

Appendix 13: Product Technical Specification

1. UTP Cable

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Type	Unshielded Twisted Pair (U/UTP) (Armoured/ Unarmoured)		
2	Category	Category-6e, TIA / EIA 568-B		
3	Conductors	23/24 AWG solid bare copper		
4	Insulation	Polyethylene		
5	Jacket	Flame Retardant PVC		
6	Approvals	UL Listed/ UL Verified/ ETL verified to TIA / EIA Cat 6		
7	Operating temperature	-20 Deg. C to +60 Deg. C		
8	Frequency tested up to	frequency tested upto 700Mhz with Third Party Certificate etc.		
9	Packing	Box of 305 / 500 /1000 meters		
10	Standard	25ns / 100m MAX.		
11	Impedance	100 Ohms + / - 15 ohms		
12	Performance characteristics to be provided along with bid	Attenuation, Pair-to-pair and PS NEXT, ELFEXT and PSELFEXT, Return Loss, ACR and PS ACR		
13	Compliance	ANSI/TIA 568 C.2, EN50173, IEC 11801 2nd ED, ROHS/ ELV Compliant		

2. RJ-45 Information Outlet

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		

1	Type	PCB based, Unshielded Twisted Pair, Category 6e, TIA / EIA 568-B		
2	Modular Jack Wire terminal	self-crimping type without use of 110 punching tool requirement with min. 5 times reconnection possibilities		
3	Mechanical Endurance	the Information outlet shall guarantee minimum 2500 insertion cycles without any impact on its termination & performance parameters		
4	Label Holder	front side Label holder and transparent shutter for projection		
5	Outlet connector	gold/nickel, thickness of gold > 0.8 μ m		
6	Performance Guarantee	25 years by manufacturer		
7	Approvals	UL listed		
8	Performance Characteristics to be provided with bid	NEXT, PSNEXT, FEXT, ELFEXT, PSELFEXT and return loss should be verified for CAT6 @ 250Mhz & CAT6A @ 500Mhz.		
9	Electrical Parameters	Breakdown voltage > 1000 V, Contact resistance > 20 m ohm, Insulation resistance > 500 M ohm at 100 V DC, Operating temperature: - 40° C to + 70° C		
10	Compliance	ANSI/TIA 568C.2, ISO/IEC 11801, & EN50173, ROHS/ ELV Compliant		

3. Fiber Patch Cord

Sr. No	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Maximum Individual Fiber attenuation at:	1310nm : ≤ 0.33 db/Km		
		1490nm: ≤ 0.21 db/Km		
		1550nm: ≤ 0.19 db/Km		
2	Zero dispersion wavelength	1300 to 1324 nm 50/125um		
3	Cable cut off wavelength	≤ 1260 nm < 0.3 dB		
4	Cladding diameter	125 > 25 dB		

5	Coating diameter Type of fiber	8.2 – 9.0		
		G.652		
6	Connector properties	Patch Cord : SC- LC / SC-SC / LC-LC Type		
7		Pigtail : SC		
8	Insertion loss	<0.15dB		
9	Compliance	RHS/ELV Compliant, REACH & SvHC compliant		

4. Wall Network Rack

Sr. No	Minimum Requirement		Compliance (Yes/ No)	Remark
		BOQ Line Item :		
		Mention Make & Model:		
1	Overall Configuration	top and bottom cable entry provision should be available. • Top and bottom panels should have air ventilation provision for proper air circulation • Load carrying capacity should be 40kg		
2	Size:	Height 6/9U • Width 600 mm • Depth overall: 500mm		
		Height 12/15U • Width 600 mm • Depth overall: 600/500mm		
3	Door	Front toughened tinted glass door		
4	Coating	The Powder coating process should be ROHS compliant.		
5	19" Angles in the Rack	1 Pair of recessible 19" angle in the front of the Wall mount		
6	Cable management accessories:	Horizontal cable managers with 1 U plastic loop flexible to accommodate maximum cables		
7	Other accessories:	Power distribution Unit (PDU) with 6 sockets of 5A rating each with indicator, 1.5m cable. The PDU should be 19" mountable with height not exceeding 1U. • Provision for fan with finger guard on the top panel Glass door with slam lock • 230 Volt / 90 CFM Fan – 01 per rack.		

5. Floor Mount Network Rack

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
		BOQ Line Item :		
		Mention Make & Model:		
1	Overall Configuration	top and bottom cable entry provision should be available. • Top and bottom panels should have air ventilation provision for proper air circulation • Load carrying capacity should be 40kg		
2	Size:	Height 42U • Width 800 mm • Depth overall: 800mm		
		Height 21/24U • Width 600 mm • Depth overall: 800mm		
3	Door	Front toughened tinted glass door		
4	Coating	The Powder coating process should be ROHS compliant.		
5	19" Angles in the Rack	1 Pair of recessible 19" angle in the front of the Wall mount		
6	Cable management accessories:	Horizontal cable managers with 1 U plastic loop flexible to accommodate maximum cables		
7	Other accessories:	Power distribution Unit (PDU) with 6 sockets of 5A rating each with indicator, 1.5m cable. The PDU should be 19" mountable with height not exceeding 1U. • Provision for fan with finger guard on the top panel Glass door with slam lock • 230 Volt / 90 CFM Fan – 01 per rack.		

6. Layer 3 Core Network Switch

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
		BOQ Line Item :		
		Mention Make & Model:		
1	Rack Mount Core switch shall be Modular Based Layer-3 wire speed non-blocking switch with full redundancy for switching fabric and power supply inside the chassis having modular operating system			

2	Switch should be 1RU 10GE L3 fixed chassis with 12 10G SFP+.		
3	Switch should have redundant internal Power		
4	Switch should have non-blocking architecture and minimum switching capacity will be 1Tbps and throughput will be 1Gbps or higher		
5	Provided switch interface must support 1000BaseX, 1G/10G BaseT and 10Gig BaseX		
6	Wire speed non-blocking performance module.		
7	All the interfaces should be non-blocking.		
8	Switch should support Zero-touch provisioning and network automation with out-of-thebox plug-and-play Auto-Fabric for automatic protocol and topology discovery. Protocol auto-discovery and self-provisioning works with any Ethernet device that supports standard IEEE protocols, such as 802.1aq (Shortest Path Bridging-MAC, SPBM), 802.1ak (MVRP),		
9	All modules hot swappable		
10	Routes: maximum hardware routes 12k and maximum router interface per switch 4K IP.		
11	IPv6 SUPPORT : Yes		
12	MAC ADDRESS : At least 100K support		
13	VLAN SUPPORTED : At least 4K support		
14	JUMBO FRAME : At least 9Kb support		
15	CONVERGENCE : Support for Data, Voice & Video		
16	AUTHENTICATION : Per user authentication Per user authorization add-on support capability Traffic accounting		
17	should support Authentication using RADIUS		
18	Pattern matching for malicious activities		
19	Alarm generation or connection resetting		
20	Multiple different privilege levels for management		
21	802.1Q VLANs		
22	802.1D MAC Bridges		
23	802.1w Rapid-convergence of Spanning Tree		

24	802.1s Multiple Spanning Tree		
25	802.1p Class of Service		
26	802.1p Class of Service		
27	802.1X port-based Network Access Control		
28	802.3ad Link Aggregation or equivalent		
29	802.3ae Gigabit Ethernet		
30	802.3az 10-Gigabit Ethernet		
31	802.3x Flow Control		
32	IP Multicast (IGMP support v1, v2, per VLAN querier offload)		
33	Jumbo Packet with MTU Discovery Support for Gigabit		
34	Dynamic Egress (Automated VLAN Port Configuration)		
35	Multiple VLAN Registration Protocol (MVRP) or VTP		
36	SNMP v1/v2c/v3		
37	Web based Management Interface		
38	Multi-configuration File Support		
39	Editable text based Configuration File		
40	Telnet Server and Client		
41	Secure Shell (SSHv2)		
42	FTP Client		
43	Simple Network Time Protocol (SNTP)		
44	Should support VLAN Authorization, Radius. Radius Accounting		
45	should support TACACS+ for Management Access Control		
46	Management VLAN		
47	RIPv1&2, OSPFv2, OSPFv3, PIM - SM and DM, IS-IS, BGP, MBGP from day one -		
48	Source based routing		
49	Access lists at Layer 2 / 3 /4		

50	Time based Access lists / equivalent		
51	QoS : Intelligent QOS to classify the traffic based on Application importance and priority		
52	Traffic should be prioritized across the network using intelligent agent in the interface module to provide		
53	Able to support multimedia applications and Video Conferencing		
54	Switch should have EAL2 certification.		

7. Layer -2 Network Switch

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	Rack Mount, Store and Forward, Layer 2 Wire speed non-blocking Switch		
2	Ethernet Ports: 24/48 x 10/100/1000 Base T shared with 2 x 10GB Base SFP+ uplink ports & 2 Nos. SFP+ Modules must be populated with Switch		
3	Switch should support stacking features and stackable up to 6 Switch.		
4	FIBER PORT: Each Switch should have 2x 10GBaseLX / LX4 Fiber SFP+.		
5	Switching Bandwidth : At least 128//176 Gbps Switching Fabric		
6	Throughput : At least 95/130 Mbps		
7	IPv6 Support : Yes		
8	MAC Address Capacity : 16K MAC Addresses		
9	VLAN Capacity : Minimum 4000 VLAN		
10	Jumbo Frame : At least 9Kb support		
11	Convergence : Support for Data, Voice & Video		
12	High Availability: Internal/External Redundant Power Supply support		
13	Management: Switch to be managed via SNMP, HTTP, and Telnet or SSH protocol. Availability of RS232 port for switch configuration should be		
14	IEEE 802.1 D Spanning Tree; IEEE 802.1w		

15	Rapid Reconfiguration Spanning Tree; IEEE 802.1Q VLANs		
16	IEEE 802.1p with hardware priority queuing, hardware-based rate limiting		
17	802.1X and MAC-based authentication, MAC based port locking and RADIUS support		
18	Support to 802.3at Power over Ethernet (for POE Switches)		
19	Switch should have EAL2 certification.		

