DEENDAYAL PORT AUTHORITY
ISO 9001:2008 | ISO 14001 | ISPS Compliant Port

Office of Executive Engineer (Electrical),
Ground Floor, Nirman Building, New Kandla, Kutch,
Pin Code 370210.

No.: EL/AC/ EOI/AUDIO VISUAL/ Date: /08/2025.

EXPRESSION OF INTEREST [EOI]

"AUDIO VISUAL works for - Construction of Conference Hall at A.O Building Gandhidham"

(This EOI is issued to elicit Expression of Interest from the parties interested in the work anddoes not constitute any binding commitment from the Deendayal Port Authority to proceedwith the work or invite any or all the parties in the subsequent bidding process. The Open Tenders will be issued subsequently.)

Executive Engineer (Electrical), DPA invites Expression of Interest for the workof **"AUDIO VISUAL works for - Construction of Conference Hall at A.O Building Gandhidham"** from the reputed firms from those who have executed similar work in Government/public sectors and other leading private organizations. The Expression of Interest (EOI) documents containing BOQ & technical specifications are enclosed herewith.

The interested firms are requested to submit their expression of interest for the said work in BOQ format as enclosed at Annexure I. The completed EOI (Expression of Interest) shall be submitted to the office of the undersigned on or before 25/08/2025. A soft copy ofEOI is also acceptable through e-mail Id xenedpa@gmail.com & deepak.hazra@deendayalport.gov.in.

Sd/-

Executive Engineer (E)
Deendayal Port Authority

ANNEXURE-I

Name of Work: - AUDIO VISUAL works for - Construction of Conference Hall at A.O Building Gandhidham

SR. No	DESCRIPTION	UNIT	QTY.	RATE (RS.)	AMOUNT (RS.
1	Supply, Installation, Testing and commissioning (SITC) of FOH loudspeaker transducer apparatus to be supplied shall comprise no fewer than a dual-array of minimum Nine elements of 2.5-inch nominal diameter drivers constructed using high-efficiency neodymium magnetic structures, configured to deliver an electro-acoustic output with a rated nominal impedance of minimum 4Ω or better as per technical specification no. 1.	**Each**	**2**		
2	Supply, Installation, Testing and commissioning (SITC) of Filler Speakers hall incorporate a transduction array comprising no fewer than a quad-set configuration of minimum 2.5-inch driver elements utilizing neodymium magnetic motor topology, arranged for coherent broadband acoustic emission. The nominal system impedance shall be defined at a minimum 4 ohms or superior equivalent, permitting optimized loading under networked amplification as per technical specification no. 2.	**Each**	**6**		
3	Supply, Installation, Testing and commissioning (SITC) of shall be of a construction wherein the capsule shall embody condenser transduction principle, and the acoustic directivity shall be engineered to conform to a minimum super-cardioid polar pattern configuration in order to facilitate heightened off-axis rejection and focused vocal acquisition from intended sources while minimizing ambient intrusion as per technical specification no. 3.	**Each**	**105**		
4	Supply, Installation, Testing and commissioning (SITC) of core processing apparatus forming the nucleus of the conferencing ecosystem shall be constructed to manage and administer high-capacity, real-time speech transmission and control within professional discussion environments. The system shall be required to accommodate and regulate a minimum of four distinct microphone activation logics, which shall include FIFO (first-in-first-out) as per technical specification no. 4.	**Each**	**1**		

5	Supply, Installation, Testing and commissioning (SITC) of equipment intended for integration as a power distribution interface within the digital conference architecture shall incorporate an embedded energy conversion and regulation subsystem designed to deliver stabilized DC power suitable for distributed microphone array infrastructure. The internalized power module as per technical specification no. 5.	**Each**	**4**		
6	SITC of digital signal processing (DSP) core device to be provisioned shall constitute a fully integrated modularized audio signal manipulation matrix, comprising embedded functionalities for automatic signal route management, signal refinement, and high-order real-time processing, purpose-engineered to facilitate conferencing, presentation, and distributed as per technical specification no. 6.	**Each**	**1**		
7	Supply, Inst., Test. & Comm. (SITC) of PTZ Camera 4K proposed imaging and optical acquisition apparatus intended for use within environments necessitating ultra-high-definition video reproduction and automated tracking functionalities shall be equipped with a minimum of one newly developed, high-fidelity CMOS sensor with a dimensional specification not inferior to 1/2.5-inch format and shall exhibit effective pixel utilization not less than 8.29 megapixels as per technical specification no. 7.	**Each**	**3**		
8	Supply, Installation, Testing, and Commissioning (SITC) of Document Camera device proposed for deployment shall incorporate an integrated camera subsystem utilizing a minimum 1/4-inch HD CMOS imaging sensor which shall not be of lesser capability than an 8 Mega Pixel array with native resolution not below 3264 x 2448 pixels, and the system shall exhibit functionality of frame acquisition at a minimum rate of 15fps at said native as per technical specification no. 8.	**Each**	**1**		
9	Supply, Installation, Testing, and Commissioning (SITC) of equipment to be provisioned shall incorporate a computational module utilizing a minimum of Intel® Core™ i5-1135G7 processing architecture, integrating a dual-channel memory configuration comprising not less than 2 x 4GB modules, which shall conform to industry standards for synchronous operation. The graphical subsystem shall be embedded with a minimum Intel® Iris® Xe Graphics IGPU for rendering acceleration and multi-display output support as per technical specification no. 9.	**Each**	**1**		

