snag-less, elastomer polyolefin boot		
Terminals with gold contacts, 50 micron" gold over nickel		
Patch cord has a characteristic impedance of 100 +/- 3 Ohms		
Patch cord has extra-long boot to maintain the bend radius.		
Assembled with short body RJ45 50u gold plate to minimize untwist pair length.		
Designed for high speed transmission ·		
Improved PS -NEXT, ELFEXT and Return Loss performance. ·		
Back-ward-compatibility with all current Cat 6 products and applications.		
UL and ETL verified to ANSI/TIA/ EIA-568-C.2-10 specifications		

## PATCH CORD TYPE – B

Description	Compliance YES / NO	Remarks
Patch cords shall be of multi strand copper cable		
Category 6A - 2M		
With Matching colored snag-less, elastomer polyolefin boot		
Terminals with gold contacts, 50 micron" gold over nickel		
Patch cord has a characteristic impedance of 100 +/- 3 Ohms		
Patch cord has extra-long boot to maintain the bend radius.		
Assembled with short body RJ45 50u gold plate to minimize untwist pair length.		
Designed for high speed transmission ·		
Improved PS -NEXT, ELFEXT and Return Loss performance. ·		
Back-ward-compatibility with all current Cat 6 products and applications.		
UL and ETL verified to ANSI/TIA/ EIA-568-C.2-10 specifications		



### **PATCH CORD TYPE – C**

Description	Compliance YES / NO	Remarks
Patch cords shall be of multi strand copper cable		
Category 6A - 3M		
With Matching colored snag-less, elastomer polyolefin boot		
Terminals with gold contacts, 50 micron" gold over nickel		
Patch cord has a characteristic impedance of 100 +/- 3 Ohms		
Patch cord has extra-long boot to maintain the bend radius.		
Assembled with short body RJ45 50u gold plate to minimize untwist pair length.		
Designed for high speed transmission ·		
Improved PS -NEXT, ELFEXT and Return Loss performance. ·		
Back-ward-compatibility with all current Cat 6 products and applications.		
UL and ETL verified to ANSI/TIA/ EIA-568-C.2-10 specifications		

### **PATCH CORD TYPE – D**

Description	Compliance YES / NO	Remarks
Patch cords shall be of multi strand copper cable		
Category 6A - 5M		
With Matching colored snag-less, elastomer polyolefin boot		
Terminals with gold contacts, 50 micron" gold over nickel		
Patch cord has a characteristic impedance of 100 +/- 3 Ohms		
Patch cord has extra-long boot to maintain the bend radius.		
Assembled with short body RJ45 50u gold plate to minimize untwist pair length.		
Designed for high speed transmission ·		
Improved PS -NEXT, ELFEXT and Return Loss performance. ·		
Back-ward-compatibility with all current Cat 6 products and applications.		
UL and ETL verified to ANSI/TIA/ EIA-568-C.2-10 specifications		

### **FACE PLATE TYPE – A**

Description	Compliance YES / NO	Remarks
Angular Bezel Module Face Plate		
With clear label(Identification)		
Made from high-impact, flame-retardant, UL- RATED 94 V 0 thermoplastic – ABS		
Patch cords shall be of multi strand copper cable		
Category 6A - Single Port		

### **FACE PLATE TYPE – B**

Description	Compliance YES / NO	Remarks
Angular Bezel Module Face Plate		
With clear label(Identification)		
Made from high-impact, flame-retardant, UL- RATED 94 V 0 thermoplastic – ABS		
Patch cords shall be of multi strand copper cable		
Category 6A - Dual Port		

## FACE PLATE TYPE – C

Description	Compliance YES / NO	Remarks
Angular Bezel Module Face Plate		
With clear label(Identification)		
Made from high-impact, flame-retardant, UL- RATED 94 V 0 thermoplastic – ABS		
Patch cords shall be of multi strand copper cable		
Category 6A - Four Port		

## INFORMATION OUTLETS

Description	Compliance YES / NO	Remarks
Made from high-impact, flame-retardant, UL- RATED 94 V 0 thermoplastic – ABS		
DC Resistance: 69 milli ohms.		
DC Resistance imbalance : 20 milli ohms.		
Insulating resistance 500 Mega ohms minimum.		
Current Rating : 1.5 A (max)		
Support for Fast Ethernet and Gigabit Ethernet,10G, IEEE		
802.3/5/12,Voice,ISDN, 10G, ATM 155 & 622 Mbps, Broadband		
Spring Contact : 50u" gold over 100u" nickel		
Meets and exceeds ISO/IEC 11801:2002 Category 6 ,EIA/TIA 568-C.2		
Category 6A component specifications		
The outlet is of IDC (insulation Displacement Contact) 180 deg punch type		
UL and ETL verified to “ANSI/TIA/ EIA-568-C-2” specifications		

## UTP CABLES

Description	Compliance YES / NO	Remarks
22 AWG Annealed bare solid copper, CAT-6A UTP Cable, Channel optimized to 800 Mhz		
Meets EIA/TIA 568-C.2 Category 6A specifications, Use CM, UL-Rated Plastic		
Worst Case Cable Skew : 25 nsec/100 meters		
Characteristic Impedance : $100 \pm 6 \Omega$ , 1-600 Mhz		
Conductor Diameter 22AWG 0.65 mm (nominal)		
Insulation High Density polyethylene		
Support for Fast Ethernet and Gigabit Ethernet,10G, IEEE 802.3/5/12,Voice,ISDN, ATM 52 & 622 Mbps, Broadband, TP=PMD and ITU V.21 and X.11		
DC Resistance Max: 75 Ohms / 1000m		
UL and ETL verified to ANSI/TIA/ EIA-568-C-2.10 specifications,		
Sheath Fire retardant PVC Compound (FRPVC) Flame Rating : 60 deg. C as per UL 1685 CM		
PAIRS Colour code: Blue / White-Blue, Orange / White-Orange Green / White-Green, Brown / White – Brown		
Outer Sheath PVC compound Thickness Diameter 1.45 mm (nominal) Outer diameter 9 mm (nominal)		
ELECTRICAL CHARACTERISTICS at 20° C Input Impedance (0.772-100 MHz) : $100 + 15 \Omega$ 125-250 MHz) : $100 \pm 22 \Omega$		
Mutual Capacitance : 45pF/mtr		
Standard length: 305 Mtrs (1000 ft.)		

## **FIBER OPTICS PANEL FULLY LOADED**

Description		Compliance YES / NO	Remarks
Height	1 U, 1.75 inches		
No. of fibers	6,12,24		
Dimensions	44 * 410 * 280 mm (H*W*D)		
Material	Complete Aluminium Alloy housing, fully powder coated		
	Splice tray and cable spools to be included from day one without any additional cost		
	Fully cushioned splice holder containing grooves for fixing splice protective sleeves		
No. of OSP Cables for termination	Minimum 2		
Grounding	2 Nos. of earthing lugs, pre-loaded		
Cable Management rings	Front and rear cable management rings, pre-loaded		
No. of 6-port adapter plates	4 max		
Sliding	Panel cover is of slide out for easy maintenance		
RoHS	RoHS Compliant		
Insertion Loss	< 0.3 dB max		
Durability (1000 Matings)	< 0.2 dB max		
Operation Temp.	-40°C to 80°C		
Material Ferrule	Zirconia (for SM)		
ROHS	RoHS Compliant		
UL	UL Listed		
IEC	IEC-874		
Compliant	EIA/TIA 568-C.0		
ISO/IEC Certificate	ISO/IEC 11081		
RoHS	RoHS verified.		
Product Features & Compliances	Zirconia or Phosphor Bronze Sleeve		
Compliant	As per ISO/IEC 11081		
UL	UL Listed		
RoHS	RoHS Compliant		
Product Compliance	IEC-874		

## **FIBER PATCH CORD TYPE – A**

Description	Compliance YES / NO	Remarks
Fiber Optic Patch Cord SM LC-LC TYPE 2M		
1.6mm or 3mm simplex or Duplex Zipcord		
Outside Diameter (Simplex) : 1.6mm x 3.0mm		
(Duplex) : 1.6mm x 3.3mm		
Minimum Cable Retention Strength 1.6mm: 11.24 lbs (50 N)		
Insertion Loss Less than 0.3 dB for SM		
Fiber Glass Technology Patch Cords must be with Clear Curve Fiber		
Micro bending coating CPC coating		
RoHS Complaint		

**FIBER PATCH CORD TYPE – B**

Description	Compliance YES / NO	Remarks
Fiber Optic Patch Cord SM SC-LC TYPE 2M		
1.6mm or 3mm simplex or Duplex Zipcord		
Outside Diameter (Simplex) : 1.6mm x 3.0mm		
(Duplex) : 1.6mm x 3.3mm		
Minimum Cable Retention Strength 1.6mm: 11.24 lbs (50 N)		
Insertion Loss Less than 0.3 dB for SM		
Fiber Glass Technology Patch Cords must be with Clear Curve Fiber		
Micro bending coating CPC coating		
RoHS Complaint		

**FIBER PATCH CORD TYPE – C**

Description	Compliance YES / NO	Remarks
Fiber Optic Patch Cord SM SC-SC TYPE 2M		
1.6mm or 3mm simplex or Duplex Zipcord		
Outside Diameter (Simplex) : 1.6mm x 3.0mm		
(Duplex) : 1.6mm x 3.3mm		
Minimum Cable Retention Strength 1.6mm: 11.24 lbs (50 N)		
Insertion Loss Less than 0.3 dB for SM		
Fiber Glass Technology Patch Cords must be with Clear Curve Fiber		
Micro bending coating CPC coating		
RoHS Complaint		

**FIBER JOINT CLOSURE**

Description	Compliance YES / NO	Remarks
The closure is spacious enough for winding and storing fibers.		
Fiber optic splice tray (FOTs) are designed in Snap in lock and easy fixable with two plates		
The curved Diameter meets with international standard		
Easy and Fast to increase and reduce FOSTs		
Integrated seal fitting		
Elastic integrated seal fitting		
4 x 16mm Inlet or outlet ports		
1 or 4 splice tray		
Earting Hook		
Heat shrinkable protective sleek		
Operating Temperature 40°C to 65°C		
Cable Sheath Thickness 2 mm		

## **FIBER PIGTAILS**

Description	Compliance YES / NO	Remarks
Should support multiple applications including CWDM.		
Available 1.6mm cordage making		
Different color-coding for easy Identification.		
Should support Pull proof connector design		
Outside Diameter (Simplex): 1.6mm x 3.0mm		
Outside Diameter (Duplex): 1.6mm x 3.0mm		
Minimum Cable Retention Strength: 1.6mm; 11.24 lbs (50N)		
Product Must have RoHS Compliant		
CPC coating for superior micro bend and environmental performance		

## **FIBER CABLES TYPE – A**

Description		Compliance YES / NO	Remarks
Fiber type	9/ 125, Telcordia's GR-20 and ITU-T 652.D Compliance		
No. of cores	Dec-24		
Cable Construction	BELLCORE GR 20 / IEC 794-1		
Nominal Diameter	Not less than 15mm		
Cable Sheath Thickness	Not less than 2mm		
Taping	Cable must have Water Proof Tape		
Strength Member	Rip Cord must be there as a strength member		
<b>Attenuation @1310nm</b>	< = 0.33 dB/Km		
<b>Attenuation @1550nm</b>	< = 0.19 dB/Km		
Coating / Cladding non-circularity	<= 12 microns		
Zero Dispersion Slope	<= 0.092 ps / sqnm-km		
Max (chromatic) dispersion	<5.3 ps/nm-km @1270-1340 nm		
	<3.5 ps/nm-km @1285-1330 nm		
	<185 ps/nm-km @1550 nm		
Fiber core	UL Listed		
Tensile rating	Not less than 2600N		
Maximum Crush resistance	Not less than 42N/mm		
Operating Temperature	-30 Degree C to +70 Degree C		
Micro bending coating	CPC coating for superior micro bend and environmental performance		
Armor	Corrugated Steel tape Armor		
Colour	Black		
Inner jacket	High density polyethylene		
Outer jacket	High density polyethylene, anti - termite, anti - rodent suitable for direct burial application.		
Secondary Buffer Material	Gel filled Loose Tube.		
Min Bend	20 X Outer Diameter		
Weight	250 Kg/Km (Approx)		
Test (Must pass)	IEC794-1-E1 , IEC794-1-E2 , IEC794-1-E3 , IEC794-1-E4 , EIA-455-104 , IEC794-1-E7 , IEC794-1-E10 , IEC794-1-F1 , IEC794-1-F3 and IEC794-1-F5		
Marking	Identification marking at regular intervals of 1 meter		
Fiber Core	Raw fiber of corning. CORNING marking should be visible on the OFC		
Corning SM Fiber type	28e+		
Qualifies	EIA/TIA 568B and ISO/IEC 11801		
	ICEA-640		
	UL-94V-O		
Complies	ANSI/TIA 568.C.0		
Weight	250kg/km (approx)		
Approval	UL Listed		
RoHS	RoHS Compliant		
Length of cable drum	standard factory length and can be supplied is max 4 Kms		
ISO Certification	Must have ISO 9001 and 14001 certified manufacturing units in India.		
Test Report	Factory Test report have to be provided for the products.		

## **FIBER CABLES TYPE – B**

Description		Compliance YES / NO	Remarks
Fiber type	9/ 125, Telcordia's GR-20 and ITU-T 652.D Compliance		
No. of cores	12		
Cable Construction	BELLCORE GR 20 / IEC 794-1		
Nominal Diameter	Not less than 6.3mm		
Cable Sheath Thickness	Not less than 2mm		
Taping	Cable must have Water Proof Tape		
Strength Member	FRP Rods must be there as a strength member		
<b>Attenuation @1310nm</b>	< = 0.33 dB/Km		
<b>Attenuation @1550nm</b>	< = 0.19 dB/Km		
Coating / Cladding non-circularity	<= 12 microns		
Zero Dispersion Slope	<= 0.092 ps / sqnm-km		
Max (chromatic) dispersion	<5.3 ps/nm-km @1270-1340 nm		
	<3.5 ps/nm-km @1285-1330 nm		
	<185 ps/nm-km @1550 nm		
Fiber core	UL Listed		
Tensile rating	Not less than 500N		
Maximum Crush resistance	Not less than 2K/mm		
Operating Temperature	-20 Degree C to +70 Degree C		
Storage Temperature	-10 Degree C to +75 Degree C		
Micro bending coating	CPC coating for superior micro bend and environmental performance		
Colour	Black		
Inner jacket	High density polyethylene		
Outer jacket	High density polyethylene, anti - termite, anti - rodent suitable for aerial application.		
Secondary Buffer Material	Gel filled Loose Tube.		
Min Bend	20 X Outer Diameter		
Weight	35± 5 Kg/Km (Approx)		
Test (Must pass)	IEC794-1-E1 , IEC794-1-E2 , IEC794-1-E3 , IEC794-1-E4 , EIA-455-104 , IEC794-1-E7 , IEC794-1-E10 , IEC794-1-F1 , IEC794-1-F3 and IEC794-1-F5		
Marking	Identification marking at regular intervals of 1 meter		
Fiber Core	Raw fiber of corning. CORNING marking should be visible on the OFC		
Corning SM Fiber type	28e+		
Qualifies	EIA/TIA 568B and ISO/IEC 11801		
	ICEA-640		
	UL-94V-O		
Complies	ANSI/TIA 568.C.0		
Approval	UL Listed		
RoHS	RoHS Compliant		
Length of cable drum	standard factory length and can be supplied is max 4 Kms		
ISO Certification	Must have ISO 9001 and 14001 certified manufacturing units in India.		
Test Report	Factory Test report have to be provided for the products.		