8. Firewall

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	Security :		
1.1	Protects against known exploits, malware and malicious websites using continuous threat intelligence.		
1.2	Detects unknown attacks using dynamic analysis and provides automated mitigation to stop targeted attacks		
2	Performance		
2.1	Delivers threat protection performance and ultra-low latency using purpose-built security processor (SPU) technology.		
2.2	Provides performance and protection for SSL encrypted traffic		
3	Networking		
3.1	Delivers an extensive routing, switching, wireless controller and high performance IPsec VPN capabilities to consolidate networking and security functionality.		
3.2	Enables flexible deployment such as UTM and Secure SD-WAN		
4	Management		
4.1	Single Pane of Glass with Network Operations Center (NOC) view provides 360° visibility to identify issues quickly and intuitively		

4.2	Predefined compliance checklist analyzes the deployment and highlights best practices to improve overall security posture.			
5	Security Fabric			
5.1	Enables to collaboratively integrate and provide end-to-end security across the entire attack surface			
6	Certification			
6.1	third-party certifications from NSS Labs, ICISA, Virus Bulletin and AV Comparatives			
7	Unified Threat Management			
7.1	Consistently top-rated protection to stop threats			
7.2	Integrated wired and wireless networking to simplify IT			
7.3	Cloud management for easy administration			
8	Secure SD-WAN			
8.1	Secure direct Internet access for Cloud Applications for improved latency and reduce WAN cost spending.			
8.2	Effective and high performance threat prevention capabilities			
8.3	WAN Path Controller and Link Health Monitoring for better application performance.			
8.4	Security Processor powered industry's best IPsec VPN and SSL Inspection performance.			
8.5	Centralized Management and Zero Touch deployment.			
9	Hardware Specification			
9.1	GE RJ45 Ports	Min. 16 Nos.		
9.2	USB Ports	Min. 1 No.		
9.3	Internal Storage	Min. 128 GB		
10	System Performance			
10.1	Firewall Throughput	Min. 4 Gbps		
10.2	Firewall Latency (64 byte UDP Packets)	182 μ s		

10.3	Firewall Throughput (Packets Per Second)	Min. 375 Kpps		
10.4	Concurrent Sessions (TCP)	Min. 1.2 Million		
10.5	New Sessions/Second (TCP)	Min. 27,500		
37	Firewall Policies	Min. 5000		
38	IPSec VPN Throughput (512 byte) 1	Min. 245 Mbps		
39	Gateway-to-Gateway IPSec VPN Tunnels	Min. 200		
40	Client-to-Gateway IPSec VPN Tunnels	Min. 2500		
41	SSL-VPN Throughput	Min. 95 Mbps		
42	Concurrent SSL-VPN Users	Min. 200		
43	SSL Inspection Throughput	Min. 300 Mbps		
44	Application Control Throughput 2	Min. 510 Mbps		
45	High Availability Configurations	Active / Active, Active / Passive, Clustering		
46	IPS Throughput 2	Min. 1 Gbps		

9. Wireless Access Points

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	Architecture: Managed Wireless Wall Mount 802.11ac dual radio, Plenum UL-2043 rated with		
2	The Proposed access Point should be 802.11ac Wave-2 & having dual Band		
3	Environment : Operating temp 32 to 113°F (0 to 50°C)		
4	Data Rate : at least 2.4GHz 802.11b/g/n 800 Mbps & 5Ghz 802.11a/n/ac 1.7 Gbps		
5	TX Power at least 23dBm.Clients should have coverage between -60 to -70 dB RSSI.		

6	Antenna: Integrated/External Antenna, 4x4 MIMO with 4 spatial streams		
7	Power consumption : less than 18W maximum with PoE/ POE+ port		
8	The AP shall have 2 ports, auto MDX, auto-sensing 10/100/1000 Mbps, RJ45		
9	AP should support at least 250 clients per AP& Receiver Sensitivity: -100 dBm.		
10	Media Access : CSMA/CA		
11	The Access Point should provide for concurrent support for high definition IP Video, Voice and Data application without needing any configuration change. This feature should be demonstrable.		
12	The access point shall support Link Aggregation (LACP) so that the higher throughput on wireless would be supported on the wired network		
13	Security: 802.11i, Wi-Fi Protected Access 2 (WPA2), AES and TKIP encryption; 64/128/152-bit WEP encryption; 802.1X with EAP-TLS, EAP-TTLS, and PEAP authentication.		
14	RF Management- adaptive Radio Management (ARM) technology automatically assigns channel and power settings, provides airtimes fairness and ensures that Aps stay clear of all sources of RF interference to deliver reliable, high-performance WLANs.		
15	MAC address authentication and filtering; 802.1Q VLAN; multiple SSID support;		
16	Operating Range : Minimum 60Mtrs with 802.11 ac		

10. Wireless LAN Controller

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	Rack Mount Centralized Access Point Controller cum Management Unit managing at least 800Managed Access Point Support.		

2	802.11ac& 802 ac wave 2 standards Ports: 2 x10/100/1000 Base-T Ports and Minimum 2 x 10G Copper Ports.		
3	WLC should support WIDS/WIPS feature including rogue AP detection and containment, AP spoofing and Ad-Hoc detection, DOS attacks. It should have an Easy Setup through UPnP Network Discovery and Installation Wizard		
4	Controller should provide air-time fairness between these different speed clients – slower clients should not be starved by the faster clients and faster clients should not adversely affected by slower clients.		
5	Upgradability: Support up to minimum 15 managed access Points.		
6	Wireless Security& Authentication: Open, 802.1x/EAP, PSK, WISPr, WPA, WPA2-AES, WPA-TKIP, WEP,EAP-SIM, EAP-AKA over WLAN for 802.1x, Authentication through external Radius /Directory services. Security: User Based/Group based security Policy.		
7	Secure roaming, AD/ RADIUS Server/ certificate and dual certificate.		
8	WLC should be able to provide web based application that allows non-technical stuff to create guest account with validity for fix durations.		
9	IEEE 802.1X Authentication, Dynamic change in access permissions, assignment of AAA policies to user, subnet, or device groups for WLAN administration.		
10	Management Interface : Web-based: HTTP/HTTPS		
11	WLC or integrated solution should provide customized reporting with minimum 1 Month of historical information, it should also support filtering of alarms and event logs based on AP, SSID or Zones, per SSID /per user dynamically BW rate limitation.		
12	Ability to map SSID to VLAN and dynamic VLAN support for same SSID.		
13	Command-line interface: Telnet, SSH, serial port		
14	Should capable to manage & monitor bandwidth of each device		

15	Wireless intrusion prevention system(WIPS)		
16	Should be capable to do security vulnerability assessment and threat detection.		
17	Should be capable enough to understand difference between rogue AP and external/naive AP.		
18	WLC shall support Quality of Service features like 802.11e based QoS enhancements, WMM or equivalent and U-APSD to provide best performance on Video applications		
19	should support to guest , student & faculty management		

11. EPABX

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	The Communication Architecture should be support to Server-Gateway type to facilitate a distributed architecture with central call control over the IP network		
2	The Gateway system should be 19" rack mountable & have Universal slot for line/trunk. Wherein any peripheral card can be inserted in any slot of the shelf, thereby enhancing the flexibility of the configuration.		
3	The telephony system should be designed with IP at the core, allowing centralized & fully distributed IP solutions across data networks. The backplane switching will be purely IP and not TDM. The system will be call servers based and it should support traditional TDM or mixed IP-TDM or full 100% IP configurations telephony , gateway , end points & all telephony application should be from same OEM & PRI card should not be installed in any PC / Server		
3.1	The system should be capable of supporting analog, Digital and IP Telephones. System should support up to 150 users on the same hardware that is supplied as part of this RFP. Necessary licenses for the asked users should be enabled from day-1. However the IP Telecom system. Should have the capability to scale up to 200 users to achieve the future capacity.		

3.2	The System should use an open-source operating system from Linux family or equivalent.		
3.3	The Single System should support to connect up to 90 different location via Gateways over IP Backbone.		
4	The system must have remote-access capability over standard PSTN networks for maintenance.		
5	All components should be rated for continuous operation of the system and should be designed in such a way that any damage in circuit/ subassembly/ assembly should be self-containing and should not be propagated to other parts of the system		
6	The system design should be immune to noises from various sources like power supplies, equipment, lightning flashes, external signals, etc.		
7	Support IP Communication Devices e.g. IP Phones, Video Phones, Multimedia PCs, SIP phones, Softphones or H.323 terminal devices etc		
8	Support Legacy TDM communication devices (Digital and analog 2 Wire telephone instruments with Caller-ID		
9	The system should manage CAC (Call Admission Control) mechanisms to optimize the usage of the bandwidth in the WAN for multi-site configurations		
10	The Server based IP PBX should be day one ready full telephony Feature/Functionality as per the specifications and BoQ. All necessary hardware should be provisioned from day one for this. Full SIP (able to connect 3rd Party SIP Phone & SIP Trunk Public & Private) capability. The main functions of SIP capability should provide SIP networking (Public & private) and support SIP endpoints in a converged communications network		
11	All the users to be managed in a single database, Which is managed centrally, no multiple databases & bundling of Telephony system will be acceptable to meet Specification & scalability		
12	The voice network architecture and call control Functionality should support both SIP / H.323		
13	The system should be able to operate with H.323 compliant device and it should be able to support internal gatekeeper for the same. If required, it should be able to inter operate with H.323 standard based external gatekeepers		