10	Supply, Installation, Testing and commissioning (SITC) of integrated Hight Adjustable digital podium system interactive display unit shall incorporate an active-matrix LCD panel having a diagonal visual dimension not less than 27 inches, constructed with edge-illuminated direct-lit backlighting architecture, and employing a native resolution threshold of minimum 3840 by 2160 physical pixel matrix, adhering to UHD standards. The luminance intensity shall not be rated below 400 cd/m^2 as per technical specification no. 10.	**Each**	**1**		
11	Supply, Installation, Testing, and Commissioning (SITC) of integrated interactive terminal assembly to be proposed shall be comprised of a high-definition visual display system, conforming to a minimum native diagonal dimension not less than 15.6 inches and engineered to deliver a screen resolution threshold not lower than Full High Definition (1920 × 1080 pixels) or equivalent display fidelity. The aspect ratio of the visual rendering component shall conform to a minimum standard of 16:09, as per technical specification no. 11.	**Each**	**1**		
12	Supply, Installation, Testing, and Commissioning (SITC) of unified multi-function visual collaboration interface shall be configured to operate across a minimum resolution of UHD 4K, enabling the rendering of sharp pixel-defined clarity during multi-modal screen sharing applications. System architecture should incorporate a minimum quad-core processing element of the ARM Cortex A55 classification, in tandem with memory allocation not below 8G DDR paired with persistent storage as per technical specification no. 12.	**Each**	**1**		
13	Supply, Installation, Testing, and Commissioning (SITC) of supplied interactive visual collaboration unit shall be of large-format construction with a minimum diagonal dimension not less than 110 inches, featuring a zero-bonded panel architecture ensuring minimized parallax deviation and enhanced visual performance with uniform image depth perception across the full viewing envelope as per technical specification no. 13.	**Each**	**1**		

14	Supply, Installation, Testing, and Commissioning (SITC) of display solution to be proposed shall comprise a minimum 65-inch diagonal active matrix panel, constructed on In-Plane Switching (IPS) technology and employing a Slim Direct LED (DLED) backlighting mechanism, intended for professional-grade applications in both landscape and portrait orientation, operating continuously under 24x7 environmental conditions. The display shall offer a minimum luminance of 500 candela per square meter or better under standard operating conditions, and shall achieve a typical static contrast ratio not below as per technical specification no. 14.	**Each**	**8**		
15	Supply, Installation, Testing, and Commissioning (SITC) of intelligent digital interface switcher solution shall provide comprehensive routing capabilities for a minimum of four independent ultra-high-definition multimedia video sources to a single display output node, incorporating integrated keyboard-video-mouse (KVM) control architecture, wherein simultaneous switching of video and USB HID signals shall be facilitated through embedded signal path synchronization protocols as per technical specification no. 15.	**Each**	**1**		
16	Supply, Installation, Testing and commissioning (SITC) Video Switcher shall be a high-performance, multi-format matrix switching platform incorporating advanced signal distribution architecture based on HDBaseT transmission standards. It shall integrate a minimum of eight (08) independent HDMI input interfaces conforming to TMDS signalling levels in the range of 2.9V to 3.3V, with a differential input impedance of not less than 100 ohms as per technical specification no. 16.	**Each**	**1**		
17	Supply, Installation, Testing and commissioning (SITC) receiver unit to be deployed the HDBaseT signal transmission infrastructure shall be engineered to decode and reconstruct digital video/audio signals with fidelity conforming to the HDMI 1.4 and HDCP 1.4 standards or better. The unit shall incorporate a single input interface based on HDBaseT protocol, utilizing as per technical specification no. 17.	**Each**	**7**		

18	Supply, Installation, Testing and commissioning (SITC) of HDMI Distribution Amplifier unit proposed for signal distribution in AV applications shall incorporate a single high-speed digital video input interface based on HDMI Type-A female connector configuration, compliant to a minimum HDMI Version 2.0 standard, and shall be capable of receiving video signal resolutions as per technical specification no. 18.	**Each**	**1**		
19	Supply, Installation, Testing, and Commissioning (SITC) of network switching apparatus to be proposed shall conform to a 1U form factor suitable for standard rackmount installations and shall incorporate a configuration comprising a minimum of twenty-four copper interfaces operating at 1GBASE-T standard, each supporting PoE++ delivery, augmented by two additional copper ports of the same bandwidth specification as per technical specification no. 19.	**Each**	**1**		
20	Supply, Installation, Testing, and Commissioning (SITC) of wireless local area network (WLAN) access device to be deployed shall be designed as a dual-radio transmission unit compliant with IEEE 802.11ax (WiFi 6) standards, supporting operation across both the 2.4 GHz and 5 GHz ISM bands. The access device shall incorporate a dual-stream (2x2) radio configuration on each frequency band, with minimum support for 20 MHz as per technical specification no. 20.	**Each**	**1**		
21	Supply, Installation, Testing and commissioning (SITC) of Fiber optic HDMI cable, boasting a length of 20 meters and equipped with connectors, shall be capable of maintaining a 90-degree cable angle, thereby ensuring a precise and nuanced signal transmission. This high-speed HDMI to HDMI cable, with a bandwidth of 18Gbps, shall support subsampling rates of 4:4:4/4:2:2/4:2:0, thereby facilitating the transmission as per technical specification no. 21.	**Each**	**8**		
22	Supply, Installation, Testing and commissioning (SITC) of Fiber optic HDMI cable, boasting a length of 10 meters and equipped with connectors, shall be capable of maintaining a 90-degree cable angle, thereby ensuring a precise and nuanced signal transmission. This high-speed HDMI to HDMI cable, with a bandwidth of 18Gbps, shall support subsampling rates of 4:4:4/4:2:2/4:2:0, thereby facilitating the transmission of high-definition video signals, including HDTV, 3D, and 2160p/1080p	**Each**	**8**		