## VIDEO CONFERENCING SYSTEM TYPE – A

Description	Compliance YES / NO	Remarks
The bidding product must be highly integrated for simplified deployment, incorporating a codec, microphone, and camera.		
The bidding product must use an embedded operating system and a non-PC architecture to help ensure system stability and security.		
The bidding product must provide full compatibility with H.323, SIP.		
The bidding product must support TCP/IP, FTP, FTPS, DHCP, SNMP, Telnet, HTTP, HTTPS, SSH, PPPoE, RTP, RTCP, and SNTP.		
The bidding product must support H.221, H.225, H.230, H.231, H.233, H.234, H.235, H.241, H.242, H.243, H.245, H.281, H.283, H.350, H.460, T.140, TLS, and SRTP.		
The bidding product must be able to connect to a power supply, network port, HD video output device, and external microphone with a single cable.		
The bidding product must support H.264 High Profile (HP), H.264 Basic Profile (BP), H.264 Scalable Video Coding (SVC), H.263+, and H.263 video protocol.		
The bidding product must support 1080p25/30, 720p50/60, 720p30, 4CIF, and CIF video format.		
The bidding product must provide great video processing capability to save network bandwidth: able to encode and decode 1080p30 video at 512 kbit/s and 720p30 video at 384 kbit/s and able to place and receive video calls at 64 kbit/s.		
The bidding product must support presentations using H.239 and SIP and be able to transmit 1080p video and presentations at the same time.		
The bidding product must provide H.235 encryption over an H.323 network and TLS/SRTP encryption over a SIP network.		
The bidding product must support G.711, G.722, G.722.1, G.722.1.C, G.728, and AAC-LD (or codec protocol for 20 kHz or higher wideband audio).		
The bidding product must provide two or more video outputs so that the video and presentation can be displayed simultaneously on two displays; it must also support two or more video inputs so that the local computer desktop can be shared with remote participants.		
The bidding product must provide a 10/100 Mbit/s autonegotiation network port and bandwidths from 64 kbit/s to 4 Mbit/s.		
The bidding product must support IPv4/IPv6 dual stack .		
The bidding product must integrate a Wi-Fi module to implement video communication over a Wi-Fi network.		
The bidding product must provide great network adaptability so that a conference can go on even when the packet loss reaches 20%.		
The bidding product must provide the chair site with the following conference control functions :		
* Broadcast, view, add, and delete a site		
* Mute and unmute microphones		
* Mute and unmute speakers		
* Set continuous presence		
* End a conference		
The bidding product must allow a user to initiate a multipoint conference by calling multiple sites defined in the address book.		
The bidding product must be able to register with Microsoft Lync Server to hold point-to-point video calls with Lync clients directly.		
The camera provided with the bidding product must:		
* Support 1080p50/60.		
* Support 12x optical zoom or higher.		
* Provide at least 30 camera presets.		
* Provide a horizontal angle of view of 72° or more.		
* Be able to pan and tilt.		
The bidding product must allow a user to import a configuration file using the USB port , which facilitates installation and deployment.		



The bidding product must support SNMPv3 and enable a user to apply settings on the conference management platform to it and update its software from the conference management platform.		
The bidding product must provide voice dialing .		
The bracket provided with the bidding product must be applicable to all displays and enable the bidding product to be mounted onto a wall or the top of a TV set.		
The bidding product must be able to work with wireless digital microphones that are of the same brand as the bidding product and provide a pickup range of at least six meters.		
The bidding product must enable a user to perform operations from an Android- or iOS-based touch panel.		
The bidding product must provide an address book that can store up to 1000 entries.		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>On Site Warranty 3 years</b>		

## **VIDEO CONFERENCING SYSTEM TYPE – B**

<b>Description</b>		<b>Compliance YES / NO</b>	<b>Remarks</b>
<b>Components</b>	Codec, 21.5" Widescreen touch LCD 1920x1080 resolution		
	1/2.8 CMOS camera , 1920*1080 30		
	Two built-in mic		
	Two Built-in Stereo speaker,		
	Remote control / touch screen / ouchpad ( option )		
<b>Audio Resolution</b>	AAC-LD Stereo		
<b>Video Resolution</b>	720p 30fps, 1080p 30fps (9050-1080p)		
<b>Max Line Rate</b>	4Mbps		
<b>Video Inputs</b>	1 x DVI / VGA		
<b>Video Outputs</b>	1xDVI/VGA		
<b>Audio Inputs</b>	2x3.5mm		
<b>Audio Outputs</b>	2x3.5mm		
<b>Embedded MCU</b>	4V+3A 720p		
<b>Tolerance to Packet Loss</b>	Upto 5 % With patented SEC technology		
<b>Bandwidth Utilization</b>	720p @ 512 Kbps & 1080p @ 1 Mb		
<b>Display Mode</b>	Picture in Picture ,Biscreen & tri screen split display		
<b>USB Ports</b>	2 Ports for connecting Data card		
<b>Support &amp; Maintenance Support 3 years</b>			
<b>On Site Warranty 3 years</b>			

## VIDEO CONFERENCING SYSTEM TYPE – C

Description	Compliance YES / NO	Remarks
<b>System Components</b>		
HD Codec, built-in camera and VPM220, display and remote control Optional: 10" touch panel (Release in future)		
<b>Standard &amp; Protocols</b>		
Standards and Protocols: ITU-T H.323, IETF SIP		
Video Standards & Protocols: H.263, H.263+, H.264 BP, H.264 HP, H.264 SVC		
Audio Standards & Protocols: G.711, G.722, G.728, G.722.1*, G.722.1C*, AAC-LD, HWA-LD		
Dual Stream: ITU-T H.239, SIP		
Other Standards: H.221, H.225, H.230, H.231, H.233, H.234, H.235, H.241, H.242, H.243, H.245, H.281, H.283, H.350, H.460, T.140		
Network Standards & Protocols: TCP/IP, FTP, FTPS, DHCP, SNMP, Telnet, SSH, HTTP,HTTPS, PPPoE, RTP, RTCP, SNTp		
<b>Bandwidth requirements</b>		
Frame = 720p 30fps, 720p 60fps, 1080p 30fps		
Minimum = 384 kbps, 512 kbps, 512 kbps		
Recommended = 768 kbps, 1 Mbps, 1 Mbps		
<b>Video Specifications and Features</b>		
People Video Resolution:		
* 1080p (25/30fps), 720p (50/60fps), 720p (25/30fps)		
Content Video Resolution:		
* Input: VGA (640 x 480) @ 60/72/75/85 fps, SVGA (800 x 600) 56/60/72/75/85 @ fps, XGA (1024 x 768) @ 60/70/75/85 fps, 1152 x 864 @ 60/75/85 fps, 1280 x 600 @ 60 fps, WXGA (1280 x 768) @ 60/75/85 fps, WXGA (1280 x 800) @ 60/75/85 fps, 1280 x 960 @ 60/75/85 fps, SXGA (1280 x 1024) @ 50/60/72/75/85 fps, 1360 x 768 @ 60 fps, 1366 x 768 @ 60 fps, 1440 x 900 @ 60 fps, XGA+ (1400 x 1050) @ 60 fps, 720p @ 60/75/85 fps, 1080p @ 60 fps, 1600 x 900 @ 60 fps, 1600 x 1200 60 fps, 720p @ 60/75/85 fps, 1080p @ 60 fps, 1600 x 900 @ 60 fps, 1600 x 1200 @ 60 fps, 1680 x 1050 @ 60 fps, 1920 x 1200 @ 60 fps		
* Coding/Decoding resolution: 800 x 600, 1024 x 768, 1280 x 1024, 1280 x 720, 1920 x 1080		
* Output: 800 x 600, 1024 x 768, 1280 x 1024, 1280 x 720, 1920 x 1080		
<b>Dual Stream: Dual 1080p; Dual 720p @ 30 fps</b>		
1080p HD Camera:		
* Lens: 2-megapixel and 1/3-inch CMOS imaging chip		
* Zoom: 12x optical		
* Maximum horizontal angle: 72°horizontal field of view		
* Panning/Tilting angle: +/-30° tilt, +/- 100° pan		
* Automatic White Balance (AWB), Automatic Exposure (AE), Automatic Focus (AF)		
* Far-end camera control		
<b>Audio Specifications and Features</b>		
* Dual-channel AAC-LD Stereo		
* Acoustic Echo Cancellation (AEC)		
* Acoustic Noise Suppression (ANS) 12 dB		
* Automatic Gain Control (AGC) ±6 dB		
* Voice Clear, Audio Enhancer		
* Lip synchronization		
<b>Security and Stability</b>		
* Super Error Concealment (SEC), Intelligent Rate Control (IRC)		
* Automatic Repeat-reQuest (ARQ), Forward Error Correction (FEC), PLC		

Security:		
* H.235 signaling and media stream encryption		
* AES media stream encryption, dual-stream encryption		
* TLS and SRTP for SIP signaling and media stream encryption		
* Conference access password, conference control password		
* Administrator password, SSH/HTTPS		
Firewall Traversal: H.460.18, H.460.19 firewall traversal, Static NAT, SNP		
<b>Bandwidth</b>		
IP: 64 Kbps to 4 Mbps		
<b>Interfaces</b>		
Audio Inputs: 1 x 3.5 mm line-in jack, 1 x HD-AI (stereo, connects to microphone array )		
Audio Outputs: 1 x 3.5 mm line-out jack, 1 x HDMI		
Video Inputs: 1 x VGA, 1 x Built-in Camera		
Video Outputs: 1 x VGA/YPbPr, 1 x HDMI		
USB Interfaces: 1 x USB 2.0 Host		
<b>Network Interfaces</b>		
IP: 10/100 Base-T, 1 x RJ45		
Wireless: Built-in Wi-Fi		
<b>Application Features</b>		
Languages: Simplified Chinese, Traditional Chinese, English, German, Spanish, French, Norwegian, Italian, Polish, Russian, Portuguese, Hungarian, Finnish, Romanian, Czech, Swedish, Arabic, Turkish, Greek		
<b>Special Features</b>		
Voice Dialing in English and Chinese		
Installation from a USB disk, Plug and play		
Integration with Microsoft Lync2010TM and OCS2007R2		
Hybrid with IMS network		
IPv6		
Wi-Fi		
SiteCall		
Lock Site/Conference		
Web-based conference management		
Web-based image monitoring and HD picture snapshot		
16:9 and 4:3 mixed display		
Picture-in-picture: 1/16 picture size, optional position		
Split output: Bi-screen and triscreen display		
LDAP/Network address book		
API for integration		
<b>Digital Caption</b>		
Caption banner, body text and information bar		
Rolling display mode of the speech draft		
Modifiable front background color, caption size and transparency		
64 optional colors		
Editable caption and auto zone adjustment		
Caption rolling mode setting		
Site name display and position shift		
Text input through remote control		
External character generator		
Powerful caption SMS function		
<b>Maintenance Management</b>		
Remote control: 3D Effects & GUI Animation		

Endpoints Network Management: SNMP		
Embedded Web server, GUI interface		
Command line mode: Telnet/SSH		
Endpoint IP and number are displayed on the front panel		
Auto sleep, wake-up by remote control or remote module		
Event log record, query, display and export query results		
IP network test, default settings restoration		
Local and remote loopback		
Test signals: providing sound test and standard test stripes		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>On Site Warranty 3 years</b>		

## VIDEO CONFERENCING SYSTEM TYPE – D

Description	Compliance YES / NO	Remarks
The system should be a point to multipoint system with Codec, 3 x HD 1080p camera with 12x zoom or higher, Mic , remote control, touch panel, cables and power supply , The system should be capable of giving HD 1080p@60fps from day one. All cameras and codec should be from the same OEM.		
<b>Video : Video Standards</b>		
H.263, H.264		
H.264 in an Encrypted call should be possible		
H.264 should be possible when sending or receiving two live video sources e.g. Presenter and Presentation.		
<b>Video Frame Rate</b>		
Should support 60 fps with 1080p resolution from day one		
<b>Video Features</b>		
Ability to send and receive Four live simultaneous video sources in a single call, so that the image from the 3 x main and Auxillary cameras and PC or document camera can be seen simultaneously.		
Should support H.239 and BFCP protocols with 1080p resolution		
<b>Video Output</b>		
Should have at least 3 nos. of HDMI / DVI ( High Definition Multimedia Interface) output to connect Full High Definition display devices such as plasma and projectors for both Video and Content.(Dual Monitor Support)		
Additional HD 1080p Output for Recording (with both near end and far end videos)		
It should be posible to display the main video on one HD screen and the presentation/dual video on the otherHD screen.		
It should also be possible to manage different outputs on different screens		
<b>Video Input</b>		
Should have at least four HD video Input (HDMI/DVI) to connect 4 x HD camera with full functionalities as mentioned in the camera sepcifications		
Should Support 1 x HDMI/DVI for Dolument Camera		
Should have 1 x DVI ( Digital Video Interface) input to connect PC/ Laptop directly to the Video conferencing system and display resolutions from WXGA (1280 x 768) to 1080p (1920 x 1080)		
Should have additional Standard Definition Input - S-Video / Composite BNC		
<b>Audio : Audio standards supported</b>		
G.711, G.722,G.722.1, 64 kbps MPEG-4 AAC-LD or equivalent standard must be supported..		
<b>Other Desirable features</b>		
Noise Reduction, Automatic Gain control, Acoustic Echo Canceller, Active Lip synchronization		
<b>Audio Inputs</b>		
Should support 4 Microphone inputs from day one whereas, Three mics should be supplied with each endpoint day one		
The microphones must be standard based microphones.		
The pick up of the microphones should be at least 10 feet from the microphone.		
Echo Cancellation for every input must be available.		
<b>External devices</b>		
The unit should be supplied with Wireless Remote Control as well as Touch Panel, either of them should work at a point of time. Touch Panel shoul dbe from the same OEM		
<b>Network Interfaces</b>		
2 x LAN /Ethernet--10/100/1000 Mbps full duplex		
Should have support for IPV4 and IPV6		