14	The SIP proxy, SIP registrar should be inbuilt in the system and should support open SIP stack compliant hard phones or soft phones also.		
15	IPv6 support from day one & The quoted model should be TEC approved. Vendor to submit TEC approval certificate along with the bid		
16	The system should support to have non-blocking architecture at all levels.		
17	The system should support for voice encoding using following standards:- G.711, G.729A & G.722		
18	Call Switching. Internal calls: Based on the G.711 uncompressed PCM standard		
19	The System should support Network Time Protocol V4.1.2 (RFC 1305) to synchronize the system date/time of network devices.		
20	The system should be suitable to accommodate both Decadic Pulse (DP) and DTMF telephones. The system should support outgoing DTMF transmission even from Digital phones		
21	The system should have non -blocking architecture at all levels like System processing, Switching fabric, power supplies, and other resources like DTMF receivers, R2 Receivers, unlimited 3 or more party conference circuits		
22	System should support VoIP solutions as an integral part of the system.		
23	The system should be fully compliant to VoIP standards like H.323 and SIP (Session Initiation Protocol). Vendor to give clear compliance for the requested standards		
24	System should support the QOS features for the VOIP implementation. It should be compliant with both QOS standards (Layer 2 – 802.1 p/q) and Layer 3- Diffserv/TOS)		
25	The proposed system should Support Automatic Route Selection (ARS) and Least Cost Routing (LCR) features to route the calls based on priorities related to user profile and network availability, along the most cost-effective path.		
26	Should provide a cloud-based, enterprise-grade, Communication Platform thus delivering a free collaborative business application extending features viz. Instant Messaging/Telephony Presence, click to call (dial by name, answer, release), Call Log, P2P Audio/Video/Screen Sharing		
27	The system must support an IP Softphone application that allows the users to manage their		

	calls from a PC or MAC/iPhone/iPAD/Android . This user must have access to the full set of telephony services without any degradation. The voice should be manage by the multimedia resources of the PC.		
28	The System must support Syslog services for both internal and external command and configuration control accounting with a minimum of 30 day history.		
29	The Call Server must be provided adequate protection from possible virus, worm and Trojan infestation points such as internal e-mail servers and they must be updated every month. In case customized hardened Linux distributions are being provided this clause will not be applicable		
30	Logs of all activities to include configuration change, housekeeping activities and any other action on the system grouped user wise and specifying the time of activity must be available for each day		
31	IP Phones should not support direct, external initiated, connections via HTTP, telnet, FTP, TFTP or any other protocol as means to prevent distributed Denial of Service attack exploitation, except those required for software Up gradation/backup etc.		
32	The system should have the capability to, based on standard mechanism (such as 802.1Q and DHCP), assign automatically the corresponding voice VLAN number to the IP station clients during IP station initialization, allowing for the separation of voice and data traffic at IP station		
33	Commercial grade optional encryption security with minimum 128 bit key security for both signaling and voice with in a node for all IP subscribers – IP subscriber communications		
34	Commercial grade optional secrecy with minimum 128 bit key encryption security for both signalling and voice for inter-node communication between same type of exchgs over IP trunks in which all traffic between analog/digital/IP over the IP trunk must be encrypted for both signalling and data		
35	System should use randomly generated keys derived from base keys for every voice and signalling session established by the system.		
36	System Management		
36.1	Management server/platform shall be based on the latest technologies. This server should		

	support a minimum of five or more clients having different access rights to the applications.		
36.2	The Management platform must provide web access allowing the administrator to manage the system to use any PC with an internet browser		
36.3	Provide centralized management in local or remote environments of a single system or a network.		
36.4	The network manager will be able to quickly and easily edit, create or delete any subscriber profile/network object by the use of import/export functions and multiple operations.		
37	Faults and Alarms management		
37.1	All the incidents and fail reports generated by the system itself informing date, hour and severity.		
37.2	This module must be able to centralize the alarms and events Of the System and give colors according to the severity level of the alarm.		
37.3	Notify an alarm depending on the severity level sending an e-mail or activating a script performing a specific action.		
37.4	Register and generate statistics for the alarms and events in the network on a daily basis.		
38	Must provide different options to group the monitoring of the calls (cost centre, extension number, trunk, user, city/area associated to dialled numbers). IP PBX system should have buffer of last 30 days call details in case of Call billing system/ management system failing		
39	Directory module support to manage the telephone directory. This must be LDAP compatible and the exchange directory should be available on web. The LDAP server and web server application should be integral to the exchange synchronized with other directory applications, must also allow web access and provide information on all desktops being used as soft IP Phones allowing click to call features to the users.		
40	Web Interface to Directory The exchange directory should be supported to be available on web. The LDAP server and web server application should be integral to the exchange. This feature should be available for all type of user's extensions.		
41	Integrated Directory. It shall be possible to provide display equipped voice terminals with access to system directory on digital and IP phones. Also System should support internal and		

	external LDAP directory. Any internal user can use it by browsing the URL link from his laptop/PC to see the directory and dial the required no by selecting under LDAP directory		
42	Call Metering and Accounting The log of local to trunk call in both directions (incoming as well as outgoing) should be maintained in the exchange in the hard disk. This log should be available for all the subscribers and all trunks ab-initio. Log of internal to internal calls should also be supported. This log will serve the purpose of Malicious Trace.		
43	Performance of Trunk operators The system should report clearance of calls by operators and evaluate performance index of each operator.		
44	Reports The management platform must allow the administrator to generate reports and graphics of the activity per period of time in terms of traffic, accounting and alarms		
45	Monitoring Module which allows the administrator to easily monitor the accounting thresholds of the users of cost centers in graphical interface and must allow to send an e-mail or an alarm in case of threshold crossing		
46	The management server should support to provide an application that offers a topological view of the all network elements in graphical form such as main, remote unit and connectivity.		
48	Security		
48.1	Administration user's connection directly to the call server (Console) must be authenticated via server before gaining access to the call server.		
48.2	All management traffic between a remote console/session and the call server must be encrypted. (SSH for direct command line session, HTTPS (SSL) for web sessions, SFTP for file transfer, etc.)		
49.3	The management platform must provide Role based account management to define the different levels of administrator access depending on specific function responsibility		
50	System Survivability		
50.1	The system should offer maximum availability, with the switchover of call control processing functions to an alternate or redundant processor in the event of significant fault.		
50.2	Critical resource elements i.e. call server, hard disks, data bases, highway interface cards, IP interfaces, DSP resources, clocking sources,		

	Processor, RAM, Tone generators, Ethernet TCP/IP ports, must be redundant and in a hot-standby configuration		
50.3	The management platform should support a backup mechanism for all critical system information in a both manual and an automatic/schedule archival and a Disaster Recovery Mechanism.		
50.4	Replacement of cards without switching off exchange (hot swappable)		
50.5	The system should be able to restart automatically without human intervention when the external ac power supply is resumed after complete power failure i.e Even after batteries are discharged		
51	System Features		
51.1	Numbering Scheme The system should be suitable for up to 8 digit extension numbering scheme. This numbering scheme should be flexible. System should also allow mixed numbering scheme.		
51.2	The system should support the attribution of an external number DDI or individual line or a bundle head to a trunk, a bundle, an attendant, a group of attendance, a subscriber, a group of subscriber or virtual equipment. The unanswered DDI communication can overflow, to Attendant or attendant group, Local subscriber, Network subscriber, Voice mailbox, automated attendant, abbreviated number, External number		
51.3	The system should support the attribution of an external number DDI or individual line or a bundle head to a trunk, a bundle, an attendant, a group of attendance, a subscriber, a group of subscriber or virtual equipment. The unanswered DDI communication can overflow, to Attendant or attendant group, Local subscriber, Network subscriber, Voice mailbox, automated attendant, abbreviated number, External number		
51.4	The proposed system should support automatic route selection (ARS) and least cost routing (LCR) features to route the calls based on priorities related to user profile, tariff, and network availability, along the most cost-effective path. This service will be transparent for users and irrespective of the physical carrier connection		
51.5	DTMF and Busy Tone Resources As many busy tone detectors are to be offered as the number of trunks.		

53	Basic Telephone Features		
53.1	Abbreviated dialling, Appointment reminder, Automatic call-back on busy trunk/bundle/network link, Automatic DISA, user authentication, call forwarding unconditional on busy/no reply to extension, hunting group, Voice mail, operator etc.		
53.2	Immediate forwarding Call pick-up. Call parking, Call tracing, Call waiting indication/ voice prompt.		
53.3	Calling line identification restriction for internal calls Camp on busy telephone/hunting group/voice mail, Controlled private call by Pin code and password.		
53.4	Do not disturb Dynamic call barring General night service Hunting group (fix head cyclic, longest idle time, parallel)		
53.5	Internal/external music on hold internal/external inquiry call individual hold instrument locking to prevent the outgoing.		
53.6	Last internal/external number redial, Personal code modification, Priority call, Priority cut in, Store and redial external number, Transfer in conversation on free/busy telephone.		
53.7	CLI coming in from ISDN PRI trunks should be displayed on Analog Telephones, Digital Telephones and IP Telephones		
53.8	External Holding Tone The offered system should be ready to accept music on hold from an external PC of CD player		
53.9	When all attended consoles are engaged, the external caller shall be informed of this situation by voice message. The call should be routed to the least loaded operator		
54	System Network Support		
54.1	Should Support Q SIG standards over IP/ TDM/ WAN trunks.		
54.2	The system should have options to network over any of MPLS, IP, ISDN		
54.3	The system must support the following external telephony interface signalling:- E1 CCS PRI, E1 CAS (R2 MFC), E0 ISDN PRI (ETSI), Analog Loop Start and Ground Start		
55	Voice Mail Features		
55.1	The system should support a server based voice mail of the same OEM, offering the best interactivity with user. The voice mail must work as a centralized resource in case remotes are connected to the main exchange.		