	resolutions. Furthermore, this cable shall be compatible with HDCP2.2, Ethernet, ARC, HDR, Ultra HD, and UHD 4K, as per technical specification no. 22.				
23	Supply, Installation, Testing and commissioning (SITC) of Fiber optic HDMI cable, boasting a length of 5meters and equipped with connectors, shall be capable of maintaining a 90-degree cable angle, thereby ensuring a precise and nuanced signal transmission. This high-speed HDMI to HDMI cable, with a bandwidth of 18Gbps, shall support subsampling rates of 4:4:4/4:2:2/4:2:0, thereby facilitating the transmission of high-definition video signals, including HDTV, 3D, and 2160p/1080p resolutions as per technical specification no. 23.	**Each**	**10**		
24	Supply, Installation, Testing and commissioning (SITC) of high-performance twisted-pair cabling medium conforming minimally to the structured format of Category 6A transmission class, constituted of four (4) twisted conductor pairs individually encompassed within foil screening elements, encapsulated overall within a sheath conforming to LS0H (Low Smoke Zero Halogen) or PVC typology, as per technical specification no. 24.	**Mtr**	**1000**		
25	Supply, Installation, Testing and commissioning (SITC) of Signal Cable Supply, Installation, Testing, and Commissioning (SITC) of shall be of Minimum 2 Core Shielded Signal transmission configuration or better, incorporating a Minimum outer PVC jacket or better with a diameter of no less than Minimum ø 8.80 mm or better, finished in marine blue or equivalent shade. Shielding integrity shall be ensured through a Minimum dual-layered shield construct or better, as per technical specification no. 25.	**Mtr**	**300**		
26	Providing, laying, connecting, testing and commissioning of 20 Mtr. length minimum required high-speed USB extender interface solution, consisting of one end terminated with minimum Type-A Male and the other with minimum Type-A Female connector, designed for dedicated support of USB 3.0 compliant devices exclusively (excluding backward compatibility with USB 2.0/1.1), ensuring minimum sustained data transfer throughput of 5Gbps or better, as per technical specification no. 26.	**Each**	**5**		

27	Providing, laying, connecting, testing and commissioning of 5 Mtr length minimum required high-speed USB extender interface solution, consisting of one end terminated with minimum Type-A Male and the other with minimum Type-A Female connector, designed for dedicated support of USB 3.0 compliant devices exclusively (excluding backward compatibility with USB 2.0/1.1), as per technical specification no. 27.	**Each**	**5**		
28	Supply, Installation, Testing and commissioning (SITC) of 32 U Equipment rack Construction The standard rack shall be constructed with a welded frame comprising four pillars made of 1.5 mm thick Cold Rolled Close Annealed (CRCA) sheet, utilizing a five-fold profile for enhanced structural integrity. The frame shall be reinforced through welding from the top to the bottom and connected to top and bottom as per technical specification no. 28.	**Each**	**1**		
29	Supply, Installation, Testing and commissioning (SITC) of installation of system interconnects shall include, but not be limited to, male and female XLR connectors, jack pin EP to RCA connectors, and all other necessary interconnects as required as per technical specification no. 29.	**Lot**	**1**		
30	Programming and Calibration Charges of Confrance Room Systems as per technical specification no. 30.	**Job**	1		
				AMOUNT	

(In Words Rupees _____)

Note :- The rates should be inclusive of all taxes, duties, fees, cess, etc. and all incidental charges, but exclusive of GST.

Sd/-

Seal & Signature of Contractor

Executive Engineer (E)

Deendayal Port Authority

TECHNICAL SPECIFICATIONS

1	**Supply, Installation, Testing and commissioning (SITC) of FOH** loudspeaker transducer apparatus to be supplied shall comprise no fewer than a dual-array of minimum Nine elements of 2.5-inch nominal diameter drivers constructed using high-efficiency neodymium magnetic structures, configured to deliver an electro-acoustic output with a rated nominal impedance of minimum 4Ω or better. The system shall be capable of sustaining a minimum continuous power rating of 120 watts RMS and exhibit sensitivity no less than 92dB measured under standardized conditions at one-meter distance with 1W input, delivering maximum achievable SPL not under 110dB peak. The operative frequency response shall span from a minimum of 95Hz up to a minimum of 20kHz without need of additional sub-bass reinforcement for full-range operation. The audio signal transmission protocol shall be based on minimum Dante architecture or equivalent digital transport medium, enabling multi-channel low-latency audio streaming over network infrastructure, controllable and routable exclusively via minimum Dante Controller software interface or better. Protection functionality must be embedded intrinsically within the device to include, at minimum, over-current, thermal overload, short-circuit, and load fault mitigation mechanisms designed for continuous reliability without external dependencies. Powering of the unit shall be conducted through a network-based PoE scheme compliant with minimum IEEE 802.3af, 802.3at, or 802.3bt standards or better, with no additional AC source required. Cooling shall be facilitated by passive thermal convection only, absent of active mechanical cooling fans. The transducer casing shall be constructed of minimum ABS material with structural reinforcement, externally available in color finishes including black, white, or grey. The front grille shall be fabricated using minimum aluminum alloy material, designed for optimal airflow and impact resistance. The dispersion pattern shall provide a directional beam coverage of minimum 120° horizontal and 20° vertical, ensuring focused yet broad-area coverage. Mounting arrangement shall utilize minimum 2 M6 threaded inserts compatible with an adjustable-angle bracket system. The device shall incorporate a single RJ45 network port for combined signal and power delivery and must permit interoperability within similarly networked devices using standardized protocol without reprogramming. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
2	**Supply, Installation, Testing and commissioning (SITC) of** Filler Speakers hall incorporate a transduction array comprising no fewer than a quad-set configuration of minimum 2.5-inch driver elements utilizing neodymium magnetic motor topology, arranged for coherent broadband acoustic emission. The nominal system impedance shall be defined at a minimum 4 ohms or superior equivalent, permitting optimized loading under networked amplification. The unit shall possess a continuous electrical power handling capacity of not less than 60 watts RMS and shall demonstrate a minimum sensitivity response of 93 decibels referenced to 1 watt input at a distance of 1 meter, under standard anechoic conditions. The system's peak sound pressure level shall be capable of attaining a minimum of 109 decibels SPL at full output. The operational acoustic bandwidth shall not be inferior to a minimum frequency range spanning from 106 hertz to 20 kilohertz, maintaining uniformity across the stated spectrum without reliance on ancillary low-frequency enhancement. Digital audio interconnection shall be achieved via a transport scheme based on minimum Dante protocol or superior, facilitating seamless integration into existing digital audio networks with full compatibility to routing configuration conducted solely through minimum Dante Controller interface or similar class-compliant software utility. Integral electronic safeguarding systems shall be embedded to provide minimum protection against overcurrent, thermal overload, input overdrive, and short-circuit load fault conditions, all managed autonomously within the internal circuit architecture.