Should have support fo H.320 ISDN PRI and BRI. PRI/BRI Modules not required day one.		
<b>Bandwidth</b>		
IP--at least 6 Mbps point to point and 10 Mbps for multipoint calls		
<b>Network Capabilities</b>		
Packet Loss Based Downspeeding		
<b>Multiparty Conferencing</b>		
The endpoint should support 1+3 calls using inbuilt MCU of the endpoint day one. The endpoint should support full transcoding and Rate Matching. Each endpoint should support HD1080p resolution in inbuilt 1+3 multisite call		
<b>H.323/ IP Features</b>		
Differenciated Services (QOS)		
IP adaptive bandwidth management (including flow control)		
Auto Gatekeeper discovery		
Auto Network Address Translation (NAT) support		
Standards based- Packet Loss Recovery feature on H.323 call		
Should support URL Dialling		
Support for H.245 DTMF tones in H.323		
<b>SIP Features</b>		
The endpoints must support SIP in addition to H323 protocol. Calls can be made on SIP or H323 without having to restart or reconfigure the endpoint.		
The endpoint must register with any standard SIP server. Please list the supported SIP servers.		
Must support data sharing capability in SIP calls for dual stream transmit and receive.		
<b>Security : Menu Control</b>		
Password protected system menu		
<b>Encryption of video call</b>		
ITU-T standards based Encryption of the video call		
Call should be encrypted end-to-end on IP		
Should support Standards-based: H.235 v3 and AES Encryption via Automatic key generation and exchange. The same should be available in a call with Video with presentation (dualvideo)		
Ability to manually turn encryption On or OFF should be there.		
Automatic key generation and exchange		
<b>Camera</b>		
Minimum of 12X optical zoom		
1920 x 1080 pixels progressive @ 60fps		
The Camera and codec should be from the same manufacturer.		
Should have at least 70 degrees filed of view (horizontal)		
<b>Directory services</b>		
Should support Local and Global directories		
Should support LDAP and H.350 protocols for directory transfer.		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>On Site Warranty 3 years</b>		

## VC CALL CONTROL

Description	Compliance YES / NO	Remarks
<b>H323 registration:</b>		
The video conferencing endpoints and MCU must be able to register with the H323 Gatekeeper.		
<b>SIP registration:</b>		
The video conferencing endpoints and MCU must be able to register with the SIP Server.		
<b>Interworking</b>		
The Call control device should be able to connect calls between H323 only and SIP only devices.		
<b>Capacity</b>		
Should allow at least 100 Registrations / 20 simultaneous calls in call routed mode to ensure complete control over the call features such a call hold, transfer etc. and provide presence features		
The capacity should be future upgradable to support 500 Registrations / 100 calls simultaneously in the future on the same hardware.		
The H323 registration over TCP/UDP should support H323 ID.		
The SIP registration over TCP/UDP should support SIP URI.		
Must have support for IPV6 and IPV4		
<b>SIP trunk</b>		
The Call Control Server must enable creation of a SIP based trunk/ neighbour with the IP-PBX		
Thus calls from IP phone should be able to reach the HD VC endpoints using the SIP URI number.		
Call from the HD VC endpoint must be able to reach the IP phones.		
Call from the IP phone should be able to reach the correct conference number on the MCU.		
Call from the MCU should be able to reach the desired IP Phone.		
The SIP Registrar must support SIP URI's in the following formats:		
number@domain name (e.g. 65679@company.com)		
alphanumeric@domain name (e.g. ABCD@company.com)		
Integration with Microsoft OCS / Lync environment should be possible		
<b>Call Control</b>		
Should provide flexibility such as creation of dialling pattern or modifying the dial plan.		
<b>Security</b>		
Security and authentication for registration of HD VC Endpoints.		
<b>Presence</b>		
The Call control server must be capable of "Presence".		
The status of the VC devices such as 'online', 'offline', 'busy' etc. such that calling party can know the status of the Video devices before making a call.		
The Call Control Server must have a presence engine so that when integration with other SIP devices such as MS OCS, Cisco CUCM, Avaya etc. is done, the presence of the VC devices can be published to the other devices.		
<b>Bandwidth management</b>		
Should allow creation of Zones/Virtual groups for a cluster of endpoints.		
Should allow restricting the bandwidth at the server level so that calls cannot exceed the defined bandwidth.		
Should be able to create an upper limit for the total bandwidth between two zones e.g. no. of call X bandwidth per call should not exceed the set limit.		
Ability to set restriction on who can call who,		
<b>Authentication and Registration</b>		
Registration to the server should be restricted by creation of either an allow list or deny		



list.		
Ability to allow registration to the server only upon authentication of the device.		
Creation of local authentication database and pulling of authentication credentials from an LDAP or AD server.		
<b>Scalability</b>		
The solution should be scalable to increase the capacity to at least 100 calls, 500 registrations.		
<b>Form factor</b>		
The Call control solution should be appliance based 1U/2U rack mountable, with the software for Call control preloaded from the OEM's warehouse		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>On Site Warranty 3 years</b>		

## MANAGEMENT AND SCHEDULING

Description	Compliance YES / NO	Remarks
The bidder must offer an independent service management platform for conference management , device management, registration, authentication, conference control, and statistics collection.		
The bidding product must use the browser/server architecture and provide a physical server instead of being integrated on the built-in web server of an MCU.		
The bidding product must provide a standalone or embedded GK server for registration and authentication of devices.		
The provided GK server must allow at least xx and up to 1000 concurrent registrations.		
The bidding product must support IPv4/IPv6 dual stack.		
The bidding product must provide organization-based management of devices, system permissions, and resources.		
The bidding product must support hierarchical and role-based management of users and allow at least 50 concurrent logins.		
The bidding product must support management for a maximum of 128 MCUs and 10000 participants.		
The bidding product must allow a user to:		
<ul style="list-style-type: none"> <li>● Query and modify settings of added devices .</li> </ul>		
<ul style="list-style-type: none"> <li>● Manage device configuration templates.</li> </ul>		
<ul style="list-style-type: none"> <li>● Apply the settings of a device configuration template to multiple devices.</li> </ul>		
The bidding product must provide automatic detection of devices to facilitate device configuration.		
The bidding product must provide the following information on its home page to facilitate management:		
<ul style="list-style-type: none"> <li>● Device monitoring information (number of alarms, online devices, and online users)</li> </ul>		
<ul style="list-style-type: none"> <li>● Utilization ratio of system resources (CPU and memory)</li> </ul>		
<ul style="list-style-type: none"> <li>● Conference information (number of ongoing and scheduled conferences)</li> </ul>		
<ul style="list-style-type: none"> <li>● Resource monitoring information (utilization ratio of MCUs and participants)</li> </ul>		
This requirement can force competitors to use higher-end MCUs for bidding, which increase the bidding quotation.		
The embedded GK supports a maximum of 1000 registrations, while a standalone GK supports a maximum of 6000 registrations.		
This capacity is the highest in the industry. Other Chinese suppliers do not offer products that support this function.		
The bidding product must support logging of system operations and query of logs. The logs record alarm operations, settings modification, and startup of MCUs and registration, startup, and settings modification of endpoints.		
The bidding product must provide alarm functions and allow a user to view the content, level, and status of alarms.		
The bidding product must allow a user to remotely update MCUs and videoconferencing endpoints in batches.		
The bidding product must provide conference template functions and enable a user to use a conference template to schedule a conference.		
The bidding product must allow participants to use the unified access number to join a conference.		
The bidding product must be able to push conference notifications to participants and allow participants to join conferences by clicking links in the notifications.		

The bidding product must provide multiple conference control functions, including:		
● Add, delete, broadcast, and view a participant		
● Set the continuous presence layout		
● Mute and unmute microphones		
● Mute and unmute speakers		
● Turn on and off video		
● View participant statistics		
The bidding product must provide participant snapshots to facilitate participant monitoring.		
The bidding product must be able to monitor the network status of participants and provide real-time packet loss statistics of each participant, which helps location of network faults.		
The bidding product must be able to export network statistics of conferences and participants and provide archiving and backup of network statistics for participants.		
The bidding product must support MCU pool management so that the system can automatically select an appropriate MCU to host a conference.		
The bidding product must support N+1 backup of MCUs.		
The bidding product must be able to automatically cascade MCUs using multiple channels to facilitate conference scheduling.		
The bidding product must support management of recording resources (including recording servers) and provide conference recording control.		
The bidding product must be able to integrate with Microsoft Active Directory and Exchange Server to allow a user to schedule a conference from an Outlook client .		
The bidding product must provide APIs for integration with third-party systems.		
The bidding product must support collection of statistics, including statistics on MCU and participant endpoint utilization, and allow a user to export reports to PDF or Excel files.		
The bidding product must support Chinese and English UIs. Other Chinese suppliers do not offer products that support this function.		
The SMC supports multiple languages. Refer to the data sheet and select the appropriate languages based on the actual project		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>On Site Warranty 3 years</b>		

## **RECORDING AND STREAMING**

Description	Compliance YES / NO	Remarks
<b>System</b>		
Embedded operating system		
<b>Record</b>		
Synchronous recording of video stream and auxiliary stream		
Supporting the recording of 1 to 5 groups of concurrent conferences		
Supporting H.264/CIF,4CIF,720P,1080P; cooperate with MCU, Supporting H.264,H.263,H.261/QCIF,CIF,4CIF,VGA,XGA,720P,1080P		
The video format of the auxiliary stream is H264/1080P		
Supporting monophony audio of G.711 u/G.711a/G.722/AAC-LD & AAC-LD double track recording		
Supporting WMA monophony/double track output		
<b>Live streaming</b>		
Synchronous live streaming with video and auxiliary stream		
Receiving real time live streaming in WEB interface		
<b>VOD</b>		
WEB based VOD		
Support up to 300 user@512 kbps		
<b>Recording capacity</b>		
2,000 hours (CR101, 1TB HDD)		
4,000 hours (CR102, 2TB HDD)		
It depends on the recording content and recording parameters.		
<b>Management mode of Beyonsys</b>		
WEB operating interface		
LCD display		
Product certification: RoHS and CE		
<b>Safety</b>		
Multilevel user authority setting		
Access authority distribution at file level		
Access authority distribution at user group level		
<b>System functions</b>		
Remote upgrade		
Threshold mechanism		
System logs		
Warning message		
LDAP support		
<b>Electrical</b>		
Operating voltage: 220 V/50 HZ		
Power consumption: 60 W		
<b>Physical features</b>		
Server dimensions (length/width/height): 430mm x 373mm x 45mm		
Weight of server: 8 kg Environment specifications		
Storage temperature: -40-80		
Relative humidity: 5%-95%		
Working temperature:-20-60		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>On Site Warranty 3 years</b>		

## VIDEO MONITORING SOFTWARE

Description		Compliance YES / NO	Remarks
<b>Camera</b>			
Number of channels Up to 100			
<b>Video</b>			
Video compression	H.264 (MPEG-4 Part 10/AVC)		
	MPEG-4 Part 2		
	Motion JPEG		
	Recording frame rate 3000 fps		
<b>Audio</b>			
Audio streaming	One-way audio		
Audio compression	AAC		
	G.711		
	G.726		
<b>Recording server</b>			
Security	Multiple user access levels with password protection using local or Windows domain users (Active directory)		
Installation and setup	Automatic camera discovery		
	Efficient camera management		
	Powerful event configuration wizard		
Recording storage	Unlimited recording database, limited only by disk space Record directly to local and network disks		
	Duration can be limited per camera to conform to local legal requirements		
	Fail-over recording in cameras		
	Locking of prioritized recordings		
Client	Camera Station Client (for Windows) included for local and remote viewing, playback and administration		
<b>Live view</b>			
Camera live view	Flexible live view configuration of up to 100 cameras, Corridor Format TM, multiple monitors Hot-spot, camera/view sequence, site maps, web page.		
PTZ	Control of PTZ and dome cameras using mouse or joystick Area zoom, Digital PTZ, Programmable hot-keys		
Image enhancement	Improved live and recorded video quality in challenging conditions such as snow and fog.		
<b>Playback</b>			
Search for recordings	Search for recordings based on camera, date and time		
	Timeline visualization, smart search, bookmarks		
Playback	Playback speed: up to 64x or frame by frame		
	Graphical timeline for quick overview of events		
Synchronized playback	Playback of video and audio from up to 25 cameras simultaneously.		
Export	Manual and scheduled export		
	Single images in JPEG format or video sequences in ASF format		
	Digital signature on exported recordings		
	Standalone player		
<b>Triggers &amp; Events</b>			
Event recording	Events triggered by video motion detection, Active Tampering		
	Alarm, Cross Line Detection, external inputs, manual trigger, system triggers and device event triggers		
Scheduled recording	Schedule per camera allows customization of weekday and		

	weekend recordings		
Motion detection	Advanced camera-based motion detection for low bandwidth utilization		
Input/output control	Advanced control of cameras' digital inputs/outputs		
Alarm notification	Visual indication, audible alert, traybar notification, switch to camera/view, go to PTZ preset, email, alarm procedure, acknowledgement of alarms.		
Logs	Alarm, event and audit logs		
<b>System</b>			
Minimum system requirements	Windows 7 Professional, Vista Business, XP Professional (server and/or client), 2008 Server R2, 2008 Server, 2003 Server (server only, 64 bit OS recommended for larger systems)		
	Always use the latest service packs		
	Microsoft .NET runtime environment (included in installation package)		
Minimum computer requirements – client	CPU : Intel P4 or higher, 2 GHz (Intel Core i7 recommended for larger systems)		
	RAM : 1 GB (4 GB recommended for larger systems)		
	Graphics card with full DirectX 9.0 hardware acceleration and onboard video memory of 256 MB or more		
	Important! Use latest graphics card driver and DirectX runtime		
Minimum computer requirements – server	CPU : Intel P4 or higher, 2 GHz (Intel Xeon recommended for larger systems)		
	1 GB RAM (8 GB recommended for larger systems)		
fixed network cameras and video encoders that support Camera Application Platform.			
Setup Web interface camera/encoder Configuration.			
<b>Application settings</b>			
Line setup	Virtual line setup with one or two segments		
Object direction	One-way or two-way		
Verification of setup	Visual confirmation		
<b>Scenarios</b>			
Typical applications	General low-traffic areas such as building entrances, loading docks, Calss Room, parking lots.		
Limitations	Weather conditions such as heavy rain or snow may affect detection accuracy.		
<b>Camera considerations</b>			
Lighting conditions	Dependent on camera light sensitivity		
Camera placement	45 - 90° angle to object direction		
<b>System integration</b>			
Camera	Integrates with camera event management system to enable event streaming to Video Management Software and camera actions such as I/O control, notification, edge storage, etc.		
Licenses	Cross Line Detection licenses for 1, 10 or 50 cameras.. Etc		
<b>Support &amp; Maintenance Support 3 years</b>			
<b>On Site Warranty 3 years</b>			