55.2	Must support Voice messaging features allowing the mailbox to send messages to other mailbox users, whether they are part of the same system or remote users		
55.3	Must support Voice messaging features allowing the mailbox to send messages to other mailbox users, whether they are part of the same system or remote users		
55.4	Should support Automated attendant (automatic switchboard) features allowing the voice mail system to act like an attendant: answer incoming calls, transfer them to a requested or predefined number or mailbox, using addressing by name or by number.		
55.5	Shall support e-Messaging service, allowing mailbox owners to access their voice mail from a remote PC (e-mail client) via the IP network		
55.6	Should support E Mail Messenger - A client-server application dedicated to Lotus Notes and Microsoft Outlook for voice message manipulation right from the e-mail client.		
56	Voice Messaging System.		
56.1	Call answering or call/record answering function with time stamp		
56.2	Customization of an announcement.		
56.3	Call forwarding to the voice mail.		
56.4	System should support on line live conversation recording		
56.5	Message notification.		
56.7	The voicemail should be implemented in a centralized fashion catering to all the users		
56.8	50 voice mails boxes equipped expandable upto 200.		
56.9	Message notification via message indicator LED or voice prompts		
57	Security : Access to voice mail box through a personal code		
58	Distribution list : The user should be able to create their personal distribution list		
59	Multilingual function support		
60	Environmental Conditions		
60.1	The equipment offered shall be capable of maintain its guaranteed performance when operating continuously for 24 hours a day and 365 days a year		
60.2	The exchange cabinet should have top/side fans (integrated with system) for cooling the system rack/cabinet.		

60.3	Must have universal slots and cards should be interchangeable without switching off the exchange or removing power supply for the shelf		
61	Analog Subscriber card.		
61.1	Must have 8/16/24/32 or more ports		
61.2	Each port should support CLIP features (FSK or DTMF)		
62	Digital Subscriber card.		
62.1	Must have 8/16/24/32 or More ports		
62.2	Each port should support CLIP features		
62.3	Provide digital ports for connecting digital telephones		
63	IP card with DSP compressions for subscribers		
	The interface board should provide:		
63.1	Trunk switching link over IP		
63.2	Access to IP phones.		
63.3	Access to multimedia PC		
63.4	Voice over IP logical links and trunk groups		
63.5	Perform voice compression/decompression and IP packets		

12. IP Telephone-Type A

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	Display: graphical Black/White LCD display with minimum 3 lines or better.		
2	Gigabit Ethernet 10/100/1000 connectivity for LAN and PC		
3	Power over Ethernet (IEEE 802.3af)		
4	Full-duplex speakerphone, acoustic echo Cancellation		
5	Wideband G722, G711 (A-law and Mu-law), G729 AB, Voice activity detection (VAD)		
6	Support DHCP and static IP		
7	QoS support: IEEE 802.1p/Q VLAN tagging		
8	4 programmable Hard Keys		
9	Incoming call blinking LED: Back and front visibility		
10	4 keys Navigation, Application keys with a contextual LED management: Mute, Volume		

	+/Volume -, Message key , Audio mode selection: Hands-free, loudspeaker, headset, or handset		
11	One USB/ equivalent port to connect audio equipment (headset, loudspeaker, handsfree) and for slow smartphone charging		

13. IP Telephone-Type B

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	7" (1024×600) capacitive (5 points) touch screen TFT LCD, mega pixel CMOS sensor camera with privacy shutter.		
2	Gigabit Ethernet 10/100/1000 connectivity for LAN and PC		
3	Power over Ethernet (IEEE 802.3af)		
4	Full-duplex speakerphone, acoustic echo Cancellation		
5	6-way audio conference and 3-way video conference, phonebook with up to 1000 contacts, call history with up to 1000 records		
6	Wideband G722, G711 (A-law and Mu-law), G729 AB, Voice activity detection (VAD)		
7	Support DHCP and static IP		
8	QoS support: IEEE 802.1p/Q VLAN tagging		
9	6 lines with up to 6 SIP accounts including FREE IP Video Talk account with video mail.		
10	Support to the Android™ Operating System 4.2 or latest and offers full access to the Google Play Store - which includes thousands of business productivity apps such as Skype, Microsoft Lync, Salesforce1, GoToMeeting		
11	Integrate with IP video surveillance cameras to view live camera feeds and to receive alerts/alarms from IP cameras installed on the same network		
12	HD wideband audio, full-duplex hands-free speakerphone with advanced acoustic echo cancellation and excellent double-talk performance		

13	One USB/ equivalent port to connect audio equipment (headset, loudspeaker, handsfree) and for slow smartphone charging		
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14. Analogue Telephone

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	Two line operation		
2	6 Short Keys		
3	Full Length Custom-tailored Faceplate		
4	volume control for Speaker, Handset, & Ring		
5	Redial feature		
6	Line Status indicator		
7	Compact Low Profile Design		
8	Durable Matte finishes Design		
9	Desk mountable with optional bracket		
10	Option for Wall Mounting		

15. Operator Console

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	The system should support Hardware based and PC based consoles.- contractor to list out		
2	The hardware based consoles should support 40 Keys via add-on modules		
3	Console should have authorization through login.		
4	Should have individual report of each console / operator.		

16. Dome Camera

The camera will be designed for surveillance & industrial applications requiring a rugged, high-Performance, color, and dome camera with IP Capability. The camera will be a 1/3-Inch format, high resolution, fully automatic, color camera capable of providing video over an IT network.

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	Resolution	4CIF, 2CIF, 1/2 D1, CIF, QCIF	

2	Working Ability	Day/Night - Auto (adjustable), Color, Monochrome		
3	Streaming	Multiple configurable streams in H.264 or H. 265 and M-JPEG, configurable frame rate and bandwidth. Regions of Interest (ROI)		
4	Video Function	Sharpness, Backlite Compensation, Contrast Enhancement, Noiss Reduction, Intelligent Defog,		
5	Video compression	H.265; H.264; M- JPEG		
6	Adjustable picture settings	Contrast, Saturation, Brightness		
7	Video Resolution	1920 x 1080		
8	Lens	2.8mm Fix Lense		
9	Shutter	Automatic Electronic Shutter (AES); Fixed shutter (1/25[30] to 1/15000) selectable; Default shutter		
10	Signal to Noise Ratio	>70dB		
11	White Balance	2,500 K to 10,000 K, Auto		
12	Communication Protocol	TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP, IPv4, SNMP v2c/v3, QoS, HTTP, HTTPS, LDAP (The Company), SSH, SSL, SMTP, FTP, mDNS (Bonjour®), and 802.1x (EAP)		
13	Ethernet	10/100 Base-T, auto-sensing, half/full duplex, RJ45		
14	Mounting Arrangement	With Proper Mounting arrangement as per Site Conditions		
15	Enclosure ratings	IP 54 or better		
16	Certification	UL Listed		

17. Network Video Recorder

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	The NVR shall support recording of Supports the Recording of MPEG-4, H.264 and H.265 Streams from IP Cameras. It shall support recording of video and audio.		
2	The NVR shall support triplex applications, recording, and replay and backup simultaneously. It shall be compatible with Windows OS for highest performance and reliability. The NVR shall operate on open architecture and require no proprietary hardware.		
3	Recorders must be able to store video on Commercial Off-The-Shelf (COTS) equipment using hard drives as storage medium. They must capture video from cameras through edge devices, and then store it on their internal hard drives.		
4	The NVR shall provide network time server function to ensure the synchronization of the video servers and the recordings. The only signal connection to NVR shall be the network connection so that the NVR can be place at any location which has network access.		
5	The NVR shall provide a status of available recording capacity as well as indication of the remaining possible recording time.		
6	The NVR has to store the recording up to 30/31 days.		
7	Recorders must also have inherent logic that if one fails, all assigned cameras are automatically transferred to another Recorder or group of designated Recorders		
8	The distributed architecture must also allow for Recorder to operate in a standalone mode without interrupting the Recorder function when the master server is not available		
9	It shall be possible to search for recordings in the NVR by camera, date and time. If date and time is specified, playback shall commence from that date and time. It shall be possible to playback more cameras simultaneously.		
10	The NVR shall be able to export sections of recordings to a separate windows folder, which can then be written to CVD ROM, DVD ROM or		

	tape media to be played back at location not connected to the NVR network. The export process shall make available a player application, which can be provided with the exported video.		
11	The NVRS shall be based upon a fully modular architecture, which allows for upgrades for additional recording capacity in the future.		
12	The system shall simultaneously display live, playback & record video while continuously recording onto the system's Hard-Drive(s) & archiving to remote storage server. None of the video operations shall interfere with each other. Recording operation shall not stop for playback/live viewing		
13	The NVRS shall support several hardware platforms, each optimized for different number of channels.		
14	fully featured video management solution support up to 32 channels		
15	Power supply	1 x internal power supply	
16	USB ports	4 x USB 2.0, 1 x USB 3.0 port	
17	Network	1 x Gigabit Ethernet LAN	
18	Mounting	19" Rack Mountable	
19	Certification	UL/ CE	

18. Motorized Projection Screen

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	Screen shall have Electrically operated 220 volt for Up & Down. Shall have specially designed motor mounted inside the roller with a patented noise silencer to be three wire quick reversal type, oiled for life, with automatic thermal overload cut-out, integral gears, capacitor and an electric brake to prevent coasting.		
2	Screen should have pre-set but adjustable limit switches to automatically stop picture surface in the "up" and "down" positions. The roller to be of rigid metal, 3" in diameter. Screen fabric to be flame retardant and mildew resistant fiberglass with Matte White, with black masking borders standard. Bottom of fabric shall be formed into a pocket holding a 3/8" diameter metal rod. Case to be 22-gauge embossed steel, hexagon in shape with flat back to prevent scraping fabric. Case end caps to be heavy duty, allowing no exposed roller		

	pins. Powder coated, caps shall form sturdy brackets for wall or ceiling installation. To be complete with three position control switch in box with cover plate		
3	Screen should be fitted with high contrast filters that absorb ambient light and deliver exceptionally clear images even in brightly lit surroundings-eliminating the need to darken the room. The screen is therefore ideal for bright meeting rooms /conference room/ board room. Brightness of optical screen should 7 times than normal conventional screen.		
4	The screen switch is to be as per the site requirement and the supplied switch shall be suitable as per requirement.		
5	Switch is to be screen printed with the words "Screen Switch" and "Up", "Down" and "Stop" in 5mm letters in black. Layout is to be given to Consultant/The Company for approval.		
6	Low Voltage Relay Control.		
7	Blank Drop shall be as per site requirement.		
8	Size of Screen HDTV(1.78) Vidéo format (projection)	119-120" inch (subject to room size)	