	The powering arrangement shall support minimum IEEE 802.3af/at/bt-compliant Power over Ethernet input methodology without recourse to supplementary local power injection. Thermal regulation shall be executed exclusively via natural convection principles with no incorporation of active fans or mechanical cooling elements. The transducer housing shall consist of a structurally reinforced ABS thermoplastic chassis, available in neutral matte finishes including black, white, or grey, with a grille constructed from minimum aluminum alloy material for mechanical resilience and acoustic transparency. The acoustic output pattern shall be governed through directional waveguide design ensuring a controlled dispersion profile of not less than 120 degrees horizontal and 20 degrees vertical. The enclosure shall integrate no fewer than two mounting interfaces compatible with M6 fasteners and an adjustable-angle bracket. Signal and power ingress shall be consolidated via a singular RJ45 interface. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
3	**Supply, Installation, Testing and commissioning (SITC) of** shall be of a construction wherein the capsule shall embody condenser transduction principle, and the acoustic directivity shall be engineered to conform to a minimum super-cardioid polar pattern configuration in order to facilitate heightened off-axis rejection and focused vocal acquisition from intended sources while minimizing ambient intrusion. The device shall possess an acoustic frequency responsiveness no less than 50Hz and shall extend upward to a minimum of 20,000Hz to ensure full-range speech intelligibility and tonal accuracy during reproduction. Sensitivity shall not be inferior to -20dB ±3dB, referenced to 0dB equating to 1V/Pa at a 1kHz stimulus, ensuring appropriate gain structure compatibility across varied AV signal paths. The maximum sound pressure handling capability shall be a minimum of 110dB SPL at a distortion threshold of <5% at 1kHz, maintaining linear acoustic response under elevated vocal input. Signal-to-noise ratio shall be not less than 100dBA (A-weighted), under equivalent conditions, thereby guaranteeing minimal self-noise contribution within mission-critical acoustic environments. Total harmonic distortion shall remain below 0.1% across the defined operating range, providing linearity and fidelity suitable for professional conferencing use. The electrical powering mechanism shall be dual-stage in nature, wherein the microphone capsule shall draw operating voltage not less than 5V DC for internal circuitry, while the primary unit interface shall be supplied via a central control module not less than 24V DC with a power consumption ceiling of 0.72W. Physical connection shall be facilitated through an RJ45 network input utilizing a screw-type detachable locking mechanism compatible with flush-mounted discussion terminals. The output format shall comply with XLRM balanced interfacing standards to ensure seamless integration with professional-grade AV switching and routing infrastructure. Visual indication of activation status shall be incorporated via an inbuilt annular LED illumination element encircling the shaft base, displaying operational readiness or mute state. The external structural housing shall be precision-machined from superior brass material finished in matte black coating to ensure durability and inconspicuous deployment within formal architectural environments. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.

4	**Supply, Installation, Testing and commissioning (SITC) of** core processing apparatus forming the nucleus of the conferencing ecosystem shall be constructed to manage and administer high-capacity, real-time speech transmission and control within professional discussion environments. The system shall be required to accommodate and regulate a minimum of four distinct microphone activation logics, which shall include FIFO (first-in-first-out), Automatic with time-limit enforcement, queued Request-to-Speak, and Sound-activated microphone triggering, thereby offering operational adaptability across moderated and unmoderated forum types. Speaker management functionality incorporated within the central engine shall permit manual or automated selection of active participants, and the controller shall be inherently capable of concurrently activating a minimum of two and optionally three or four microphones in parallel, in alignment with administrator-defined policies or automatic logic. Advanced video control integration shall be a mandatory feature, whereby the processor shall support camera auto-tracking functionality based on positional logic via serial control protocols including, but not limited to, RS-232 and RS-422. The controller shall provide direct interfacing with a minimum of four separate PTZ camera units, and shall support cross-protocol compatibility with industry-recognized VISCA, PELCO-D, and PELCO-P standards. For video signal distribution, the device must offer a minimum of four BNC-style SDI or HD-SDI compatible video inputs and one video output via similar BNC connection, conforming to an impedance standard of 75 ohms. Digital audio interfacing over IP shall be provisioned via an integrated Dante™ output connection using an RJ45 port for flexible distribution across networked audio ecosystems. The device shall support intelligent automatic gain control (AGC) as part of its internal audio processing architecture, for optimizing speech clarity and eliminating audio feedback under live conditions. The system shall further incorporate auxiliary input and output connectivity via RCA interfaces to allow external source integration such as background music, audio feed-in from other AV infrastructure, or audio-out to PA systems or recorders. For user expandability, the controller shall natively support a minimum of 30 microphone units and, via integration with compatible expansion interfaces (e.g., NEB-I24W), scale up to a maximum of 110 units per system loop. The microphone extension interface shall incorporate a minimum one anti-drop 9-pin aviation-grade connector. The network communication port shall consist of one female RJ45 socket, while additional output ports shall include XLRM balanced audio out, 6.35 mm TRS jack, and RCA connector. Serial command and camera control shall be accessible via a DB9 female port and 5-pin Phoenix-style terminal blocks for both RS-232 and RS-422 protocols. The electrical subsystem shall accept universal AC power ranging from 90V to 264V (or 127–370V AC), operating across a frequency range of 47–63Hz. Total system power consumption shall not exceed 100W under maximum operational load at 24V supply. The system shall be compliant with audio output standards up to a maximum of 14.6 dBu on both XLR and 6.35 mm outputs, with audio fidelity parameters exceeding 96 dBA signal-to-noise ratio, crosstalk rejection better than 85 dB, total harmonic distortion under 0.05%, and dynamic range exceeding 94 dB. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.