## CAMERA TYPE - A

Description		Compliance YES / NO	Remarks
General Requirements	The camera shall be of manufacturer's official product line, designed for commercial/industrial 24/7/365 use.		
	The camera shall be based upon standard components and proven technology using open and published protocols.		
Quality Assurance	All camera installation, configuration, setup, program and related work shall be performed by electronic technicians thoroughly trained by the manufacturer in the installation and service of the equipment provided.		
	All equipment provided shall be backed by a minimum of one year manufacturer warranty.		
	The specified unit shall be manufactured in accordance with ISO 9001 / EN 29001.		
Environmental sustainability	The specified unit shall be manufactured in accordance with ISO 14000.		
	The specified unit shall be compliant with 2002/95/EG RoHS and 2002/96/EG WEEE.		
Certifications standards	EN55022, EN55024		
	FCC Part 15 - Subpart B		
	VCCI		
	C-tick AS/NZS CISPR22		
	ICES-003		
	<b>Video Standards</b>		
	SMPTE 296M (HDTV 720p)		
	<b>MPEG-4</b>		
	ISO/IEC 14496-10 AVC (H.264)		
	<b>Networking</b>		
	IEEE 802.3af (Power over Ethernet)		
	IEEE 802.1X (Authentication)		
	IPv4 (RFC 791)		
	IPv6 (RFC 2460)		
QoS – DiffServ (RFC 2475)			
Design	Be designed to provide video streams in HDTV 720p (1280x720) resolution at 30 frames per second using H.264 or Motion JPEG.		
	Be equipped with Day/Night functionality and remote back focus capabilities.		
	Operate on an open source; Linux-based platform, and including a built-in web server.		
	Be equipped with a slot for SD/SDHC memory card expansion.		
	Be manufactured with an all-metal casing.		
Hardware	Use a high quality IR-sensitive 1/4" progressive scan megapixel sensor.		
	Be equipped with a removable IR-cut filter, providing day/night functionality.		
	Be equipped with a high quality varifocal lens with automated iris functionality providing remote back focus functionality. Varifocal 3-8 mm: 66° - 27° view*, F1.2, DC-iris		
	Provide pictures down to 0.3 lux while in day mode (with IR-filter in use) and down to 0.05 lux while in night mode (with IR-filter removed).		
	Shutter Time 1/24500 s to 1/6 s		

	PTZ : Digital PTZ, preset positions, guard tour		
	Processor & Memory on board : ARTPEC-3, 128 MB RAM, 128 MB Flash		
	Support memory expansion by providing an available SD/SDHC card slot.		
<b>Video</b>			
Resolution	The camera shall be able to deliver at least two individually configurable full frame rate video streams of resolutions up to HDTV 720p over IP networks.		
Supported Resolutions	320x240		
	640x480		
	800x600		
	1024x768		
	1280x720 (HDTV 720p) 1280x800 (16x10)		
Encoding	Support Motion JPEG encoding in a selectable range from 1 up to 30 frames per second in all resolutions.		
	Support H.264 encoding in a selectable range from 1 up to 30 frames per second in all resolutions.		
	Be able to provide independently configured simultaneous H.264 and Motion JPEG streams.		
	Support both Constant Bit Rate (CBR) and Variable Bit Rate (VBR) in H.264.		
	Provide configurable compression levels.		
Transmission	Support standard baseline profile H.264 with motion estimation.		
	The camera shall allow for video to be transported over:		
	HTTP (Unicast)		
	HTTPS (Unicast)		
	RTP (Unicast & Multicast)		
	RTP over RTSP (Unicast)		
	RTP over RTSP over HTTP (Unicast)		
	The camera shall support Quality of Service (QoS) to be able to prioritize traffic.		
	Image control		
	Incorporate Automatic and Manual White Balance		
	Be equipped with an electronic shutter and support automatic and manually defined exposure zones operating in the range 1/6 and 1/24.500 second.		
	Be equipped with Wide Dynamic Range functionality.		
Audio	Provide Back Light Compensation.		
	Allow for rotation of the image in steps of 90°.		
	The camera shall support two-way full duplex audio:		
	Input sources		
Output sources	Built-in microphone		
	External microphone		
Encoding	External line device		
	The camera shall support:		
	AAC LC at 8/16 kHz		
	G.711 PCM at 8 kHz		
	G.726 ADPCM at 8 kHz		
<b>Functionality</b>			



Web server	The camera shall contain a built-in web server making video and configuration available to multiple clients in a standard operating system and browser environment using HTTP, without the need for additional software.		
	Optional components downloaded from the camera for specific tasks, e.g. Active X, shall be signed by an organization providing digital trust services, such as Verisign, Inc.		
IP addresses	The camera shall support both fixed IP addresses and dynamically assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server.		
	The camera shall allow for automatic detection of the Camera based on UPnP and Bonjour when using a PC with an operating system supporting this feature.		
	The camera shall provide support for both IPv4 and IPv6.		
Event functionality	The camera shall be equipped with an integrated event functionality, which can be triggered by:		
	External input		
	Video Motion Detection		
	Audio Detection		
	Schedule		
	Camera tampering		
Response to triggers shall include	Local storage full		
	Notification, using TCP, SMTP or HTTP		
	Image upload, using FTP, SMTP or HTTP		
	Activating external output		
	Recording to local storage		
	The camera shall provide at least 48 MB memory for pre & post alarm recordings.		
	Event functions shall be configurable via the web interface.		
Protocol support	The camera shall incorporate support for at least IP, HTTP, HTTPS, SSL/TLS, TCP, ICMP, SNMPv1/v2c/v3 (MIB-II), RTSP, RTP, UDP, IGMP, RTCP, SMTP, FTP, DHCP, UPnP, ARP, DNS, DynDNS, SOCKS, NTP and Bonjour.		
	The SMTP implementation shall include support for SMTP authentication.		
Text overlay	The Camera shall:		
	Provide embedded on-screen text with support for date & time, and a customer-specific text, camera name, of at least 45 ASCII characters.		
	To ensure accuracy, the camera shall accept external time synchronization from an NTP (Network Time Protocol) server.		
	Provide the ability to apply a privacy mask to the image.		
	Allow for the overlay of a graphical image, such as a logotype, into the image.		
Security	The camera shall:		
	Support the use of HTTPS and SSL/TLS, providing the ability to upload signed certificates to encrypt and secure authentication and communication of both administration data and video streams.		
	Support IEEE 802.1X authentication.		
	Provide support for restricting access to pre-defined IP addresses only, so-called IP address filtering.		
	Restrict access to the built-in web server by usernames and passwords at three different levels.		
API support	The camera shall be fully supported by an open and		

	published API (Application Programmers Interface), which shall provide necessary information for integration of functionality into third party applications.		
Installation maintenance	The camera shall:		
	Be supplied with Windows-based management software which allows the assignment of IP addresses, upgrade of firmware and backup of the Cameras' configuration.		
	Support the use of SNMP-based management tools according to SNMP v1, 2c & 3 / MIB-II.		
	Allow updates of the software (firmware) over the network, using FTP or HTTP.		
	Provide the ability to perform back focus adjustment remotely from the products web interface.		
	Provide the ability to apply a rectangle of customer-defined number of pixels to the image, which can be used as a pixel counter identifying the size of objects in number of pixels.		
	All customer-specific settings shall be stored in a non-volatile memory and shall not be lost during power cuts or soft reset.		
User logs	The camera shall:		
	Provide a log file, containing information about the 250 latest connections and access attempts since the unit's latest restart. The file shall include information about the connecting IP addresses and the time of connecting.		
	Provide a connection list of all currently connected viewers. The file shall include information about connecting IP address, time of connecting and the type of stream accessed.		
Camera diagnostics	The camera shall:		
	Be equipped with an LED, indicating the camera's functional status.		
	Be monitored by a Watchdog functionality, which shall automatically re-initiate processes or restart the unit if a malfunction is detected.		
Interfaces	<b>Inputs/Outputs</b>		
	The camera shall be equipped with one digital (alarm) input and one digital output, accessible via a removable terminal block. This input shall be configurable to respond to normally open (NO) or normally closed (NC) dry contacts.		
	The camera shall be equipped with one 3.5 mm jack for line/mic input and one 3.5 mm jack for line output for Audio		
	<b>Network interface</b>		
	The camera shall be equipped with one 100BASE-TX Fast Ethernet-port, using a standard RJ-45 socket and shall support auto negotiation of network speed (100 MBit/s and 10 MBit/s) and transfer mode (full and half duplex).		
Enclosure	The camera shall be manufactured with an all-metal casing.		
Power requirements	Power over Ethernet according to IEEE 802.3af - Class 2.		
	8 - 20 VDC, max 6.4 W		
Environmental	The camera shall:		
	Operate in a temperature range of 0°C to +50°C (+32°F to +122°F).		
	Operate in a humidity range of 20–80% RH (non-condensing).		
<b>Support &amp; Maintenance Support 3 years by Certified Engineer</b>			
<b>Warranty 3 years</b>			

## **CAMERA TYPE - B**

Description	Compliance YES / NO	Remarks
Chip Inch Size : ¼		
Colour Type : Colour / Monochrome		
Resolution : 1280 x 800		
Specialist Type : Network		
Sensitivity Lux : 0.0		
Electrical Specifications : Voltage:PoE		
Motion Activated : Yes		
Focal Length MM : 2.9		
<b>Network Properties</b>		
Interface: RJ-45 10BASE-T/100BASE-TX PoE		
Network Protocols : IPv4/v6, HTTP, HTTPS*, QoS Layer 3 DiffServ, FTP*		
Control : PTZ		
Image Frame Rate : 30 fps		
Back Light Compensation : Yes		
White Balance : Yes		
Electronic Shutter Range : 1/24,500 ~ 1/6		
Signal Mode : PAL/NTSC		
Mini or Compact : Yes		
Compression Type : H.264, M-JPEG, MPEG-4		
Electrical Specifications : Power Consumption: 6.49 W		
Physical Specifications : Weight g: 160		
Environmental		
Operating Temperature oC: 0 ~ 40		
Operating Humidity %: 20 ~ 80		
<b>Protocal</b>		
*SMTP		
Bonjour		
UPnP		
SNMPv1/v2c/v3(MIB-II)		
DNS		
DynDNS		
NTP		
RTSP		
RTP		
TCP		
UDP		
IGMP		
RTCP		
ICMP		
DHCP		
ARP		
SOCKS		
Support & Maintenance Support 3 years		
Warranty 3 years		

## **LARGE FORMAT DISPLAY**

Description	Compliance YES / NO	Remarks
<b>Display</b>		
Screen Size 46"		
Panel Technology 120Hz LED panel		
Brightness 450 cd/m2		
Contrast Ratio 5000:1/10,000:1 Dynamic		
Resolution 1920 x 1080		
Pixel Pitch (H x W) 0.17675 x 0.53025		
Response Time 9ms		
Viewing Angle 178°/178°		
Color Support 80% (Color Gamut)		
<b>Video</b>		
Native Resolution 1920 x 1080		
Scanning Frequencies H: 30~81KHz, V: 56~85Hz		
Pixel Frequency 148.5 MHz		
<b>Connectivity</b>		
Inputs PC: D-SUB (VGA), Video: HDMI, Audio: JACK type		
Outputs PC: DVI out, Audio: JACK type		
Built-in PC		
External Control LAN RJ45, RS 232C IN/OUT		
<b>Power</b>		
Power Supply AC 100 - 240V(+/- 10%), 50/60 Hz		
Power Consumption Typical/Max 170W/220W		
Power Consumption Stand-by : Less than 2W		
Power Consumption Power Off : Less than 1W		
<b>Environmental Conditions</b>		
Operating Temperature : 32°F~104°F		
Operating Humidity 10%~80% non-condensing		
MTBF 50,000		
Recommended Runtime 16/7		
<b>Special Features</b>		
VESA Standard Wall-Mount Interface 400 x 400mm		
Landscape/Portrait Option Yes/Yes		
Stand Type Foot Stand (Optional)		
Temperature Sensor Yes		
Split Zoom Yes (Supports Natural Mode)		
Source Selection Digital (HDMI)/Analog (RGB) Component/AV (D-SUB)		
Brightness/Control Yes		
Color Support Warm/Cool/User Control		
Tracking Auto/Clock/Phase		
Set-up Language (English/French/Spanish/German)		
Time Clock/On/Off Timer/Auto Sleep/Power on Delay		
Mute/Sleep Timer Yes		
Auto Power/Source Memory Yes		
Key Lock/DPM Select Yes		
Others Magic info, 10Wx2 (Built-in speakers)		
LED BLU, LAN MDC		

<b>Dimension</b>		
Product Dimension Without Stand: 42.61" (W) x 25.77" (H) x 1.57" (D)		
Shipment Dimension 47.6" (W) x 30.35" (H) x 7.83" (D)		
Bezel Width 29.5mm		
<b>Certification</b>		
Safety UL/c-UL/CB scheme/TUV/NEMKO		
EMC: FCC Class "B"/		
Energy Efficiency : Energy Star 5.0		
<b>Warranty/Service 3 Years Onsite Parts and Labor</b>		
<b>Wall Mount</b>		