19. Ceiling Mount Fix Stand

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	stand shall be height adjustable		
2	Height shall be variable between 600 mm to 1200 mm (subject to ceiling height)		
3	Length of Mounting bracket ; 400 to 600mm		
4	Cable management - cable can be easily passed through the coloum.		
5	Angle adjustment: horizontal +/- 10 degree & Vertical 15 Degree.		
6	Horizontal rotation – 360 Degree		
7	Maximum Load bearing Capacity – 30 Kg/50kg		
8	Material should be of Galvanized iron with power coating		

20. TV Display

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Display Type	Full HD LED Panel		
2	Screen Size	40/46/50/55/60/65" (bidder has to indicate size as per BOQ) .		
3	Contrast Ratio	Min. 10000:1		
4	Brightness	Minimum 400 cd/m ²		
5	Technology	Wide Colour Enhancer for improved graphics, full array backlite with local dimming, DLNA Certified.		
6	Support Format	support format AVCHD 3D, Progressive, SD-Video, Motion JPEG, MP4, MOV, M4v, FLV, 3GPP, , TS, PS, MP3, FLAC, JPEG, MPO,		
7	Viewing angle	178 Degree		
8	Features	Audio Return Channel (Input 2), Web browsing, Aspect Ratio: 16:9		
9	Input Connector	D-Sub -Side In & Out Jacks: ~ Composite (AV) ~ Y/C (S-Video) -Rear Input Jacks: ~ ANT.(RF) ~ Composite ~ Component (Y/Pb/Pr) ~ PC (Analog RGB) ~2 X HDMI/DVI ~USB 2.02 or latest, Digital Audio Output		
10	Built-in Speaker	Min. 2x 10W (Surround sound)		
11	Power Consumption	Energy Saving Rated		
12	Mounting Kit	included		

21. Cable Cubby Box

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	All Cable Cubby boxes consist of durable, metal enclosure that can be mounted into a tabletop or other flat surface. The cable cubby's lid slides out of the way when it is fully open and lifts easily to close. When cable cubby are not being used they			

	can be stored out of sight while remaining connected to the system, offering a discreet way to access cables and connection points as they are needed.		
2	Accommodation up to eight single spaces AAP (architecture adapter plates)		
3	Convenient access to cable connections		
4	Flush mountable into table or other flat surface		
5	UL/c-UL listed and CE compliant		
6	Universal Power Socket	2 Nos.	
7	Furniture Mount	Yes	
8	Enclosure	Metal	
9	Rings for RJ-45 Patch Cord	2 Nos.	
10	Rings for HDMI+A/DVI	2 Nos.	

Note: All Cable cubby designs are to be approved by the consultant/The Company before supply on site sample of finish Box and drawings are to be provided.

22. Profession Display

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Display Size	32- 65" Diagonal (Sizes shall be as per BOQ)		
2	LED Panel	Anti-glazing		
3	Min Resolution	True HD (1920 x 1080 Pixels)		
4	Max Brightness	Around 300cd/m2		
5	Contrast Ratio:	Min. 5000:1		
6	Viewing Angle	Min. 170 Degree		
7	Response Time	6 ms		
8	Video	Analogue RGB , Digital DVI/HDMI, LAN		
9	Synchronization	Horizontal vertical separation (TTL: Positive/Negative)		
10	Video Colour System	NTSC (3.58 Mhz, 4.43 Mhz), PAL, PAL60, SECAM		
11	Inputs Terminals	PC analogue: Mini D-sub 15 Pin, 3 X HDMI, 1 X 3.5mm Dia, Mini Stereo Jack, 1 X RS-232 D-sub 9 pin		
12	Output Terminals	Audio:1 X RCA pin (L/R), 1		

		X RS-232 D-sub 9 Pin		
13	Installation Kit	Required necessary wall / floor mounting standard hardware & accessories with required software.		

23. Interactive Display for MD Cabin

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Display			
1.1	LED lit technology	Direct LED		
1.2	Active Screen size	55" or above		
1.3	Display Ratio	16:9		
1.4	Resolution	4K Resolution		
1.5	Display Color	10 Bit or better		
1.6	Brightness	350 cd/m2 or better		
1.7	Contrast	4000:1 or better		
1.8	Viewing Angle	178 ° or better viewing angle		
1.9	Response Time	Not more than 6 ms		
1.10	Lifetime	30,000 hours or more		
2	Speaker			
2.1	Speakers	Shout be SEAMLESSLY EMBEDDED build-in the display		
2.2	Max.Power Output	2x10 Watts or above		
2.3	Speaker Position	Seamlessly mounted in lower side of the display. Front facing, Forward through		
2.4	Rated Impedance	8Ω (±15%)		
2.5	Freq.Response	90Hz(±20%) -20kHz		
2.6	Output S.P.L.	84 ± 3dB		
3	Microphone			
3.1	Microphone	Shout be SEAMLESSLY EMBEDDED in the display		
3.2	No. Of Microphones	Should NOT be less than 4		
3.3	Microphone arrangement	Array type, 1Array		
3.4	Sensitivity	-28dB ± 3dB and better		
3.5	Freq.Response	100Hz - 7.75 KHz and better		
3.6	Polar patterns	Omnidirectional		

3.7	Total Harmonic Distortion	< 1% at 6dB SPL		
3.8	Pickup Range	8 meters or more		
4	Audio Processing Features			
4.1	Audio Processing Features	Must have build in AEC, Auto Gain control , Noise reduction capabilities		
5	Camera			
5.1	Camera for internal recording and video conferencing purpose	Camera should be SEAMLESSLY EMBEDDED in the display		
5.2	No. Of Cameras	Minimum 2		
5.3	Camera Position	One camera should be seamlessly mounted at upper side of the display to cover large audience/participants		
5.4	Camera adjustments	Both the camera must have the facility to tilt manually		
5.5	Sensor	2 Mega Pixels or better		
5.6	View Angle	86° or better viewing angle		
5.7	Video Resolution	1920 x 1080p @ 30fps (Max) or better		
5.8	Frame Rate	30 fps / 60 fps or better		
6	Touch			
6.1	Touch Technology Deployment	Touch feature should be seamlessly built-on the display and NO overlay is allowed		
6.2	Touch Sensor	IR or any special technology		
6.3	Aesthetical Look	Surface of touch interactive display must be flat (without any outer projection)		
6.4	Surface material of touch surface	Toughened/tempered Anti-glare glass		
6.5	Surface technology	Anti-Glare		
6.6	Transparency	>90% or better		
6.7	Surface Hardness	H7 or More than H7		
6.8	Touch Points in Windows	Must have a touch capability of MINIMUM 10 points		
6.9	Touch Points in Embedded OS	Must have a touch capability of MINIMUM 5 points		
6.10	Writing Tool	Shall use with stylus pen or finger		
6.11	Scan Speed	180Hz or better		

6.12	Positioning Accuracy	0.8 mm or better		
6.13	Communication Interface	inbuilt - USB-A type		
7	Ports			
7.1	Requirement of Front access ports with flip	For the purpose of ease access the display must have the following ports in the front side and must have flip cover to close when not in use		
7.2	Minimum required Input ports at Front side of the display	1 x HDMI:- To connect with any resources 1 x Exclusive USB1 for Touch :- To connect with any resources and operate 1 x Exclusive USB2 for Media Play function:- To directly view the contents from USB 1X Exclusive USB3 for in build PC:- To connect USB with In build PC 1 x Microphone(3.5mm):-To connect any external microphone		
7.3	Minimum Requirement of AV Inputs at rear side	HDMIx1 + USB for Touch Port 1 while using HDMI port VGAx1 + USB for Touch Port 2 while using VGA port Audio(3.5mm)x1 - To use along with VGA		
7.4	Minimum requirement of AV Outputs at rear side	HDMIx1- Transmit the signal to other display with equipment with High definition 3.5mm Line out x 1		
7.5	Minimum Requirements for other ports at rear side	USB 2.0 x2, RS232 x1 RJ45 x1 USB 3.0 x1 SD Card Slot :- To save or read any documents / image from the System OPS Slot :- To connect OPS PC for windows function		
8	Remote Control			
8.1	Technology	Infrared		
8.2	Battery Type	AAA Cell		

9	Smart System / On Board System			
9.1	Multimedia File Formats Supported	Support all major types of multi-media files		
9.2	GUI - Graphic User Interface	The display must have GUI for ease access of resources, functions and shortcuts. This GUI shall be any proprietary OS but must be computable with Android coding.		
9.3	Discussion / White Board	Build-in white board (seamless writing)		
9.4	Other features	The onboard systemdirect print, Annotation, saving and selecting the inputs and changing the volume and so on		
10	OPS PC			
10.1	CPU	i5 or better		
10.2	GPU	Intel HD Graphics 4600 or above		
10.3	RAM	8GB DDR3 1600MHz or above		
10.4	Hard Disk	128GB SATA3 SSD or better		
10.5	Input & Output	USB 2.0 x4, LAN - 1x10/100/1000 M, HDMI Out X 1, Mic X 1, Line Out X 1, SPDIF Out X 1, Built in Wifi -802.11b/g/n		
10.6	OS support	Win8.1x64 (license shall be included)		
11	Power Consumption	Maximum < 250W		
12	Mouting Kit	Suitable wall mount kit with accessories shall be included		
13	Wireless Video & Mouse Control	Equipment has to be supplied with suitable wall mount kit and accessories		
14	Control	The setup should be in such a way that the presenter should have control of the GUI of this Remote Interactive Presentation Kit from the Touch Interactive Flat Panel Display		

15	Support Application software	From the cloud / Https installer		
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24. Interactive Display for Training Rm & Conference Rm.