5	**Supply, Installation, Testing and commissioning (SITC) of** equipment intended for integration as a power distribution interface within the digital conference architecture shall incorporate an embedded energy conversion and regulation subsystem designed to deliver stabilized DC power suitable for distributed microphone array infrastructure. The internalized power module shall be engineered to generate a continuous regulated output not less than 24 volts DC and shall support a total power delivery capacity of not less than 72 watts or better, thereby facilitating simultaneous operation of a minimum of 30 microphone terminal units under full-load deployment scenarios. The system shall ensure consistent performance within rated output limitations without inducing voltage fluctuation or load variance under diverse ambient and operational states. Electrical interfacing shall accommodate global AC grid variations through a universal power input subsystem capable of operating within a voltage band ranging from a minimum of 110V to a maximum of 240V AC, across both 50Hz and 60Hz frequency environments, thereby supporting broad deployment in heterogeneous electrical infrastructure contexts. The unit shall further include dual network communication interfaces configured via RJ45 modular sockets for input and output chaining of digital communication and power signals through dedicated conference-grade network cabling. These connectors shall be reinforced to ensure secure signal propagation and mechanical reliability across extended usage cycles. An integrated thermal management system shall be mandated within the chassis, comprising a minimum one internal cooling fan designed for active convective airflow, ensuring heat evacuation during elevated power draw conditions and continuous-duty operation. Visual state indication shall be incorporated on the enclosure, with LED-based feedback display providing real-time status monitoring. During non-operational standby condition, the unit shall emit a red status illumination, whereas active system engagement shall be visually represented by a blue LED state, enabling at-a-glance diagnostics by installation and maintenance personnel. The unit shall adhere to form-factor and connectivity norms compatible with centralized conference equipment and be suitable for installation within professional AV system enclosures or control racks, conforming to safety and performance standards applicable to active digital power distribution units within institutional conferencing ecosystems. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.

6	**Supply, Installation, Testing and commissioning (SITC) of** digital signal processing (DSP) core device to be provisioned shall constitute a fully integrated modularized audio signal manipulation matrix, comprising embedded functionalities for automatic signal route management, signal refinement, and high-order real-time processing, purpose-engineered to facilitate conferencing, presentation, and distributed AV infrastructure environments. The unit shall incorporate as standard a minimum one automatic mixing console algorithmic framework capable of dynamic voice activity detection (VAD), signal prioritization via ducking (and dodging), and seamless gain compensation transitions among multi-channel inputs. The device shall support expansion via optional modular plug-in or software-enabled functionalities, including but not limited to feedback path elimination algorithms, full-duplex acoustic echo cancellation compliant with voice-grade standards, and spectral noise elimination mechanisms, either integrated natively or activated via licensing. On each signal input path, the DSP shall include a comprehensive pre-processing chain comprising a preamplifier module, adjustable signal generation unit, a dynamic range expander, compressor, and a parametric equalizer with not less than ten bands adjustable independently per channel. The output signal chain per channel shall include a user-configurable 31-band graphic equalizer, programmable delay engine, crossover configuration utility (suitable for multi-way speaker alignment), and limiting stage with clip threshold control. Signal acquisition and playback over digital interfaces shall be enabled through an integrated bi-directional USB audio interface compatible with soft codec conferencing environments. This USB interface shall support simultaneous multi-track audio recording and real-time playback functionality. Integrated digital audio networking must be realized via a built-in Dante™ audio module supporting a minimum of 8×8 (eight inputs, eight outputs) uncompressed digital audio channels over IP. The matrix mixer functionality shall be full-featured and fully configurable, supporting multi-source-to-multi-destination signal routing, dynamic gain matrix control, and internal signal loopbacks. A scene preset function shall be embedded, allowing instant recall of entire DSP signal path configurations, including EQ, matrix, gain, and dynamic settings. The unit shall feature automatic non-volatile memory storage for power failure scenarios, ensuring all preset configurations persist across shutdowns. Furthermore, the system must include automatic camera tracking integration to facilitate voice-activated camera switching and position control via internal logic triggers, with configurable parameters via serial or GPIO control. Management and customization shall be supported via a user-definable graphical user interface (GUI) software, which shall allow control and monitoring of all DSP features over Ethernet through the dedicated control port. Analog signal interfacing shall include not less than 8 balanced analog inputs and 8 balanced analog outputs, and similarly, Dante audio I/O shall support 8×8 operation. Port allocation shall include one primary Dante interface and one secondary Dante interface for redundancy or daisy-chain configuration. Additional control interfaces shall include RS232 and RS485 serial ports and 8 freely assignable GPIO terminals. The system shall operate on an AC mains supply in the range of 110 to 220 volts, 50/60Hz, with stable internal regulation. The analog and digital dynamic range shall not be less than 114 dB and 120 dB respectively, frequency response shall remain within ±0.2 dB across the 20 Hz to 20 kHz band, and total harmonic distortion (THD+N) shall not exceed 0.004% at 4 dBu. Maximum input/output level shall be at least 18 dBu, equivalent input noise shall be below –125 dBu, background noise below –90 dBu, and channel isolation at 1 kHz shall exceed 100 dB. Input impedance (balanced) shall be a minimum of 20 kΩ and output impedance shall be no more than 100 ohms. Input gain control shall be available in 3 dB steps across a 24 to –27 dB range, totaling no fewer than 17 increments. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.