## SERVER TYPE – A

Description		Compliance YES / NO	Remarks
Chassis attributes	Chassis of atleast 10U height to accommodate min 16 hot pluggable half height blades or 8 full-height blades with SAS hard disks/8 hot pluggable full height servers with hot plug SAS hard disks. Minimum 6 I/O bays with minimum 3 fabric support. Shall provide common resources for the Blade Servers like power, System Management, Cabling, Ethernet Management and extension, External fiber Channel Storage switching and connectivity. Chassis with all redundancy features.		
Chassis Architecture	High-Availability Dual Path Midplane or passive midplane for providing two-way communication paths for Ethernet, Fiber Channel, KVM Switches, Power Supply and Management Signals and should be able to support with minimum throughput of 5 Tb/s		
Interconnect	Two Nos of Gigabit Layer 2 /3 Ethernet Switch Module with minimum 4 up-link ports each. The switches shall have internal ports for communication to all the blades populated in the Blade Chassis. Internal switches shall have optional 10GbE uplinks &/or stacking connectors. Optional support for 10G and Infiniband switch modules		
SAN connectivity	Dual redundant management modules to communicate with the system management processors on the blade server. The Management Modules shall be capable of providing KVM Connectivity for the Blade servers housed inside the chassis, Real time, actual power cons. Status/Inventory/Alerting for Blades, Chassis Infrastructure, & IOMs; Centralized Configuration; GUI & CLI;SSL/SSH ;Power/Thermal Monitoring; Dynamic power engagement; Temperature monitoring; Persistent WWN/MAC---Should allow locking a WWN/MAC address into a specific blade slot.		
Cooling	Hot swap variable speed blowers/fans for Cooling the chassis fully redundant and all populated ; Ability to withstand temperature excursions up to 45 degree Celsius.		
Power Supplies	Power Supplies shall be hot swappable and shall be supplied in adequate numbers so as to ensure n+n redundant power supply is there for completely populated chassis sufficient to power the fully populated chassis.		
Management	Shall provide support for remote console management, power on/off blades, modules shall monitor power status, operating system, temperature, disks, blowers, power modules system diagnostic programs provided through the management s/w.Real Time Power/Thermal Monitoring and Management, Real Time System AC Power Consumption with reset-able peak and minimum values System level power limiting and slot based power prioritization		
Chassis Health Monitoring	Interactive LCD/LED panel for local trouble shooting & wizard based set up. Control panel display to show health of the systems including power-on, over temperature ,other information and system error conditions.		
Availability	The chassis should support Updatation of firmware with no downtime		
<b>8 Server Loaded Dual-socket Blade Server</b>			
8 Server Dual-socket Blade Server	2 x 8-core latest generation server processor of atleast 2.60 GHz/higher with atleast 20 MB/higher Cache and 8.0 GT/s QPI or HT and max TDP of 115 Watts or equivalent		
	Latest OEM chipset supporting an optimized for the above processor		
	RAM (min/max): 32 GB GB DDR-3 ECC RDIMM RAM		

	2 x 600 GB H/S 6 Gb/s SAS Hard Disk Drives configured in RAID 1		
	Atleast Two PCIe mezzanine slots		
	Integrated Graphics with atleast 8MB Video Memory		
	Integrated Dual port 10G adapter without blocking the 2 available mezzanine slots		
	OEM embedded controller with IPMI 2.0 compliance and Server Management Tool from same OEM		
	<p><b>The quoted server models should have the following Certifications:</b>  Microsoft Windows Server2008 R2, Microsoft® Windows® HPC Server 2008, Novell SUSE Linux Enterprise Server, Red Hat Enterprise Linux, Sun Solaris, Microsoft® Windows Server® 2008 Hyper-V, VMware® ESXi Version 4.1, Citrix® XenServer 5  FCC, UL, ROHS</p>		
	The server OEM must be ISO-14001 and Greenpeace certified		
	The quoted server model must have published benchmark on <a href="http://spec.org/tpc.org">spec.org/tpc.org</a>		
	3 years onsite warranty by OEM		

## **SERVER TYPE – B**

	<b>Compliance YES / NO</b>	<b>Remarks</b>
<b>Converges servers, storage and networking into a single, optimized Chassis.</b>		
Powerful: Up to 4 enterprise-class server nodes		
Small: Just 12" X 19 and about 175 lbs.		
Two form factors: Desk side or rack able		
Storage: Up to 48tb of storage with 12 x 3.5" hot plug hard drives		
Fast networking: 8 1Gb Ethernet ports or optional 1GbE internal switch module		
Fully expandable input/output:8 PCIe slots (3 full height/full length and 5 low profile/half length)		
High availability and reliability: Redundant power supplies and fans		
Simple, easy-to-use management: Entry "Express" and advanced "Enterprise" levels of chassis-level management		
Office level acoustics & power: Standard 100V – 240V AC power – just plug in the wall		
12 nos. x 300GB 15K RPM,6Gbps SAS 3.5 " Hot Plug Hard Drive		
Internal RAID Controller 1GB NVRAM		
DVD+/-RW, SATA, Internal		
Redundant Power Supply, 3 x 1100W, (2+1)		
Up to 8 PCIe slots		
1Gb Switch Module Internal 16 ports to External 8 ports		
<b>4 Sever Loaded</b>		
2 x Intel(R) Xeon(R) Processor E5-2450 2.10GHz, 20M Cache, 8.0GT/s QPI, Turbo, 8C, 95W		
4 x Integrated Two Broadcom 5720 dual-port Gigabit Ethernet		
2 x 8GB RDIMM, 1333MHz, Low Volt, Dual Rank, x4 Bandwidth		
2 x 500GB 7.2K RPM Near-Line SAS 6Gbps 2.5in HotPlug Hard Drive		
3 years onsite warranty by OEM		



## SERVER TYPE – C

	Compliance YES / NO	Remarks
Form Facrors 1 U Server		
2 x Quad-core latest generation server processor of at least 2.20 GHz/higher with at least 10 MB/higherL3 Cache and 6.4 GT/s Bus Speed		
Latest OEM chipset supporting an optimized for the above processor		
RAM 32 GB DDR-3 ECC RDIMM RAM		
3 x 6000 GB H/S 15K SAS Hard Disk Drives - upgradeable up to at least 8 drives		
Internal DVD-ROM drive		
At least 2 PCIe Gen2 slots		
Support for RAID 0,1 ,5		
1 x Embedded Dual Gigabit Ethernet adapter		
Integrated Graphics with atleast 8MB Video Memory		
OEM embedded controller with IPMI 2.0 compliance, dedicated management port and Server Management Tool from same OEM, prferably embedded in the system board		
4 USB 2.0 ports(2 each on rear and front, 1 internal), 1 Serial, keyboard, mouse, graphics (DB-15)		
Redundant high energy-efficient Power Supply (atleast 500 Watts each) to sustain above configuration.		
User-selectable power cap (subsystems throttle to maintain the specified power cap), ACPI 3.0 Compliant, PCI 2.3 compliant, PXE and WOL Support, IPv4 and IPv6 support		
<b>The quoted server models should have the following Certifications:</b> Microsoft Windows Server2008 R2, Microsoft® Windows® HPC Server 2008, Novell SUSE Linux Enterprise Server, Red Hat Enterprise Linux, Sun Solaris, Microsoft® Windows Server® 2008 Hyper-V, VMware® ESXi Version 4.1, Citrix® XenServer 5 FCC, UL, ROHS		
1U Rackable form factor with sliding rails		
The server OEM must be ISO-14001 and Greenpeace certified		
3 years onsite warranty by OEM		

## STORAGE

Description		Compliance YES / NO	Remarks
Storage Architecture	Unified Storage System with NSPoF (No single point of failure) Architecture. The Storage should support NAS & SAN (Unified) as an integrated offering. The architecture should allow modular upgrades of hardware and software for investment protection. The system must support dual-ported 6Gbps SAS Disk Drives and NL-SAS Disk Drives.		
Storage Controller	System to have minimum Two controllers with NSPoF Architecture (NO single point of failure architecture). Each controller to have 64-bit multi-core CPU.		
Storage Cache / System Memory	The system should have a minimum of <b>16GB of</b> system memory across multiple controllers. Should have destaging facility to protect the cache in case of power loss.		
Front-end Ports Support	System to support 8Gbps FC, 1GigE IP and iSCSI Ports. System should have the support for 10GigE IP, iSCSI and FCoE as an upgrade in the future.		
Front-end Ports Configured	Storage System to have minimum <b>4 x iSCSI ports and 2 x 8Gbps FC Ports</b> per controller.		
Back-end Disk Ports	Storage System should have 6Gbps SAS Drive interface (latest technology drive connectivity interface).		
Storage Capacity Configured	System should be configured with 115TB useable capacity in RAID-5. System should be configured with 500GB in SSD drives, 10.5TB on 600GB 15k RPM SAS drives and 104TB useable capacity on 3TB 7200rpm NL-SAS Disks.		
Storage Scalability	System should be scalable to minimum <b>125 Disk Drives</b> .		
Disk Support	System should support 10K rpm, 15K rpm, 6Gbps SAS Disks. System should also support 7200 rpm SATA II or 7200 rpm NL-SAS (Nearline SAS) Disk Drives. System should also support Flash Drives.		
Global Hot Spare	System should have the capability to designate global hot spares that can be automatically be used to replace a failed drive anywhere in the system. Storage system should be configured with required Global Hot-spares for the different type and no. of disks configured, as per the system architecture best practices.		
Protocols Support	System should be configured with CIFS, NFS, iSCSI and FC Protocols. All the licenses should be provided.		
RAID Support	Should support RAID 5, 6, and 1+0.		
Storage Array Management	Easy to use GUI based and web enabled administration interface for configuration, storage management. The storage management to have an option to provide storage management related information/function in the form of Dashboard e.g. the storage capacity utilization with respect to host/application or file system and free capacity available etc.		
Data Deduplication	Offered Storage System to support file-level Data-deduplication with compression.		
Thin Provisioning and Compression	Offered Storage System to have Thin Provisioning for NAS and SAN both. Storage System to also support compression for NAS and SAN.		
On-line Expansion / RAID Group creation/Expansion	System support online expansion of RAID Group or addition of new RAID Group. Must be able to add additional disks on the fly to expand the RAID group capacity or create new RAID Group.		
Subsystem based striping	Most applications benefit from striping across multiple spindles. The array must support subsystem based striping across for enhanced performance. This should be inbuilt into		

	the storage and should not require any host based volume manager.		
Auto Tiering	The array should be provided with Auto Tiering software for automatic/manual movement of data between all the three types of drive i.e. SSD , SAS and NL-SAS.		
Clone	The system should be configured with software licence for creating clone copy of LUN /volume accessed by Fibre channel and iSCSI hosts		
Snapshots	The system should be configured with Snapshot licenses , snapshot restore licences for the entire systems capacity		
Software licenses	The system should be configured with licences for FC , iSCSI, Thin Provisioning, Management software license should be for entire system		
Upgradability	The proposed system should support field upgradable to higher models in the same family with controller based upgrades.		
Management	Support a browser based built in management. Should be able to support automated email to vendor support centre for proactive maintenance		
Disaster Recovery / Replication Support	Storage array should support long distance data replication at storage or fabric level, if required through optional software license.		
Warranty and Support	3 Years 24 x 7 support for hardware and software		

## Desktop PC

Description		Compliance YES / NO	Remarks
Display	20-inch diagonal widescreen WLED backlit anti-glare LCD		
	Resolution: 1600 × 900 resolution (16:9)		
	Contrast ratio: 1000:1 typical		
	Orientation: Designed to operate in portrait or landscape Mode		
	Image brightness: 250 nits typical		
	Viewing angle (typical): 85/85/80/80 (L/R/U/D)		
	Pixel Pitch: 0.27675(H) x 0.27675(W) [mm]		
	Tilt adjustment: -5 degree to + 25 degree to the vertical plane		
	Adjustable Tilt stand / Tilt Angle		
Processor	Intel Core i7 Latest generation with Intel HD Graphics 2500 (2.90 GHz, 6 MB cache, 4 cores) or AMD equivalent		
Chipset	Intel H61Express chipset		
Motherboard	OEM Motherboard		
Memory	Two SODIMM slots; Non-ECC dual-channel 1600 MT/s, DDR3 SDRAM, installed 8GB Memory Expandable to 16 GB DDR3		
Hard Disk Drive & controller	500GB/1 TB SATA 6.0-Gb/s Hard Drive ( 7200 RPM, Smart IV) and Support up to 128 GB Solid State Drive or 256 GB Self-Encrypting Drive		
	Pre failure alerts for the HDD		
Optical Drive	Integrated Slim tray load, SATA Super Multi DVD Writer / DVD ROM		
Media card reader	optional 6-in-1 Media Card Reader		
Graphics	Intel HD 2500 Graphics		
Audio	Realtek ALC269 codec - 16 & 24-bit PCM Integrated business class 2.0 speakers (2W x 2) with Basic Business Audio		
MIC	Integrated single Microphone array (optional)		
Webcam	Integrated 1.3 MP Webcam, Upto 30 frame /sec support (optional)		
Ethernet	Integrated Gigabit (10/100/1000 NIC) LAN		
Wireless	Integrated 802.11a/b/g/n wireless minicard with Bluetooth combo		
Slots	1 - mini PCIe half-length		
Ports	6 - USB 2.0 (2 side, 4 rear)		
	1 - Microphone in (side)		
	1 - Headphone jack (side)		
	1 - Stereo audio line out (rear)		
	1 - RJ-45 (rear)		
	1 - 6-in-1 Media Card Reader		
	Provision for 1 optional legacy Serial port and Display port for dual monitor support		
Bays	2		
Form Factor	All – in – one		
Power Supply	External 150W, 87% efficient, active PFC, 100-240V AC		
Keyboard	PS/2 / USB Keyboard		
Mouse	PS/2/ USB Optical Scroll Mouse		
Software	: Adobe Flash Player		

<b>(not included when configured with Free DOS)</b>	Microsoft Security Essentials		
	PDF Complete Corporate Edition		
	Recovery Manager		
	Support Manager		
	WinZip Basic		
<b>Operating System</b>	Pre-Installed Genuine Windows 7 Professional (32-bit)		
<b>Security</b>	Security lock slot		
	HP Keyed Cable Lock		
	USB port disable		
<b>Compliance And Certification</b>	UL		
	CSA		
	FCC compliance		
	ENERGY STAR		
	EPEAT Silver		
	ROHS		
	Win certification		
	Linux (SuSe Certification)		
<b>Support &amp; Maintenance Support 3 years</b>			
<b>On Site Warranty 3 years</b>			

## **Workstation Type “A”**

Description	Compliance YES / NO	Remarks
2.7GHz quad-core Intel Core i5/i7 processor(latest generation) (Turbo Boost up to 3.2GHz)/ Intel Xeon Processor E3-1200v2 series or E5-1600v2 or 2600v2 series		
21.5” Screen		
6MB L3 cache		
4 DIMM slots, installed 8GB Memory Expandable to 32 GB DDR3 memory		
500GB/1TB (5400-rpm) hard drive		
NVIDIA GeForce GT 640M graphics processor with 512MB of GDDR5 memory/professional NVIDIA Quadro series graphics		
Stereo Speakers / Dual microphones Headphone port Headphone/optical digital audio output (mini-jack) SDXC card slot / Four USB 3 ports Two I/O ports supporting 10 GBPS / Mini DisplayPort output with support for DVI, VGA and dual-link DVI 10/100/1000BASE-T Gigabit Ethernet (RJ-45 connector)		
Full-size backlit keyboard		
Mouse with Multi-Touch surface		
802.11n Wi-Fi wireless networking;2 IEEE 802.11a/b/g compatible		
Bluetooth 4.0 wireless technology		
Preloaded : licensed operating system with CD		
Licensed MS Office (full)		
Form Factor - all in one		
<b>Environmental Conditions :</b>		
The offered desktop must conform to standards as follows for <b>Green Features</b>		
Should be of recyclable enclosure		
Mercury-free LED-backlit display		
Arsenic-free display glass		
BFR-free		
PVC-free		
Energy Efficient Ethernet		
Reduced packaging volume		
Meets ENERGY STAR Version 5.2 requirements		
Rated EPEAT Gold		
<b>Operating System</b>		
The Server should be installed with latest Windows Operating System/ latest SUSE Linux/Red Hat Enterprise Linux Workstation		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>On Site Warranty 3 years</b>		