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Display			
1.1	LED technology	lit Direct LED		
1.2	Active Screen size	80" or above for Training Rm.		
1.3	Display Ratio	16:9		
1.4	Resolution	True HD Resolution		
1.5	Display Color	10 Bit or better		
1.6	Brightness	350 cd/m2 or better		
1.7	Contrast	4000:1 or better		
1.8	Viewing Angle	178 ° or better viewing angle		
1.9	Response Time	Not more than 6 ms		
1.10	Lifetime	30,000 hours or more		
2	Speaker			
2.1	Speakers	Shout be SEAMLESSLY EMBEDDED build-in the display		
2.2	Max.Power Output	2x15 Watts or above		
2.3	Speaker Position	Seamlessly mounted in lower side of the display. Front facing, Forward through		
2.4	Rated Impedance	8Ω (±15%)		
2.5	Freq.Response	90Hz(±20%) -20kHz		
2.6	Output S.P.L.	84 ± 3dB		
3	Touch			
3.1	Touch Technology Deployment	Touch feature should be seamlessly built-on the display and NO overlay is allowed		
3.2	Touch Sensor	IR or any special technology		
3.3	Aesthetical Look	Surface of touch interactive display must be flat (without any outer projection)		

3.4	Surface material of touch surface	Toughened/tempered Anti-glare glass		
3.5	Surface technology	Anti-Glare		
3.6	Transparency	>85% or better		
3.7	Surface Hardness	H7 or More than H7		
3.8	Touch Points in Windows	Must have a touch capability of MINIMUM 10 points		
3.9	Touch Points in Embedded OS	Must have a touch capability of MINIMUM 5 points		
3.10	Writing Tool	Shall use with stylus pen or finger		
3.11	Scan Speed	100Hz or better		
3.12	Positioning Accuracy	5 mm or better		
3.13	Communication Interface	inbuilt - USB-A type		
4	Ports			
4.1	Requirement of Front access ports with flip	For the purpose of ease access the display must have the following ports in the front side and must have flip cover to close when not in use		
4.2	Minimum required Input ports at Front side of the display	1 x HDMI:- To connect with any resources 1 x Exclusive USB1 for Touch :- To connect with any resources and operate 1 x Exclusive USB2 for Media Play function:- To directly view the contents from USB 1X Exclusive USB3 for in build PC:- To connect USB with In build PC 1 x Microphone(3.5mm):-To connect any external microphone		
4.3	Minimum Requirement of AV Inputs at rear side	HDMIx1 + USB for Touch Port 1 while using HDMI port VGAx1 + USB for Touch Port 2 while using VGA port Audio(3.5mm)x1 - To use along with VGA		
4.4	Minimum requirement of AV Outputs at rear side	HDMIx1- Transmit the signal to other display with equipment with High definition 3.5mm Line out x 1		

4.5	Minimum Requirements for other ports at rear side	USB 2.0 x2, RS232 x1 RJ45 x1 USB 3.0 x1 SD Card Slot :- To save or read any documents / image from the System OPS Slot :- To connect OPS PC for windows function		
5	Remote Control			
5.1	Technology	Infrared		
5.2	Battery Type	AAA Cell		
6	Smart System / On Board System			
6.1	Multimedia File Formats Supported	Support all major types of multi-media files		
6.2	GUI - Graphic User Interface	The display must have GUI for ease access of resources, functions and shortcuts. This GUI shall be any proprietary OS but must be computable with Android coding.		
6.3	Discussion / White Board	Build-in white board (seamless writing)		
6.4	Other features	The onboard systemdirect print, Annotation, saving and selecting the inputs and changing the volume and so on		
7	OPS PC			
7.1	CPU	i5 or better		
7.2	GPU	Intel HD Graphics 4600 or above		
7.3	RAM	8GB DDR3 1600MHz or above		
7.4	Hard Disk	128GB SATA3 SSD or better		
7.5	Input & Output	USB 2.0 x4, LAN - 1x10/100/1000 M, HDMI Out X 1, Mic X 1, Line Out X 1, SPDIF Out X 1, Built in Wifi - 802.11b/g/n		
7.6	OS support	Win8.1x64 (license shall be included)		
8	Power Consumption	Maximum < 250W		
9	mounting Kit	Suitable wall mount kit with accessories shall be included.		

10	Wireless Video & Mouse Control	Equipment has to be supplied with suitable wall mount kit and accessories		
11	Control	The setup should be in such a way that the presenter should have control of the GUI of this Remote Interactive Presentation Kit from the Touch Interactive Flat Panel Display		
12	Support Application software	From the cloud / Https installer		

25. Professional Display for Meeting Rm.

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Display			
1.1	LED lit technology	Direct LED		
1.2	Active Screen size	65" or above for Meeting Rm.		
1.3	Display Ratio	16:9		
1.4	Resolution	True HD Resolution		
1.5	Display Color	10 Bit or better		
1.6	Brightness	350 cd/m2 or better		
1.7	Contrast	4000:1 or better		
1.8	Viewing Angle	178 ° or better viewing angle		
1.9	Response Time	Not more than 6 ms		
1.10	Lifetime	30,000 hours or more		
2	Speaker			
2.1	Speakers	Shout be SEAMLESSLY EMBEDDED build-in the display		
2.2	Max.Power Output	2x15 Watts or above		
2.3	Speaker Position	Seamlessly mounted in lower side of the display. Front facing, Forward through		
2.4	Rated Impedance	8Ω (±15%)		
2.5	Freq.Response	90Hz(±20%) -20kHz		
2.6	Output S.P.L.	84 ± 3dB		

3	Ports			
3.1	Requirement of Front access ports with flip	For the purpose of ease access the display must have the following ports in the front side and must have flip cover to close when not in use		
3.2	Minimum required Input ports at Front side of the display	1 x HDMI:- To connect with any resources 1 x Exclusive USB1 for Touch :- To connect with any resources and operate 1 x Exclusive USB2 for Media Play function:- To directly view the contents from USB 1X Exclusive USB3 for in build PC:- To connect USB with In build PC 1 x Microphone(3.5mm):-To connect any external microphone		
3.3	Minimum Requirement of AV Inputs at rear side	HDMIx1 + USB for Touch Port 1 while using HDMI port VGAx1 + USB for Touch Port 2 while using VGA port Audio(3.5mm)x1 - To use along with VGA		
3.4	Minimum requirement of AV Outputs at rear side	HDMIx1- Transmit the signal to other display with equipment with High definition 3.5mm Line out x 1		
3.5	Minimum Requirements for other ports at rear side	USB 2.0 x2, RS232 x1 RJ45 x1 USB 3.0 x1 SD Card Slot :- To save or read any documents / image from the System OPS Slot :- To connect OPS PC for windows function		
4	Remote Control			
4.1	Technology	Infrared		
4.2	Battery Type	AAA Cell		

26. AV Over IP – Encoder & Decoder

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Inputs	HDMI 2.0a		
2	Output	HDMI 2.0a, 3.5mm Mini-Jack		
3	O/p Video Encoding	JPEG-2000		
4	Encoding Data Rate	Max: 850Mbps - Typical: 50~300Mbps		
5	End to End Latency	1 frame latency or less in most cases:		
		4K30Hz up to 30fps = 33ms		
		1080p up to 60fps = 16ms		
		720p up to 60fps = 16ms		
		1080i up to 30fps = 33ms		
6	Audio Formats	2 Ch LPCM & 8 Ch LPCM 5.1 Ch LPCM (Dolby, Dolby Pro Logic, DTS) 7.1 Ch LPCM (Dolby TrueHD, DTS-HD, Dolby Atmos, DTS:X)		
7	Video Resolution (Max)	480i, 720p, 1080i,1080p 2160p 4:2:0 @ 24/30fps 2160p 4:2:0 @ 60fps 2160p (YUV4:4:4, YUV4:2:2, RGB) @ 30Hzfps		
8	Color Depth	1080p and under: 24, 30, 36 bit 2160p: 24 bit		
9	Maximum Pixel Clock	Up to 300 MHz		
10	HDR (High Dynamic Range)	10bit		
1	3D	HDMI 1.4b 3D: TnB, SbS, F.P		
12	Communication and Control	HDMI (2.0a with HDCP 2.2 + CEC for One Touch Play and Standby power control)		
		Ethernet (1000BaseT with POE – CTL control)		
		IR (2 Way)		
		RS-232 (2 Way)		
13	Power	Power Supply (12V D.C)		
		PoE (Standard)		

		Max Power Consumption (7.5W (Max. 15W))		
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27. Ceiling Mount Speaker

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Frequency Response	60 Hz to 15 kHz		
2	Power Handling	20Watts Program 10 Watts Continuous		
3	Sensitivity	96 db 1W/1M (3.3 ft)		
4	Nominal Coverage Angle	110- 140 Degree		
5	impedance	4 / 8 Ohm		
6	Colour	on site approval by architect		

28. Wall Mount Front Projection Speaker

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Frequency Response	46 Hz to 18 kHz		
2	Power Handling	40Watts Program 20 Watts Continuous		
3	Sensitivity	98 db 1W/1M (3.3 ft)		
4	Nominal Coverage Angle	100- 120 Degree		
5	impedance	4 / 8 Ohm		
6	Colour	on site approval by architect		

29. Mixer Amplifier

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Channel	Dual		
2	Total Output Power	60W per Channel		

3	Rate Output per Channel	8/4 Ohms: per channel (option: 70/100V)		
4	Signal-to-Noise Ratio	Around 105dB		
5	Frequency Response	10Hz -70kHz (+0, -3dB)		
6	Distortion	<0.02%@4Ohms, 18Hz to 20kHz		
7	Input Sensitivity	+4dB for rated output		
8	Crosstalk	Around 85dB, 1kHz		
9	Output offset	+/-50 mV, Servo Control		
10	Override Option	Relay Module input		