7	**Supply, Installation, Testing, and Commissioning (SITC) of** PTZ Camera 4K proposed imaging and optical acquisition apparatus intended for use within environments necessitating ultra-high-definition video reproduction and automated tracking functionalities shall be equipped with a minimum of one newly developed, high-fidelity CMOS sensor with a dimensional specification not inferior to 1/2.5-inch format and shall exhibit effective pixel utilization not less than 8.29 megapixels, within a total pixel matrix not under 8.50 million. The imaging mechanism shall function on a progressive scan methodology and must support output resolutions reaching up to a minimum of 3840 x 2160 pixels at a frame rate of 60fps or better, particularly through select interfaces supporting high-bandwidth transmission. The optical zooming arrangement shall incorporate a precision-engineered telephoto lens mechanism featuring a focal length variation ranging from a wide-angle threshold of no less than 5.05mm up to a tele end of minimum 91.49mm, with aperture values dynamically adjustable within an f/1.8 to f/2.9 envelope. The optical zoom capability must be no less than 20x, with digital magnification provisions up to a minimum of 16x, thereby enabling both spatial framing accuracy and enhanced visual proximity under electronically stabilized zoom operations. The resultant horizontal field coverage angle shall be no narrower than 60.05°, supporting adaptability across large-area coverage. Signal output modalities must encompass at minimum USB3.0, HDMI, LAN, and 3G-SDI pathways, all capable of synchronous signal duplication, with USB, HDMI, and LAN ensuring minimum UHD 4K60 resolution transmission, while SDI should support no less than 1080p60 standard. The unit shall include enhanced imaging in minimal ambient luminance conditions, ensuring functionality down to a threshold of 0.1 Lux, supported through dual-stage 2D and 3D noise suppression techniques, thereby achieving a signal-to-noise performance ratio not inferior to 50dB. The device shall possess an advanced low-light algorithm optimized for dynamic environments. The visual compression protocols supported by the system shall include, but not be limited to, YUY2, MJPG, H.264, and H.265 depending upon interface compatibility, whereas the communication transport layer shall accommodate minimum ONVIF, SRT, RTSP, RTMP, FreeD, with NDI®|HX3 considered as an optional enhancement. System control shall support VISCA protocol over both IP and traditional RS interfaces, including automatic protocol negotiation and support for PELCO D/P standards. The unit shall employ a minimum AI-powered visual subject tracking mechanism capable of discerning and interpreting humanoid motion and facial structure, and further enabled with gesture-triggered operations for tracking activation, framing adjustment, target switching, and zoom control—all without requiring physical interaction. A minimum of five gesture categories should be recognized to initiate said functions. Preset positional memory shall be implemented with no fewer than nine programmable views via infrared remote and no fewer than 255 using compatible control peripherals. Operational configuration shall permit ceiling, wall, or flat-surface installation. Powering shall be facilitated via PoE under the IEEE 802.3af standard and/or DC 12V input, with maximum power consumption not exceeding 24W under full operational load and current draw capped at 2.0A. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.

8	**Supply, Installation, Testing, and Commissioning (SITC) of** Document Camera device proposed for deployment shall incorporate an integrated camera subsystem utilizing a minimum 1/4-inch HD CMOS imaging sensor which shall not be of lesser capability than an 8 Mega Pixel array with native resolution not below 3264 x 2448 pixels, and the system shall exhibit functionality of frame acquisition at a minimum rate of 15fps at said native resolution, with full HD (1080p) supported at a minimum 30fps operational throughput. The optical subassembly shall comprise no less than 5x optical zoom, supplemented by a digital zoom of no less than 4x to provide a cumulative 20x zoom capacity, all controlled via a mouse-wheel interface or better for smooth operation. The interface panel shall include a minimum of two USB2.0 ports, dual VGA output interfaces, a minimum one VGA input for signal pass-through, and optionally an HDMI output pathway, all conforming to standard video transmission protocols. The scan mechanism shall enable sub-1-second acquisition latency with provision for freeze-frame functionality and video image retention. Image operations including color/BW toggling, mirror, rotational displacement in 90° increments up to 270°, optional negative inversion, and image cropping shall be incorporated, alongside integrated support for mark-up and PDF conversion. The system shall support a minimum continuous frame capture feature with adjustable frame rate, resolution-selectable photo shooting, and integrated audio-video capture functionality (optional), with supported video file outputs in WMV and AVI formats. Automatic brightness, contrast, saturation, sharpness, and gain controls shall be embedded, and the unit must support instant image capture and scan with multi-page compilation in PDF format and multilingual OCR functionality. Power requirements shall be fulfilled via USB connectivity with no external supply necessary, and all operational parameters must be natively executable through bundled software utilities.
9	**Supply, Installation, Testing, and Commissioning (SITC) of** equipment to be provisioned shall incorporate a computational module utilizing a minimum of Intel® Core™ i5-1135G7 processing architecture, integrating a dual-channel memory configuration comprising not less than 2 x 4GB modules, which shall conform to industry standards for synchronous operation. The graphical subsystem shall be embedded with a minimum Intel® Iris® Xe Graphics IGPU for rendering acceleration and multi-display output support. The primary non-volatile storage device shall be a solid-state module not less than 256GB capacity interfaced via M.2 SATA protocol, ensuring high-speed data throughput with reliable performance. In terms of connectivity and interfacing, the unit shall support high-efficiency wireless protocols via a module not inferior to the AX201 standard and Bluetooth communication in a version not less than 5.0. Power delivery shall be facilitated via a DC19V/5A external supply, with additional support for PoE-based operation where required. The I/O subsystem shall include a minimum of three HDMI OUT interfaces capable of delivering 4K@60Hz signal fidelity, a minimum one HDMI IN with equivalent resolution support, a singular PoE-enabled port, one standard headphone output, at least one 10/100/1000 Mbps self-adaptive LAN port, one multifunctional HUB interface, and one Type-C interface with display and data functions. Furthermore, there shall be not less than one USB2.0 port and three USB3.0 ports, ensuring broad peripheral compatibility.