## **SERVER RACK**

Description	Compliance YES / NO	Remarks
The offer should include one OEM complete 42U or above rack per Server		
Pallet rack		
Side panel Kit		
Fan Kit 220 V AC		
Rack Grounding Kit		
42U Rack		
Cable Management D-Rings Kit		
Rack mount 2 Modular PDU 10 x 16A 220V		
Large open base for cable entry and exit		
Dual rear doors and split side panels		
Adjustable vertical mounting rails slide forward or backward within the rack 80% of the surface area of front and rear doors are perforated to aid in the thermal management of ultra-dense environments		
Rack-top cable exits with adjustable, sliding door		
Reinforced frame for stability		
Unique side-rack PDU options		
Reversible front door can be configured to open from left or right		
Front and rear doors are removable		
Rotating rear casters to easily position rack		
Ideal base dimensions for 2-tile placement in data center		
U-space numerical markings on both front and rear server mounting posts		
Easily accessible leveling feet		
Height allows movement through standard doorway		
Dimensions : Height 78.7" (1999mm) x Width 23.82" (605mm) x Depth 42.15" (1070mm)		
Static Load Rating 2,500 lbs.		
Frame, doors, sides 225.5kg		
The rack should have wheels with lock		
<b>Support &amp; Maintenance Support 3 years</b>		
<b>Warranty 3 years</b>		

## UPS TYPE - A

Description		Compliance YES / NO	Remarks
UPS Manufacturers Credentials	Manufacturer must be ISO 9001:2000 certified. Please enclose Certificate		
	Manufacturer must be ISO 14001 certified. Please enclose certificate		
UPS Ratings	20 KVA / 16 KW in case of 20 KVA		
UPS Type	UPS should be True Online Double Conversion Type based on Digital Signal Processor (not microprocessor)		
	<b>Both Rectifier and Inverter must be IGBT based</b>		
Mandatory System Features	UPS system must have <b>inbuilt Isolation Transformer</b> at the output side		
	UPS system must have fully functional LCD display for		
	1. Fault Annunciations		
	2. System Parameters Display like Input / Output Voltages, Frequency etc.		
	3. System must have logging facility for easy diagnosis of system problems		
	<b>UPS must have protection for Phase Reversal and UPS must automatically correct the input Phase Sequence without unnecessarily discharging the batteries</b>		
	<b>System to be supplied with Monitoring Software &amp; SNMP card.</b>		
Input Parameters	UPS must not be based on a single Power PCB with Inverter, Charger or Rectifier on the same PCB. (so that in case any one of these fails then the entire UPS system becomes non-functional and repeated failures does not render the PCB un-repairable) Undertaking stating that neither Charger, Rectifier or Inverter sections will be located on a single PCB must be provided by the bidder		
	Nominal Input Voltage : 415V 3-phase, 4 Wire		
	Permissible Input voltage range : +25%,-30%		
	Nominal Input frequency : 50Hz		
	Permissible input frequency variation : +/-10%		
	Input power factor : 0.99 p.f.		
Bypass Parameters	Power walk in: Progressive over 10 seconds		
	220/230/240 VAC selectable		
Intermediate Dc Circuit Parameters	<b><u>Nominal DC bus voltage: 356V</u></b>		
	Permissible DC voltage variation: 260V-410V		
	DC bus OV trip: 410V		
	End of discharge DC bus voltage: 260V		
	Types of batteries supported : SMF		
	Nominal battery float voltage: 356V		
	Minimum battery charging current: 7.0 A		
	DC ripple : < 2% rms		
D C Voltage Regulation : +/- 1 %			
Output Parameters	<b><u>Output power rating at 1.0 pf:</u></b>		
	<b><u>20 KVA / 16 KW in case of 20 KVA</u></b>		
	Output power factor : 0.8 p.f.		
	Nominal Output voltage : 220 / 230 / 240V AC 1 Phase		
	Output voltage regulation: +/-1%		
	Output voltage distortion for 100% Linear Load < 2% and for 100% Non Linear load < 3%		



	Nominal Output frequency : 50Hz		
	Power Rating at 0.8 pf : 20 KVA		
	Output frequency tolerance : +/-0.1%		
	Output frequency synchronization : +/-1Hz, ± 2 Hz, ± 3Hz Settable		
	Output Crest factor capacity : 3:1		
	Overload Capacity:		
	110% overload for 1 hour		
	125% overload for 10 minutes		
	150% overload for 1 minutes		
	Transient response for 100% load change : + / - 10 % recovery within 10 msec		
	Transfer time to bypass Synchronized: 0 milliseconds		
	Unsynchronized : 20 millisecond		
<b>DC Parameters</b>	Voltage Limits for Inv operation: 260 VDC to 410 V DC		
	SMF Battery: 26 Blocks of 12V 65 AH each.		
	Total VAH Capacity – 26X12X65		
<b>Environmental Parameters</b>	<i>Operating temperature range : 0 degree C to 45 degree C</i>		
	Storage temperature: 0 degree C to 70 degree C		
Relative humidity : 0-95% RH Non-Condensing			
Maximum attitude with full rating: 1000 Meters			
<b>Protections Required</b>	INPUT UNDER VOLTAGE		
	INPUT OVER VOLTAGE		
	DC OVER VOLTAGE		
	DC UNDER VOLTAGE		
	INPUT CURRENT LIMIT		
	BATTERY UNDER VOLTAGE		
	BATTERY DEEP DISCHARGE		
	BLACK START ON LOW CHARGE OF BATTERIES		
	BATTERY CURRENT LIMIT		
	HIGH AMBIENT TEMP		
	OUTPUT SHORT CIRCUIT PROTECTION		
	OUTPUT OVER VOLTAGE		
	OUTPUT UNDER VOLTAGE		
	OUTPUT OVER CURRENT		
	BYPASS UNDER VOLTAGE		
	BATTERY OVER TEMPERATURE ALARM		
	INVERTER/CONVERTER DEVICE OVER TEMP.		
	TRANSFORMER OVER TEMPERATURE.		
<b>Parameters Display on LCD</b>	INPUT VOLTAGE LINE TO LINE		
	INPUT CURRENT		
	INPUT FREQUENCY		
	BYPASS VOLTAGE		
	BYPASS FREQUENCY		
	DC BAS VOLTAGE		
	BATTERY VOLTAGE		
	BATTERY CURRENT		
	OUTPUT VOLTAGE		
	OUTPUT CURRENT		
	OUTPUT FREQUENCY		
	OUTPUT KVA		
	AMBIENT TEMPERATURE		

	INVERTER TEMPERATURE		
	OUTPUT TRANSFORMER TEMPERATURE		
	INPUT CHOKE TEMPERATURE		
	DC BUS MODE OF OPERATION		
	NUMBER OF BATTERY USED		
	TYPE OF BATTERY USED		
	FLOAT VOLTAGE PER CELL		
	BATTERY CURRENT LIMIT		
	BOOST VOLTAGE PER CELL		
	BOOST CHANGEOVER CURRENT LEVEL		
	BOOST MODE CURRENT LIMIT		
	BOOST TIMER		
	BATTERY AH		
	BATTERY AH		
	BATTERY LOW PREALARM		
	END OF DISCHARGE VOLTAGE		
	AUTO RESTART		
	DC BUS VOLTAGE		
	BYPASS UNDER VOLTAGE		
	BYPASS OVER VOLTAGE		
	RECTIFIER OPERATION MODE (FLOAT/BOOST)		
	TIME		
	DATE		
	PART NUMBER OF THE UNIT.		
	RATING OF THE UNIT		
	UPS INSTALLATION DATE		
	BATTERY INSTALLATION DATE		
	UPS ID.		
	LAST SERVICE DATE.		
	SERIAL NUMBER OF THE T		
	FIRMWARE REVISION NUMBER		
	LAST 50 EVENTS IS STORED WHICH HELPS FOR DIAGNOSIS AND REPAIR		
<b>Standard Backup time</b>	120 minutes for each UPS system		
<b>Support &amp; Maintenance Support 3 years</b>			
<b>On Site Warranty 3 years</b>			

## UPS TYPE - B

Description		Compliance YES / NO	Remarks
Technology	True On Line UPS with double conversion technology based on DSP (Digital Signal Processor). Microprocessor based systems will not be acceptable		
	UPS should be with Intelligent Battery Management for longer battery life		
	UPS should come with Auto Shutdown and monitoring software in CD media		
	IGTB based rectifier and inverter. With input power factor minimum 0.95		
<b>Power Rating</b>	5 KVA		
<b>Configuration</b>	Standalone Configuration		
<b>Input</b>			
Nominal Voltage	220 VAC		
Voltage Range	110 – 300 VAC load dependent		
Frequency	50 Hz ± 5%		
<b>Output</b>			
<b>Voltage Range</b>	220 VAC ± 3%		
<b>Harmonic Distortion</b>	<4% (Linear Load)		
	<7% (non Linear Load)		
<b>Frequency</b>	±5%, synchronized with bypass, 50 Hz ±0.2% free run		
<b>Power Factor</b>	0.8		
<b>Crest Factor</b>	03:01		
<b>Inverter Efficiency</b>	>95%		
<b>Inverter Overload</b>	110% for 60 mins, 125% for 10 min, 150% for 1 min		
<b>Bypass Voltage</b>	120 – 250 VAC		
<b>Battery</b>			
<b>Type</b>	Sealed Maintenance Free, Valve regulated Lead Acid		
<b>Number of Battery cells/Make</b>	To be specified		
<b>Rated Voltage</b>	To be specified		
<b>AH Rating</b>	Minimum 10000 VAH		
<b>Standard Backup Time</b>	120 mins for each UPS System		
<b>Charger Capacity</b>	To be specified		
<b>Transfer Time</b>	Zero		
<b>Dynamic Response</b>	±5% at 100% load change (resistive)		
<b>Environmental and Other</b>			
<b>Audible Noise</b>	<40 dB		
<b>Display</b>	LCD Display inbuilt should be provided in the UPS system		
<b>TVSS</b>	A UL certified Transient Voltage Surge Suppressor will have to be supplied at the input of the UPS system of minimum 25kA Capacity with two mode protection and response time of nano seconds. Please enclose brochure of the offered TVSS.		
<b>Credentials</b>	Manufacturer should be ISO 9001:2000 certified		
	Manufacturer should be ISO 14001 certified		
<b>Special Feature</b>	Manufacturer should be MAIT LEVEL II certified (preferable)		
	In the event of a shut down to low battery, the UPS should automatically restart once the input AC power resumes		
<b>Support &amp; Maintenance Support 3 years</b>			
<b>On Site Warranty 3 years</b>			

## **LASER MONO PRINTER**

Description		Compliance YES / NO	Remarks
Type	A4 Size Laser Mono		
Resolution	upto 1200x1200 dpi		
Speed	35 PPM in A4		
First copy out	As fast as 6.5 seconds		
Memory	128 MB exapndable to 384 MB		
Duplex	Automatic inbuilt		
Network	Inbuilt		
Processor	600 MHz		
Consumable	Printer to be supplied with full toner		
Interface	Hi-Speed USB 2.0, Ethernet 10/100/1,000 Base TX		
Emulation	PostScript3, PCL6/5e, IBM ProPrinter, EPSON		
input capacity	250-sheet Cassette, 50-sheet Multi Purpose Tray		
Media Size	76 x 127mm (3 x 5) ~ 216 x 356mm (8.5 x 14)		
Media Type	Plain, Thin, Thick, Thicker, Cotton, Colored, Envelope, Transparency, Pre-Printed, Recycled, Labels, Bond, Card stock, Archive		
Duty Cycle	80,000 sheets		

## **LASER COLOR PRINTER**

Description		Compliance YES / NO	Remarks
Type	A4 Size Color Laser Printer		
Resolution	Up to 9600 x 600 effective dpi		
Speed	Color Print Speed up to 35 ppm in letter		
First copy out	Less than 11 seconds (in Color from Ready mode)		
Memory	384 MB (Max. 896 MB)		
Duplex	manual		
Network	Ethernet 10/100/1000 Base TX / Wireless Option Available		
Processor	600 MHz dual core		
Consumable	printer to be supplied with full toner		
Interface	High-Speed USB 2.0, Ethernet 10/100/1000 Base TX, Optional Wireless (with expansion card)		
Emulation	PostScript 3, PCL5e, PCL6, PDF 1.7		
input capacity	500 sheets @ 80g/ & 100 sheets (Multi purpose bypass @ 80g)		
Media Size	3" x 5" to 8.5" x 14"		
Media Type	Media Type: Plain Paper, Thick, Thicker, Extra Thick, Thin, Bond, Color Paper, Cardstock		
Duty Cycle	120,000 pages		

## **DOCUMENT SCANNER**

<b>Description</b>		<b>Compliance YES / NO</b>	<b>Remarks</b>
Scanner Type	Flatbed colour image scanner		
Optical Resolution	Main 4800 dpi x Sub 9600 dpi		
Document Size			
Reflective	216 × 297 mm (A4, US Letter size document)		
Transparency	32.9 x 244.4 mm (35 mm x 6 frames Strip film, 35 mm x 4 frames mounted slides)		
Interface	Hi-speed USB 2.0		
Photoelectric Device	Matrix CCDTM (12 line colour CCD with On Chip Micro Lens) 122,400 pixels (10,200 x 4 lines x 3 colours)		
Light Source	White LED		
Sub-Scanning Method	Fixed document and moving carriage		
Output Resolution	50 to 6400, 9600, 12800 dpi (50 to 6400 dpi in 1 dpi increments)		
Colours	Internal 48 bit (281.5 trillion colours), Output 48 bit (281.5 trillion colours) 24 bit (16.7 million colours), 16 bit (65,536 grayscale levels), 8 bit (256 grayscale levels) 1 bit Monochrome		
<b>Scanning Speed Reflective Scanning (A4)</b>			
Monochrome	600dpi Approx. 2.9 msec/line		
	1200dpi Approx. 10.1 msec/line		
	4800dpi Approx. 21.8 msec/line		
24bit Color	600dpi Approx. 3.5 msec/line		
	1200dpi Approx. 10.1 msec/line		
Functions	PRINT Image Matching II ICC Profile Embedded Backlight Correction Colour Restoration Dust Removal Grain Reduction Selectable Tone of Auto Exposure Unsharp Mask with Noise Reduction De-Screening with Document Type Optimizer Tone Curve Adjustment with Histogram Resizeable Preview Window EASY SCANNING 4 Push Buttons with customisable job settings Multiple page scan to PDF feature High Compression PDF Searchable PDF *1 Text Enhancement Auto Area Segmentation Colour Enhance and Dropout features Correct Document Skew User defined setting name Stand-Alone Application and Scan to File Feature Multi Document Auto Detection Multi Document Auto Cropping Auto Skew Correction Auto Photo Orientation Multi Marquee Film Scanning Thumbnail Preview		