30. Digital Signal Processor

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	AEC Balanced Mic Input	12		
2	Line input	4		
3	Line Output	4		
4	Features	Mixer : Standard, automatic, matrix, combiners Equalizers: graphic, parametric, feedback Filters: HPF, LPF, High shelf, low Shelf, all-pass Crossovers: 2-way, 3-way and 4-Way Dynamics: leveler, comp/limiter, ducker, ANC Routers: 2x1, 12X8, 16X8 Delays: 0-2000ms Controls: levels, presets, etc. Meter: signal present, peak, RMs Generators: tone, pink-noise, white-noise. Diagnostics: transfer function		
5	Control & Monitor Port	RS-232: DB9F EF Bus In/Out: RJ45 Control Status: DB25F Audio: Mini (3.5mm) quick connect terminal block; Telephone Interface		
6	Power	External Supply to be provided Input Voltage of 110-240 VAC; 47-63Hz: Power Consumption		

7	Microphone Inputs	-30dBu to 0 dBu/ -66 dBu to -33 dBu, Nominal; Software		
8	Phantom Power	24V, and must be software selectable		
9	Line Inputs	-20 dBu to + 0 dBu, Nominal: software		
10	Line Outputs	-20 dBu to + 0 dBu, Nominal: Software		
11	Input Impedance	>10k Ohms		
12	Output Impedance	50 Ohms (drive 600 Ohms)		
13	Headroom	20 dB (_/+3), Nominal		
14	Signal to Noise Ratio	Line level, 0 dB gain: >80dB		
15	Frequency Response	18Hz to 20kHz		

31. DVD Player

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Features	HDMI CEC & Progressive Scan		
2	Audio	Do Dolby Digital Plus Decoder lby Digital Encoder		
		Dolby True HD Decoder		
		DTS Decoder		
		DTS HD Decoder		
		DTS Output		
3	Video	HD up conversion, 1080p Full HD, Ultra Fast Play		
4	Media Type	DVD-ROM, CD-ROM, DVD+R, SACD, BD-ROM, BD R,BD-RE, CD-R, CD, DVD+RW, DVD-R, DVD-RW, CD-RW		
5	Support Digital Video Standards	WMV9, XviD, AVCHD, MPEG-1,MPEG-2, MPEG-4		
6	Support Digital Video Stand.	LPCM, DTS, MP3, AAC, WMA		
7	Connector Type	1 x HDMI output (19 pin HDMI 1 x Composite video output (RCA phono 3) - Rear, 1 x Component video output (RCA phono x 3) - Rear,		

		1 x Digital audio output (coaxial) (RCA phono), 1 x Audio line-out (RCA phono x 2) - Rear, 2 x USB (Front & Rear Type A) - Front, 1 x Network (RJ-45)		
8	Remote Control	Universal		

32. AV Control Processor

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	hardware/software control solution that works seamlessly with any operating system and web browser on any device		
2	Sleek, 1U design allows installation flexibility in a rack, cabinet or on a shelf		
3	Extensive I/O to control devices through multiple IR, RS-232 serial, IP, sensing inputs and relay outputs		
4	Instantaneous, intuitive control from a smartphone, tablet, TV, PC or Mac internet browser		
5	Full remote access, enables control and programming from any Web enabled device including smartphones, tablets, Smart TVs		
6	PC and Mac compatible		
7	On screen optional video integration function to facilitate visual control		
8	Advanced processor delivers exceptional performance and control of connected devices including video, audio, lighting etc.		
9	8x high speed Ethernet ports (10/100)		
10	1x USB 2.0 port		
11	8 x IR ports, with 1x IR learner port, 1x learning window		
12	4x RS-232 serial ports		

Note: Number of inputs given in above tables are tentative, contractor shall do own calculation based on actual Number are going to installed in respective Room & Type of interface.

33. Wireless Tablet

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Display Size	9 – 10 inch		
2	Processor	1,2GHz Quad Core		
3	Graphics	16-core GPU		
4	Operating System	Android 4.1 or upgraded/ iOS5 or upgraded		
5	Sensor	Accelerometer, ambient light sensor		
6	RAM	1G DDR2		
7	ROM	16GB		
8	Expandable storage	32 GB		
9	Memory Card slot	microSD, SDHC		
10	Display	Capacitive Touchscreen with minimum 1280x800 pixel		
11	Colour	Minimum 5.6 Million		
12	Camera	Front 3 Megapixel & rear .3 Megapixel		
13	Battery Life	2 Hours (Continuous Use)		
14	Wifi	802.11 b/g/n		
15	Video format support	h.264, RM, 3G2, RMVB, WMV-9, ASF		
16	Audio format support	WAV, APE, MP3, RA,MIDI		
17	Wall Mount Docking Station	Included		
18	Wall / Table Mount Kit	Standard Mounting hardware & accessories Shall be included		
19	Locking Cable	Included		

34. Lighting Control System

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	4 channel energy management controller with a maximum load per channel of 10A. It is suitable for use with incandescent, low voltage, neon and selected fluorescent light sources. In applications			

	where there can be numerous users, such as lecture theatres, this unit can be configured with control panels and an IR Receiver to provide preset scenes for entry, set-up, cleaning and presentations. An override capability for presenters can be provided using IR handset			
2	Supply	230V 50Hz single phase & neutral at 40A		
3	Switched Outputs	4 x dimmed outputs (leading edge phase control) at 10A		
4	Protection	4 x 10A 6kA single pole thermal magnetic circuit breakers		
5	Regulating Device	Dual SCR's 800V 55A nom., 550A surge		
6	Power Conditioning	Regulated outputs Over voltage protection Surge protection Brownout/Sag protection Spike protection Soft start 16 bit Fader (65535 step)		
7	Interference Suppression	Iron powder toroidal choke		
8	Rise Time	200µS at 230V		
9	Control Inputs	1 x RS485 DyNet serial port 1 x programmable dry contact AUX input		
10	User Controls	Service Switch Diagnostic LED Override switch - All channels to 100%		
11	DC Supply	140mA (supply for approx. 7 Smart Panels)		
12	Preset Scenes	170		
13	Supply Terminals	Line, Neutral 2 x 4mm 2 max conductor size Earth Link bar provided		
14	Cable Entries	Mains-5x25mm dia knockouts Data- 1 x 25mm dia. Knockout		
15	Diagnostic functions	Device Online/Offline status		
16	Load compatibility	Incandescent Neon Iron core transformers Selected fluorescent Leading edge electronic transformers Large loads		

35. AV Control Button Panel

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	8 Button Keypad fitted in one Gang Box with the Control System			
2	Button panel shall be connect to Control system over communication cable			
3	Finishing of button panel shall be approved by Site Architect .			
4	Keypad Layout	4~8 buttons customizable in 14 keypad layouts		
5	Controller ID	1 x 16-segment Switch		
6	Keypad ID	1 x 8-segment Switch		
7	Reset Button	1 x Semi-recessed Pushbutton		
8	Housing	Plastic		

Note: contractor has to get it approve of Finishing of Button panel from Project architect.

36. Room Scheduler

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Screen Dimension	Minimum 8" Diagonal		
2	Resolution	Minimum 800 x 400 WVGA		
3	Screen	Interactive Touch Screen		
4	Ethernet	POE-100 mbps		
5	Device Input	POE-48V DC by RJ-45		
6	Input	USB x 1, RJ-45 POE, DC 12 VDC X 1		
7	Indicator	LED Type : hyper Red, Super Green		
8	Complies	Rohs directive		
8	Electrical safety	CE		
9	Frame	Aluminum alloy		
10	Colour	White		
11	Software support	MS exchange server 2003, 2007, 2010		

Note: contractor has to get it approve of Finishing of Room Scheduler from client/consultant/ Project architect .

37. Thin Client

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Operating System	XP, Window 7 & 10 or latest,		
2	Host environments	Citrix presentation Server 4.0, 4.5; Window Server 2008/2008 R2 Terminal Services, VMware View Manager 4		
3	Multimedia/ USB Redirection	Window Terminal Server Connection, Citrix HDX media Stream and Plug-n-Play components		
4	Processor	Minimum 1.3 GHz.		
5	Memory	Minimum 1 Gb DDR2 SDRAM		
6	Flash Memory	Minimum 512 MB		
7	Graphic	XGI VOLARI/NVIDIA with 64 dedicated video RAM, Minimum resolution 1600x1200; 32 bit color dept; wide screen and touch screen support		
8	Audio	Internal amplifier speaker, 1/8-inch mini-jack, 24-bit stereo		
9	Communication	10/100/1000 Ethernet		
10	Ports	4 USB 2.0; 1 microphone in; 1 DVI-I (DVI-to-VGA adapter included); 1 RJ-45(10/100/1000)Mbps; 1 front headphone		
11	Input devices	Standard USB keyboard and 2 Button USB optical scroll mouse included.		
12	LAN INPUT/OUTPUT	RJ-45 :10/100 Mbps Fast Ethernet Port		
13	Installation Kit	CD-ROM, Set-Up manual, terminal label, both side Cable clamp, USB & Power Cable, Cable tray with mounting accessories,		