	The operational envelope shall include ambient temperature ranges from 0°C to 40°C and humidity tolerances between 10% to 90% non-condensing, while storage conditions must support -20°C to 60°C at 5% to 95% RH non-condensing. The mechanical structure of the device shall measure approximately 225mm in length, 142.2mm in width, and 40mm in height with a. The housing finish shall exhibit a black and grey coloration schemeThe integrated touch interface panel shall be a 10-inch capacitive touchscreen supporting 1080p@60Hz resolution and shall derive power directly from the box via PoE. The panel shall further incorporate 1x HDMI IN (1080p@60Hz), 1x RJ45 (PoE), 2x USB2.0, and 1x USB Type-C interface supporting DisplayPort In and USB 2.0 functionality, accompanied by a power button interface. The unit must be capable of operation where both signal and power are transmitted over a single cable, meeting functional expectations for streamlined deployment in unified AV/IP environments. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
10	**Supply, Installation, Testing and commissioning (SITC) of** integrated Hight Adjestable digital podium systeminteractive display unit shall incorporate an active-matrix LCD panel having a diagonal visual dimension not less than 27 inches, constructed with edge-illuminated direct-lit backlighting architecture, and employing a native resolution threshold of minimum 3840 by 2160 physical pixel matrix, adhering to UHD standards. The luminance intensity shall not be rated below 400 cd/m^2 and the static contrast ratio shall not be less than 1000:1 under standard ambient light testing conditions, conforming to applicable IEC display calibration parameters. The temporal response characteristic of the pixel activation shall not exceed a maximum latency of 14 milliseconds, and the viewing cone shall permit no less than 178 degrees both on horizontal and vertical axes, ensuring fidelity preservation across wide-angle visibility. Pixel pitch shall be maintained at a grid not exceeding 0.1554mm in both horizontal and vertical pitch measurement vectors, and effective image rendering area shall span minimum 596.736mm horizontally and 335.664mm vertically.The minimum color processing depth shall include support for 10-bit color or better, with total displayable colors not less than 1.07 billion, and minimum color gamut coverage shall extend to 72% NTSC or equivalent chromatic range. The display system shall be engineered for continuous operational runtime up to 16 hours per day, 7 days a week, with an LED module service life expectancy not less than 30,000 operational hours. The integrated SoC platform shall be configured on Android OS, not earlier than Version 12, with system architecture provisioned for a quad-channel memory interface delivering not less than 8GB DDR4 volatile memory (RAM), and persistent flash storage capacity provisioned at minimum 64GB eMMC or equivalent. Wireless interoperability protocols shall include support for Wi-Fi IEEE 802.11a/b/g/n/ac dual-band operating in both 2.4GHz and 5GHz spectrums, and backward/forward Bluetooth compatibility up to Version 5.2 shall be inherent. The panel shall provide HDMI signal reception through a minimum one HDMI v2.1 port supporting resolutions up to 3840×2160 at 60Hz, and a single HDMI v2.1 TMDS output port shall enable full signal loop-through at identical resolution and frame rate. Additionally, the display shall incorporate a bidirectional Type-C output interface supporting DisplayPort 1.2 or better, and a dedicated Type-C power interface shall facilitate DC input at 20V 5A power envelope. Peripheral connectivity shall include a minimum of two USB-A (3.0 or better) ports with media decoding capabilities supporting standard image, video, and audio formats. RJ45-based Ethernet physical interface shall comply with 10/100/1000 Base-T auto-negotiation protocols and provide IPv4/v6 compatibility. External dimensions, excluding base, shall not exceed 775.6mm in width, 526mm in depth, and 1118mm in height, and the unit shall include an elevation-capable and rotation-supporting base structure for ergonomic positioning.