## DOCUMENT DUPLEX SCANNER

Description		Compliance YES / NO	Remarks
Scanner Type	Flatbed colour image scanner		
Sub-Scanning Method	Movement of the carriage		
Photoelectric Device	Alternative 6 line CCD		
Document Size	Flatbed: 216 x 297mm (8.5 x 11.7 inches) ADF: 216 x 356 mm (8.5 x 14.0 inches)		
Light Source	White cold cathode fluorescent lamp		
Optical Resolution	Flatbed: 1,200 (main) x 1,200 dpi (sub) with Micro Step Drive ADF: 600 (main) x 600 dpi (sub) dpi with Micro Step Drive		
Output Resolution	50 ~ 4,800dpi (in 1dpi increments), 7,200dpi and 9,600dpi		
<b>SCANNING SPEED</b>	<b>LINE SPEED</b>	<b>WITH ADF</b>	
300DPI B/W (Draft Mode)	0.4msec/line	27ppm	
300DPI COLOUR (Draft Mode)	1.2msec/line	11ppm	
600DPI B/W (Draft Mode)	0.8msec/line	8 ppm	
600DPI COLOUR (Draft Mode)	2.5msec/line	3 ppm	
1,200DPI B/W (Draft Mode)	1.6msec/line		
1,200DPI Colour (Draft Mode)	4.9msec/line		
ADF Type	Sheet through, Duplex scanning		
Pixel Depth	In: 8, 16 bit/pixel Out: 1, 8, 16 bit/pixel		
Paper Supply	Face up load, Face down eject		
Document Size	A4, Letter, Legal, B5, A5 Max. size: 215.9 x 355.6mm Min. size: 148.5 x 148.5mm		
Paper Setting Capacity	50 pages (75g/m2)		
Interface	USB* (Type-B standard connector) x 1 Extended I/F slot x 1		

## **LANGUAGE LAB 30 USERS**

<b>Description</b>	<b>Compliance YES / NO</b>	<b>Remarks</b>
1 + 30 sitter		
The Digital Language Lab Control/communication Systems/Module supporting one teacher station and Thirty student stations. The system should include the required hardware and software which can provide the following facilities/features to facilitate audio-visual teaching / learning process.		
The system should provide flexibility to teacher to drive the class into different group and perform any activity either for an individual or a group or for the whole class.		
The system should provide the teacher to control the whole class with different controlling toll like Lock students screen, lock Students keyboard and mouse, shutdown student computer.		
The system should have a media activity dashboard which will enable a teacher to upload audio, video and texts based content and integrate into customized study modules.		
The media activity dashboard should enable a multi teacher access facility for sharing, and collaborating content resources remotely across the campus.		
The teacher should be able to create session modules for students to access a content management library on the media activity dashboard for self-study.		
The Media Activity Dashboard interface should enable multi-lingual capabilities like English, Hindi, Urdu and other Indian and international languages and it should not be restricted to any single language.		
The teacher should be able to use one monitor dedicated as the control panel to manage the language lab activities.		
The teacher should be able to send the instructor's screen, audio, video and text based content to student's consoles for teacher presentations.		
The teacher should be able to connect and use Auxiliary audio-visual input devices to the teacher station.		
The teacher should be able to send any student's screen, Audio, Video and text based content as a model to all other student's consoles.		
The teacher should be able to disable the student's stations from the teacher's station control panel.		
Teachers and students should be able to interact (speaking /listening) using headset with built-in microphone.		
There should be facilities for the teacher to have one to one talk with the students, to address them as a group, to facilitate student pairing, small group formation etc to facilitate different language learning activities.		
The teacher should be able to have access to individual student work station and to take control of it whenever he wants to do so.		
The student/teacher should be able to interact through the headset and microphone without interfering with other student's audio –visual track.		
The students should be able to call the teacher through the system to clear doubts without disturbing the other students.		
The students should be able to access the Content Management Library on the Media and practice even when teacher is not present in classroom.		
The System should facilitate teacher to create different group and perform group discussion or pair discussion at the same time for different group and record their discussion.		
The System should be able to perform reading aloud activity for more than one student or for whole class at the same time without disturbing the others and record their reading.		
The system should allow the teacher to use any audio file as content and also to add subtitle to that file.		
The system should allow the teacher to browse any webpage and launch it to student computer.		
The system should allow the student to perform voice chat or written chat among themselves.		
The system should allow for the installation of independent classrooms with a separate server computer for each, or using a shared server computer for multiple		

classrooms.			
The system should allow text to speech facility.			
Activity Dashboard for self-study.			
Elementary	Should expose the learner to the language through the bilingual mode and help the student learn through the emulation and guided-memorization strategy.		
Basic	Should build the vital foundation for using English language in day to day situations.		
Intermediate	Enhances fluency and grammatical accuracy; helps overcome Indianisms and MTI, and focuses on improving vocabulary, speech sounds, syllable stress & intonation.		
Advanced	Should hone grammar, pronunciation, writing skills. Exposure to foreign accent through authentic news clippings; extensive vocabulary building.		
Writing Skills	Should hone punctuation and writing styles through writing tasks and tips for writing effectively.		
Soft Skills	Should focus on soft skills like group discussions, presentations, handling job interviews, telephone etiquette; increases employability quotient.		
The company should be in the business of Language Lab solutions for the last 5 Years.			
The annual Turnover should be at least INR 10 Cr.			
The company should be able to provide the Language Lab solution that can handle any Language.			
The company should have an Installation base of at least 20 Language Labs across India			
The company should be an ISO 9001-2008 Certified Organization.			
The bidder should have installed at least one Language Lab for the Government Sector, preferably at an IIT, NIT or Central University.			
<b><u>Installation, Support, and Training:</u></b>			
The vendor must provide-			
Complete installation services for all system hardware and software components.			
Electronic documentation for a system user guide and for the system technology.			
Interactive Wireless Projector <b>(As specified under this heading in the detailed specification)</b>			
White Board <b>(As specified under this heading in the detailed specification)</b>			
Visual Presenter <b>(As specified under this heading in the detailed specification)</b>			
Audio Mixer <b>(As specified under this heading in the detailed specification)</b>			
Audio Transducer <b>(As specified under this heading in the detailed specification)</b>			
Wireless Hand Held & Wireless Collar microphone <b>(As specified under this heading in the detailed specification)</b>			
Speaker <b>(As specified under this heading in the detailed specification)</b>			
<b>Warranty for a period of at least 3 year.</b>			
<b>End-user training to the teachers.</b>			



## **e-Class Rooms 60 USERS**

<b>Description</b>	<b>Compliance YES / NO</b>	<b>Remarks</b>
1 + 60 sitter		
Interactive Wireless Projector <b>(As specified under this heading in the detailed specification)</b>		
White Board <b>(As specified under this heading in the detailed specification)</b>		
Visual Presenter <b>(As specified under this heading in the detailed specification)</b>		
Audio Mixer <b>(As specified under this heading in the detailed specification)</b>		
Audio Transducer <b>(As specified under this heading in the detailed specification)</b>		
Wireless Hand Held & Wireless Collar microphone <b>(As specified under this heading in the detailed specification)</b>		
Speaker <b>(As specified under this heading in the detailed specification)</b>		
<b>Warranty for a period of at least 3 year.</b>		
<b>End-user training to the teachers.</b>		

## **VIRTUAL CLASS ROOM**

Description	Compliance YES / NO	Remarks
<b>EQUIPMENT</b>		
HD VC System (Type A)		
Additional Camera		
VC Call Control		
VC Management & Scheduling		
IP Video Conferencing Recording & Streaming		
Multipoint Control Unit		
LCD Writing Panel 15" HD Touch Screen		
2 Way RF Wireless Touch panel		
Power Control Interface		
System Power Supply		
AV Control System		
Digital Graphic Engine		
Audio Mixer		
Audio Transducer		
Wireless Hand Held & Wireless Collar microphone etc.		
Amplifier		
Speaker		
Omni Directional Ceiling Microphones		
Boundary Microphone		
Interactive Wireless Projector		
Interactive White Board		
Large Format Display 65"		
Visual Presenter		
6 x 6 DVI Matrix Switcher		
4 x 4 UXGA/Audio Matrix Switcher		
HDMI Transmitter		
HDMI Receiver		
Speaker Cable (in Meters)		
Microphone Cable (in Meters)		
VGA & HDMI Cables & Connectors		
<b>FURNITURE &amp; FIXTURE</b>		
False Ceiling 35' x 45'		
Wall Panelling up to False Ceiling height 160' x 9' with laminated wooden wall panels ISO Certified		
Wooden Platform 25' x 8' made of water proof 19 MM boards of ISI mark.		
Electrical Lighting System – CFL Luminaries 2/3 x 36 watt. The lighting system should be fitted in falls ceiling.		
Wooden Cabinet for equipment shelf type 8' x 3' made of 19 MM laminated boards of ISI mark.		
Podium with Accessories – Brass Logo, CFL Tube, Power Strip & cables, etc.		
Vertical blends for windows		
Necessary Electrical Points for Lights		
Necessary Electrical Points for Air Conditioner		
Necessary Electrical Points for Equipment		
<b>Warranty for a period of at least 3 year.</b>		
<b>End-user training to the teachers.</b>		

## **INTERACTIVE WIRELESS PROJECTORS**

Description		Compliance YES / NO	Remarks
Ultra Short Throw	Should project approx 100" image from 19" distance		
LCD Size	0.59" with MLA		
Interactive Feature	interactive pen		
Projection System	RGB liquid crystal shutter projection system		
Projection Method	Ceiling mount Front / Ceiling mount Rear		
Pixel Number	1,024,000 dots (1280 x 800) x 3		
Native Resolution	WXGA		
Aspect Ratio	16:10		
F-Number	1.8		
Focal Length	3.71 mm		
Contrast	3000:1 contrast		
White and Color Light Output	3100 lm (Colour mode: Dynamic, Zoom: Wide)		
Mic Input Signal Audio	-50dBV to -40dBV (0dB = 1 V/Pa,1kHz)		
Mic Input Terminal Audio	Stereo Mini jack		
Sound output	16 W Monoaural		
Direct Power On	Yes		
Direct Power Off	Yes		
Start-up Time	8.5 seconds		
Mounting Kit	Complete with mounting Kit, of the same make as of projector		
Connectivity	3 in 1 USB Display, USB Type A&B		
	Direct Pendrive display		
	wired LAN		
	RS 232		
	2*D Sub 15 Pin input		
	1*Composite RCA Yellow input		
	1*mini S-Video input		
	1*HDMI input		
	1*D Sub 15 Pin output		
	1*RCA input		
	2*Stereo input jack		
	Complete with cables and connectors		

## **WHITE BOARD**

Description		Compliance YES / NO	Remarks
<b>MAGNETIC WHITE BOARD</b>			
6' X 4'			
With writing pen & duster			

## **MOTORIZED SCREEN**

Description		Compliance YES / NO	Remarks
<b>GLASSA BIDDED</b>			
100"			

## VISUAL PRESENTER

Description	Compliance YES / NO	Remarks
<b>The desktop visual presenter shall be suitable for capturing still and video images for projection through multimedia projector and shall be complete with the following features:-</b>		
<b>Camera</b>		
image Pick-up Device: 1/4inch CCD/CMOS or higher		
Resolution/Effective Pixels: XGA (1024x768 pixels) or SXGA 1280 x 1024		
pixels for aspect ratio of 5:4 and 1280x960 pixels for aspect Ratio of 4:3) as specified or better		
Frame rate: 20FPS or 30 FPS as specified or better.		
<b>Optics</b>		
Zoom (Optical): 4x or 12x as specified or better		
Lens: Appropriate focal length		
Shooting Area: 210x297 mm or more		
Focusing: Auto or Manual.		
<b>Features</b>		
Digital magnification: 2x or better		
Image rotation facility: Yes		
Graphic User Interface: Yes		
Image Memory: 6 images or more		
Computer Interface: Yes with software for transmission of images to computer.		
<b>Remote Control, where applicable</b>		
Full function remote for: Zoom, rotate, store, auto-focus, power on, input sources etc.		
<b>Lighting</b>		
Top/side: Cold cathode lamp(s) or LED.		
<b>Light Box</b>		
Light Box for backlit images: Suitable for backlit transparencies of (Only from OEM) size 210x297mm or more.		
<b>Input / Output</b>		
Input: One VGA		
Output: One VGA or one DVI, one RS 232 C or one USB		
Control: USB or RS 232C		
<b>Operating Conditions</b>		
Operating temperature: 5-35 degree Celsius		
Power Requirement: 210V-240V, 50 Hz AC.		
Weight: 5 kgs maximum.		
Standard Accessories : Remote Control (where applicable), VGA Cable, Power Cable, Lens Cap		
<b>Warranty for a period of at least 1 year.</b>		
<b>End-user training to the teachers.</b>		