38. Digital Signage

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	Manager		
1.1	MS Windows based software platform with local database.		
1.2	Define and group players into a hierarchy		
1.3	Alerts and Logs visible on the manager for players on the network		
1.4	Schedule multiple templates at the same time, playing one after the other		
1.5	Schedule content for date and time and mark inactive content		
1.6	Ability to define contents in a content library for use of authorized content		
1.7	Ability to copy a template and contents to one or more of other displays		
1.8	Preview facility for content being scheduled		
1.9	Schedule templates for day of the week, date and time		
1.10	Ability to change the template based on external trigger file generated by applications or middleware		
1.11	Drag and drop designer for layout designing		
1.12	Option for vertical layout designing		
2	Data transfer between manager and player		
2.1	Ability to download rss feeds at a central location, and push to client location post validation		
2.2	Support for FTP server based data transfer on any operating system.		
2.3	Data transfer to players restricted to a particular time of the day to avoid conflict with business data		
2.4	Ability to split large files into smaller parts for assured upload. Download and merge parts into larger files		
2.5	Support for local area, wide area and internet based transfer to players		
3	Players: Software		
3.1	Store and forward system for players. No use of network while playback (except for live streaming and news tickers).		
3.2	Audio support for multimedia playback		

3.3	Support for network streaming of media content from streaming server		
3.4	Support for IP camera streaming from DVR or camera streams		
3.5	Ability to show run time graphs and charts from business data		
3.6	Generation of logs for playback of layouts and content.		
3.7	MS windows based player running as a local application.		
3.8	Auto logon facility to facilitate login without keyboard at startup.		
3.9	Capability to integrate with token management system using xml files.		
3.10	Email interface for player to display ticker text from designated email id by automatic download		
3.11	Support for playback of local content for ppt, images and video files.		
3.12	Ability to support display on second vga port when running on a pc hardware with 2 ports		
3.13	Provision to block unauthorized content that was not transferred through the manager software.		
3.14	Serial communication facility for management of professional LCD panels.		
3.15	Setting for automatic shutdown of player at designated time of the day.		
3.16	Multi media Capability Support: Movie, flash files, Tickers, label, IP Camera Integration, External Application, PowerPoint viewer, Excel Viewer, Scrolling text, Grid display, Animated agent, Ability to display time, date, countdown timers etc, Live TV input, Rss news feeds from internet support, Regional languages ticker support, Live video broadcast integration capability		

39. Wireless Microphone

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Receiver			
1.1	Operating Range Under Typical Conditions	100m (300 ft.) Note: actual range depends on RF signal absorption, reflection, and interference		

1.2	Audio Frequency	Minimum: 45 Hz, Maximum: 15 kHz; Response (+/- 2 dB) : single Channel / Dual Channel / four Channel		
1.3	Total Harmonic Distortion	0.5%, typical		
1.4	Dynamic Range	>100 dB A-weighted		
1.5	Features	Over 1400 selectable frequencies ; Automatic frequency Selection Predictive Diversity ; RF presence LED ; Multi Function LCD ; Detachable ¼ wave antennas ; Durable Plastic Chassis; XLR and ¼" Output Locking DC Connector on the power supply ; Mic/Line switchable XLR Output ; In line DC power on Antenna Connections Frequency & Volume Lockout		
1.6	Operating Temp. Range	-18°C (0°F) to +57°C (+135°F)		
1.7	Transmitter Audio Polarity	Positive pressure on microphone diaphragm (or positive voltage applied to tip of WA302 phone plug) produces positive voltage on pin 2 (with respect to pin 3 of low impedance output) and the tip of the high impedance 1/4-inch output.		
2	Transmitter			
2.1	Audio Input Level	10 dBV maximum at "mic" gain position +10 dBV maximum at 0dB gain position +20 dBV maximum at -10dB gain position		
2.2	Gain Adjustment Range	Minimum 25 dB		
2.3	Input Impedance	1 MΩ		
2.4	RF Transmitter Output	10 mW typical		

2.5	Features	Automatic transmitter gain adjustment Backlit LCD with easy to navigate menu control 50 Meter (150ft) line of sight operation range Rugged metal construction Frequency and power lockout Detachable ¼ wave antenna		
2.6	Battery Life	>8 hours		

40. Table flush Microphone

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	Type of Mic	Table flush in Rectangle or square or Square shape with LED indication & on/off Switch		
2	Transducer Type	Condenser		
3	Features	Flat frequency response across the vocal range for uncolored sound Interchangeable cardioids, super cardioid and omnidirectional cartridges Sleek, Low-profile design for unobtrusive appearance; Programmable membrane on/off Switch; On/off indicator LED; Screw terminal connections Attached unterminated cable; Balanced transformerless output for increased immunity to noise over long cable runs; Low susceptibility to electromagnetic hum and RFI; Logic input/output terminals for remote control or use with automatic mixers		
4	Frequency Response	50 Hz to 17 kHz :At 1 kHz (0db=1V/Pa)		
5	Polar Patter	Omni directional		
6	Signal to Noise Ratio	78dB (+/- 2)		

7	Sensitivity (Open Circuit voltage)	-22.0 dBV/Pa (79.4mV)		
8	Equivalent Output Noise	18dB (+/-1)		
9	Common mode rejection	40dB Minimum, 10Hz to 100kHz		
10	Switch Attenuation	50dB Minimum		
11	Load Impedance	>= 1 K Ohms		
12	Power	11 to 52 Vdc phantom, 2.0mA Current consumption		
13	Connection Type	3 pin XLR		

Note: contractor has to get it approve of Finishing of Mic from client/consultant/ Project architect.

41. Video Conference Unit

Sr. No.	Minimum Requirement		Compliance (Yes/ No)	Remark
	BOQ Line Item :			
	Mention Make & Model:			
1	VC Channel	Point to multi-points (1+9 sites)		
2	Video Standards	H.261 , H.263, H263+, H.263++ , H.264 High Profile, H.264 Baseline Profile		
3	Video Frame Rate	Should support 60 fps with 1080p resolution from day one		
4	Video Features	Ability to send and receive two live simultaneous video sources in a single call, so that the image from the main camera and PC or document camera can be seen simultaneously.		
		Should support H.239 and BFCP protocols with 1080p resolution		
5	Point to Multi-point	Should have point to Multi-point connectivity on SIP/H.323 in 1080p/60fps conference feature enabled from day one.		
6	Video	Should support Minimum 1 monitor & upgrade to 2 Monitor for Self View, Remote View and Content all in separate Monitors.		

7	Video Output	Should have at least 1& upgradable to 2 nos. of HDMI / or equivalent (High Definition Multimedia Interface) output to connect Full High Definition display devices such as plasma and projectors for both Video and Content.(Single / Dual Monitor Support)		
8	Video Input	Should have at least 2 HD video Input to connect full HD cameras. Main and sub		
		Should have at least one additional video Input to connect auxiliary full HD camera.		
		Should have VGA/DVI/HDMI port to connect PC/ Laptop directly to the Video conferencing system and display resolutions up to 1080p/30		
9	Audio : Audio standards supported	G.711, G.722,G.722.1, 64 kbps MPEG-4 AAC-LD or equivalent standard must be supported.		
10	Other Desirable features	Noise Reduction, Automatic Gain control, Acoustic Echo Cancellor.		
11	Audio Inputs	Bidder should supply 1 tabletop microphone.		
		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		
12	External devices	Should have USB port , support USB Recording		
13	Network Interfaces	1 LAN /Ethernet-10/100/1000 Mbps full duplex. Should have support for IPV4 & IPV6 networks		
14	Bandwidth	IP at least 6 Mbps and upto 18 Mbps		
15	Security : Menu Control	Password protected system menu		
16	Encryption of video call	ITU-T standards based Encryption of the video call		

		Call should be encrypted end-to-end on IP Should support Standards-based: SRTP (AES 128 bit), H.235 (AES 128 bit)		
17	Camera	3x optical zoom & 4x digital zoom camera with 1920x1080p 60 frames per second. Camera should be PTZ., Field of view minimum 72 deg		
18	Specifications:	Pan range: +/-100 degrees, Tilt range: +/-20 degrees		

42. UPS

Sr. No.	Minimum Requirement	Compliance (Yes/ No)	Remark
	BOQ Line Item :		
	Mention Make & Model:		
1	The UPS shall be fully microprocessor controlled double conversion type with the following features.		
1.1	IGBT rectifier and rectifier		
1.2	Input paver factor near unit		
1.3	Static switch		
1.4	LCD display with history events		
1.5	VRLA sealed maintenance batteries		
1.6	Battery monitoring and auto / manual test facilities		
1.7	Vide input voltage range		
1.8	Overall efficiency not less than 94%		
1.9	Current harmonics less than 7% over 30 to 100% load		
2	The UPS system shall be fully tested at site by the manufacturer's technical representatives and test results to be submitted for approval.		
3	Rating – As per Schedule		
4	Efficiency (Total) @ 25%, @50%, @75,@100%-supplier to indicate		
2	Acoustical Noise Level - Max.55 DB @ 1 Metre		
2.1	Ambient Temp- 15 to 40 Deg.C without de-rating		
2.2	Humidity- 0 – 95%		
2.3	Duty- Continuous at 40 Deg.C		
2.4	Input Voltage -415 V Ac, +/- 15%		
2.5	Input Frequency -50 Hz, +/- 5%		
3	Input Pf- Should be greater than 0.95 from 30% Load To 100% Load		

3.1	Total Harmonic Distortion Current - Less than 7% from 30% to 100% Load		
3.2	Cooling - Forced Draft / Natural		
3.3	Output Voltage -415V AC +/- 1% Selectable in steps of 1%		
3.4	Output Frequency -50 Hz, +/- 1% Selectable		
3.5	Wave Form- Sinusoidal		
3.6	Static Switch- Without Break		
3.7	Manual Bypass - To be Provided		
3.8	Display- LCD Panel to measure various Parameters of UPS & record data on real time basis with BMS Output		
3.9	Batteries - Acid in enclosed Cabinet / Racks		
3.10	Battery Life - Supplier To guarantee the life in years, min. 3 Years. The calculation of battery shall be based on the efficiency / duration at the end of 3 years.		
3.11	Battery Testing - Manual / Auto On-Line Battery testing through UPS. Vendor to indicate In details Max. time & min. voltage limit		
3.12	Battery Back-Up –as per schedule		
3.13	Time Delay For Rectifier Start- UPS to have adjustable time delay to avoid inrush current during DG Supply		