## AUDIO MIXER

Description	Compliance YES / NO	Remarks
Stable, quick-acting, noise-free microphone selection to automatically adjusts to changes in background room noise		
User-configurable parameters for automatic operation		
Automatic gain adjustment as additional microphones are activated (NOMA: Number of Open Microphones Attenuator)		
Last Mic Lock-On circuit to maintain ambient sound		
Adjustable EQ per channel: low-frequency roll off and high frequency shelving		
48 V phantom power selectable for each input		
Active balanced microphone- and line-level inputs and line-level output		
RF-resistant design and circuitry		
Bi-color LED indication of channel activation and clipping		
Linking capability for systems up to 400 microphones		
Non-automatic aux-level inputs with level control		
Front-panel headphones output with level control		
Peak-responding output limiter with selectable thresh olds and LED indicator		
Line voltage 120 Vac, 60 Hz (SCM810) or 230 Vac, 50 Hz (SCM810E); full gain; 1 kHz, one channel activated; source impedances: Mic 150 ohms, Line 150 ohms; terminations: Line 10 kohms, Phones 300 ohms tip-sleeve and ring-sleeve), Direct Out 10 kohms; Auto mode, equalization controls adjusted for flat response		
Frequency Response (Ref 1 kHz, channel controls centred) 50 Hz to 20 kHz +2 dB; -3 dB corner at 25 Hz		
Total Harmonic Distortion (through 20 Hz–20 kHz filter; Input 1 and Master at 5, all other controls full counter clockwise) < 0.1% at +18 dBV output level, 50 Hz to 20 kHz		
Hum and Noise (150 W source; through 400 Hz–20 kHz filter) Equivalent Input Noise: -125 dBV		
Equivalent Input Hum and Noise (150 W source; through 20 Hz–20 kHz filter) -123 Dbv		
Output Hum and Noise (through 20 Hz–20 kHz filter; channel controls full counter clockwise) Master full counter clockwise: -90 dBV Master full clockwise: -70 dBV		
Common Mode Rejection : >70 dB at 1 kHz		
Polarity Mic/Line, Send inputs to all outputs are non-inverting; Aux input to all outputs is inverting		
Input Channel Activation Attack Time: 4 msec Hold Time: 0.4 sec (switchable to 1.0 sec) Decay Time: 0.5 sec		
Off-Attenuation : 15 dB		
Overload and Shorting Protection. Shorting outputs, even for prolonged periods, for no damage. Microphone inputs should not be damaged by signals up to 3 V; Line and Monitor inputs by signals up to 20 V		
Equalization Low-frequency: 6 dB/octave cut, adjustable corner from 25 to 320 Hz High-frequency : 6 dB at 5 kHz, 8 dB at 10 kHz, shelving		
Limiter Type: Peak Threshold: Switchable: off, +4, +8, +16 (dBm at output) Attack Time: 2 msec Recovery Time: 300 msec Indicator: Lights red when limiting occurs		
Phantom Power 46 Vdc open-circuit through 6.8 kW series resistance per DIN 45 596		

## **AUDIO TRANSDUCER**

Description	Compliance YES / NO	Remarks
Fully featured 2x2 audio processor for automatic feedback reduction.		
Equipment to include equalization, dynamics processing, delay, matrix mixing, and a 2-way crossover.		
Should be configurable using drag-and-drop software interface.		
It should also function as an out-of-the-box two channel feedback reducer that does not require a computer for configuration.		
DFR Automatic Feedback Reduction 5-, 10-, and 16-filter single-channel and stereo modules Frequency resolution: 0.1 Hz Filter width: 1/10 to 1/70 per octave		
EQ and Shelving Cut/Shelf Equalizer High/low shelf filters: 6 and 12 dB/octave slopes, 18dB boost/cut High/low cut filters: 6, 12, 18, and 24 dB/octave slopes High/low cut filter types: Butterworth, Bessel and Linkwitz- Riley		
Graphic Equalizers 10- and 30-band modules Combining and non-combining		
Parametric Equalizers 3, 5, 7, and 10 filter modules, plus cut/shelf filters Bandwidth: 1/70 to 4 octaves Filter depths: up to 18dB		
Crossover Independently adjustable slopes Butterworth, Bessel & Linkwitz-Riley up to 24 dB/octave		
Dynamics Processing Automatic Gain Control Maximum boost: 12dB		
Compressor/Limiter Selectable soft knee or fixed hard knee Single-channel or stereo Peak Stop (look-ahead) limiter Ducker Gate and Downward Expander		
Delay 10 seconds of available delay memory 20 microsecond resolution		
Matrix Mixer Routes any input to any output Independently adjustable cross point gain, muting, and polarity		
Frequency Response : 20 Hz to 20 kHz +/- 1dB		
Dynamic Range : 110 dB minimum, A-weighted, 20 Hz to 20 kHz		
Digital-to-Analogue, Analogue-to-Digital Conversion : 24 bit		
Impedance Input: 10 k ohms Output 120 ohms		
Input Clipping Level : +24 dBu minimum		
Output Clipping Level +24 dBu +12 dBu with 12 dB pad engaged +06 dBu with 18 dB pad engaged		
Total Harmonic Distortion : < 0.05%, +4 dBu, 20 Hz to 20 kHz		
Propagation Delay : < 1.5 ms. Processing blocks add no latency		
Polarity - Input to output: non-inverting (inverting optional)		

## WIRELESS MICROPHONES

Description	Compliance YES / NO	Remarks
Available Frequencies: between 536 - 865 MHz		
Operating Range: 250 ft. (75m) under typical conditions		
Audio Frequency Response: 45 to 15,000 Hz +/- 4 dB		
Transmitter RF Output Power: 10 mW typical		
Audio Output Connector: XLR balanced and 1/4" unbalanced		
Maximum Output Level: -19 dBV (XLR), -5 dBV (1/4") (ref. +/- 33 kHz deviation, 1 kHz tone)		
Battery Life: up to 8 hours with a 9V battery		
Dynamic Range: >100 dB, A-weighted		
System Distortion: .5% typical (ref. +/- 33 kHz deviation, 1 kHz modulation)		
Visually discreet lapel microphone suitable for spoken word and presentations		
Cardioid pickup pattern for rejecting off-axis sound and provide superior gain before feedback.		
Electret condenser cartridge for high sensitivity and a smooth, natural sound.		
Clothing clip for secure placement.		
Acoustic windscreen for minimizing wind noise in outdoor applications.		
<b>Transmitter AN19</b>		
Antenna diversity to monitor signal strength, adjusting automatically for optimum reception.		
Up to 8 selectable frequencies per band and up to 4 compatible channels per band.		
Receiver 1/4" output & XLR output connectors.		
<b>Audio Input Level</b> : Mic setting -7 to -15 dBV, Line setting 9 to 1 dBV		
<b>Input Impedance</b> : Mic setting 16k Ohms, Line setting 120k Ohms		
<b>Gain Adjust. Range</b> : 8 Db		
<b>RF Output</b> : 10mW Maximum		
<b>Power Requirements</b> : 2 x AA size alkaline or rechargeable batteries		
<b>Battery Life</b> : Up to 10 hours (alkaline)		
<b>RECEIVER</b>		
<b>Audio Output Level</b> : XLR connector into 100k Ohms load: -16 dBV ; 1/4" Jack connector into 100k Ohms load: -22 dBV; (Ref. ±48 kHz deviation with 1 kHz tone)		
<b>Output Impedance</b> : XLR connector: 600 Ohms ; 1/4" Jack connector: 600 Ohms		
<b>RF Sensitivity</b> : -105 dBm for 12 dB SINAD, typical;		
<b>Image Rejection</b> : >50 dBm, typical		

## **SPEAKER**

Description	Compliance YES / NO	Remarks
Frequency Response (+/-3 dB) : 75 Hz - 18 kHz		
Frequency Range (-10 dB) : 60 Hz - 20 kHz		
Nominal Dispersion : 180° H x 75° V		
Recommended High-Pass Filter : 55 Hz high-pass filter		
Loudspeaker EQ : Required		
Overload Protection : Lamp		
Long-Term Power Handling : 100 W (400 W peak)		
Sensitivity (SPL / 1 W @ 1 m) : 85 dB SPL		
Maximum SPL @ 1 m : 105 dB SPL (111 dB SPL peak)		
Nominal Impedance : 8 Ω (transformer bypassed)		
Transformer Taps (70/100 V) : 70 V: 12.5 W, 25 W, 50 W, 100 W. 100 V: 25 W, 50 W, 100 W		
Driver Compliment : Two (2) 2.25" (57 mm) Twiddler® drivers in an Articulated Array® speaker configuration 5.25" (133 mm) woofer		
Enclosure : PC/ABS, textured		
Grille : Powder-coated steel grille		
Environmental : Outdoor per IEC 529 IP55		
Connectors : Three-terminal barrier strip integrated on included mounting bracket. Optional accessories available for use when ceramic connector and thermal fuse are required. Wire gauge: 18 AWG (0.8 mm) to 14 AWG (2.0 mm)		
Suspension / Mounting : Included bracket allows for horizontal or vertical mounting positions, each with either pitch or yaw adjustment. Insert on rear of enclosure sized for M4 x 14 mm screw for use with safety chain		



**EXECUTIVE CHAIR.**

Description	Compliance YES / NO	Remarks
Hydraulic, revolving chair with high back & arm rest.		
All ready-made furniture should have minimum ISO 9001:2000 certifications, the bidder must visit site and ensure that the color scheme and material quality is maintained strictly.		
Pneumatic adjustable Seat Seat Pan Height: adjustable 16"-21" minimum Seat Pan Depth minimum: 15"-18" with a waterfall sloping front edge. Seat Pan Width: 17"-20" Seat Pan Angle: adjustable 0-10 degrees Seat Back Height: minimum 15" Seat Back Width: minimum 13" Seat Back Tilt: adjustable 0-15 degrees Padding: seat pan, backrest and armrests Lumbar Support: 1.2"-2" placed in the lumbar region of the back Base: 5 casters minimum Adjustments: must be possible to make all adjustments from the seated position		

**EXECUTIVE TABLE.**

Description	Compliance YES / NO	Remarks
Custom made with 19/25 mm boards. Work top must be of 25 mm. the instructor table must have a drawer & safe with lock & key		
Each seat will have distribution box under the table, which will have following fitted : 1 switch for power on/off for all three sockets (anchor roma brand or equivalent ISI certified) 3*5Pin5Amp sockets (anchor roma brand or equivalent ISI certified) 1*RJ45 I/O box single, shutter type, CAT 6 A		
All ready-made furniture should have minimum ISO 9001:2000 certifications, the bidder must visit site and ensure that the color scheme and material quality is maintained strictly.		
All board used should be of 19/25 mm		
All work top must be of 25 mm thickness.		

**BOARD ROOM TABLE.**

Description	Compliance YES / NO	Remarks
The Board Room Table should be 10+1 user.		
Custom made with 19/25 mm boards. The top must be of 25 mm.		
Each seat will have distribution box under the table, which will have following fitted : 1 switched based socket for power on/off (anchor roma brand or equivalent ISI certified)		
All ready-made furniture should have minimum ISO 9001:2000 certifications, the bidder must visit site and ensure that the color scheme and material quality is maintained strictly.		

## **BOARD ROOM CHAIR.**

Description	Compliance YES / NO	Remarks
Hydraulic, revolving chair with high back & arm rest.		
All ready-made furniture should have minimum ISO 9001:2000 certifications, the bidder must visit site and ensure that the color scheme and material quality is maintained strictly.		
Pneumatic adjustable Seat Seat Pan Height: adjustable 16"-21" minimum Seat Pan Depth minimum: 15"-18" with a waterfall sloping front edge. Seat Pan Width: 17"-20" Seat Pan Angle: adjustable 0-10 degrees Seat Back Height: minimum 15" Seat Back Width: minimum 13" Seat Back Tilt: adjustable 0-15 degrees Padding: seat pan, backrest and armrests Lumbar Support: 1.2"-2" placed in the lumbar region of the back Base: 5 casters minimum Adjustments: must be possible to make all adjustments from the seated position		

## **4 SITTER WORKSTATION**

Description	Compliance YES / NO	Remarks
Each workstation should be in "L" shape 60"X22"X60", complete with keyboard tray, including working space. The CPU shall be placed below the table for which adequate place to be provided.		
Custom made with 19/25 mm boards. Work top must be of 25 mm. the workstation must have a drawer & safe with lock & key.		
Each seat will have distribution box under the table, which will have following fitted : <ul style="list-style-type: none"> <li>• 1 switch for power on/off for all three sockets (anchor roma brand or equivalent ISI certified)</li> <li>• 3*5Pin5Amp sockets (anchor roma brand or equivalent ISI certified)</li> <li>• 1*RJ45 I/O box single, shutter type, CAT 6 (Dlink)</li> </ul>		
All ready-made furniture should have minimum ISO 9001:2000 certifications, the bidder must visit site and ensure that the color scheme and material quality is maintained strictly.		

## **COMPUTER TABLE.**

Description	Compliance YES / NO	Remarks
For installation of TFT with KB & Mouse. Each Computer table should have a 30" (wide) x 22" (depth), with minimum 4" raised apron at back, complete with keyboard tray, for installation including working space. The CPU shall be placed below the table for which adequate place to be provided.		
All ready-made furniture should have minimum ISO 9001:2000 certifications, the bidder must visit site and ensure that the color scheme and material quality is maintained strictly.		
Each seat will have distribution box under /over the table, which will have following fitted : <ul style="list-style-type: none"> <li>1 switch for power on/off for all two sockets (anchor roma brand or equivalent ISI certified)</li> <li>3*5Pin5Amp sockets (anchor roma brand or equivalent ISI certified)</li> <li>1*RJ45 I/O box single, shutter type, CAT 6 A</li> </ul>		
All board used should be of 19/25 mm		
All work top must be of 25 mm thickness.		

<p>Provide a Table that allows the keyboards to be located at seated elbow height and the top of the screen at eye level. The computer table should have the following specifications:</p> <p>Width: minimum 30"</p> <p>Depth: Minimum 22"</p> <p>Specifications for articulating keyboard:</p> <p>Size: Minimum 16" wide, 9" deep including area for the mouse.</p> <p>Mouse area: must be directly adjacent to the keyboard surface and if retractable, must allow left or right position.</p>		
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### **STUDENT CHAIR.**

Description	Compliance YES / NO	Remarks
For Student		
The bidder must visit site and ensure that the color scheme and material quality is maintained strictly.		
Standalone without arm revolving chair.		
Pneumatic adjustable Seat Seat Pan Height: adjustable 16"-21" minimum Seat Pan Depth minimum: 14"-16" with a waterfall sloping front edge. Seat Pan Width: 16"-18" Seat Pan Angle: adjustable 0-10 degrees Seat Back Height: minimum 14" Seat Back Width: minimum 12" Seat Back Tilt: adjustable 0-15 degrees Padding: seat pan, backrest Base: 5 casters minimum Adjustments: must be possible to make all adjustments from the seated position		

### **WAITING & VISITING CHAIR**

Description	Compliance YES / NO	Remarks
Custom made fixed chair with Medium back & arm rest.		
The bidder must visit site and ensure that the color scheme and material quality is maintained strictly.		

### **FILE RACK**

Description	Compliance YES / NO	Remarks
Readymade metal rack with self & glass door.		

### **CENTRE TABLE**

Description	Compliance YES / NO	Remarks
Custom made centre table.		
The bidder must visit site and ensure that the color scheme and material quality is maintained strictly.		