	Environmental thresholds shall support operating ambient temperature range between 0°C to +40°C and storage temperature tolerance of -10°C to +60°C. Relative operating humidity shall be maintained between 20% to 85%, and storage humidity between 10% to 90%, both non-condensing. Bundled accessory kit shall include a minimum of one active stylus, one certified external adapter matching the required power profile, two gooseneck microphones with fixed base connectors, one HDMI cable not less than 5 meters in length, one Type-C cable minimum 1.8 meters in length, and official product documentation including qualified certificate, operational manual, and warranty entitlement card. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
11	**Supply, Installation, Testing, and Commissioning (SITC) of** integrated interactive terminal assembly to be proposed shall be comprised of a high-definition visual display system, conforming to a minimum native diagonal dimension not less than 15.6 inches and engineered to deliver a screen resolution threshold not lower than Full High Definition (1920 × 1080 pixels) or equivalent display fidelity. The aspect ratio of the visual rendering component shall conform to a minimum standard of 16:09, providing a landscape layout optimized for collaborative or presentation environments. The touch interface shall incorporate a high-sensitivity projected capacitive recognition layer supporting a minimum of ten-point concurrent input capabilities, with a tactile actuation force not exceeding ≤2 ounces and a signal recognition latency not surpassing ≤3 milliseconds under normative conditions. Display adjustment shall be achieved via an automated tilt mechanism, calibrated to permit angular displacement of the viewing plane not exceeding ≤15 degrees or as otherwise improved by internal mechanical optimization. The illumination architecture shall utilize a WLED-based backlighting arrangement rated for a minimum service life of 15,000 operational hours. Contrast ratio performance shall be sustained at no less than 600:1, and luminance intensity of the active matrix screen shall achieve a threshold of 300 cd/m^2 or higher. Viewing angles under standard test condition (CR>10) must meet or exceed a composite horizontal and vertical axis performance of 45/45/20/40 (typical), ensuring consistent visibility in variable seated environments. Mechanical actuation of the screen lift assembly shall incorporate a linear motion guide system driven via dual chain transmission, actuated by a precision-grade AC geared electric motor. The housing architecture must be milled from a

	monolithic aluminum block using CNC processing and finished with anodized, brushed metallic surfacing. Functional surface controls should include discrete toggles or contact switches for screen tilt actuation (Up), stabilization (Stop), vertical retraction (Down), source signal routing (Input Select), USB pass-through interface, and global power state toggling. system responsiveness shall be enabled via a tri-modal control strategy encompassing manual actuation, RF remote command within a functional radius of 30 meters, and serial interface integration supporting both RS232 and RS485 communication protocols via RJ45 dual connectors. The module shall accept video input from a minimum of one HDMI and one VGA port, while touch signal input shall be facilitated through USB-B interface(s) not less than one in quantity. Auxiliary switching and connectivity shall be supported via USB-A interface, which must also serve as a functional power toggle port. Environmental operational range shall encompass temperatures from –10°C to +45°C, under a relative ambient humidity not exceeding ≤80% at a nominal 20±5°C. Mechanical actuation subsystems shall be driven by motors with rated capacities of 18W (lifting mechanism) and 14W (angle adjustment), operating at no less than 5 revolutions per minute. Total system power consumption must remain within a ceiling value of 60W under typical operation and 96W under peak transient loads. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
12	**Supply, Installation, Testing, and Commissioning (SITC) of** unified multi-function visual collaboration interface shall be configured to operate across a minimum resolution of UHD 4K, enabling the rendering of sharp pixel-defined clarity during multi-modal screen sharing applications. System architecture should incorporate a minimum quad-core processing element of the ARM Cortex A55 classification, in tandem with memory allocation not below 8G DDR paired with persistent storage no less than 32G Flash-type medium, allowing multi-thread execution of concurrent functions such as hybrid screen mirroring, touch feedback, and BYOM-centric connectivity protocols. Minimum dual HDMI output interfaces shall be provisioned, of which at least one shall be capable of transmitting 3840×2160 at a frequency not less than 60Hz, while the alternate must offer 1080p at the same frequency. HDMI input port shall also be present to facilitate external AV input with corresponding USB HID return paths for full touch-enabled interactivity, which shall function via standard USB Touch or equivalent Type-A and Type-C transmission ports. The power consumption of the system must not exceed a maximum threshold of 36W and shall be powered using a DC input of 12V with a current draw not exceeding 3A. Wireless architecture shall ensure compliance with minimum dual-band 5.8GHz transmission standards, simultaneously supporting Soft AP and Wi-Fi operation, enabling wireless bridging through at least DLNA, Miracast, AirPlay, and Chromecast communication layers. The transmission range shall not be under 50 meters line-of-sight, supporting minimum 128 simultaneous connections. Decoding architecture shall support a wide range of codecs inclusive of, but not limited to, H.264, H.265, MPEG4, VP8, AVS, WMV, and H.263, with native 4K decode ability for all transmission modes.

	Touchback interaction shall be accomplished via IR and capacitive interfaces through USB HID mode, with mouse cursor control and remote annotation integrated natively within the firmware stack. The platform shall provide full bi-directional BYOM functionality for unified conferencing platforms such as Zoom, Teams, and GoToMeeting, allowing virtual microphone and camera extension from the connected host PC to USB-connected peripherals via the system's wireless transmission layer. System shall provide USB wired screen transmission capability for both Android and iOS, and USB Ring Out wherein external USB devices connected to the system may be read by the user's PC via back-channel communication. Management interfaces shall incorporate centralized control over LAN (via RJ45) and remote management options through built-in GUI accessible via browser over web backend. Serial RS232 control interface must be provided for third-party automation platforms, supporting API-based customization. The system shall support dynamic photo rotation across 90°, 180°, and 270° display orientations and must enable dual-screen independent or mirrored rendering from a single host source. Maximum screen-sharing concurrency shall not be less than nine individual inputs, with both mirror and extended screen modalities supported, along with mixed-cast capabilities. Security management must include PIN-based access gating and dynamic password refresh capabilities to prevent unauthorized screen capture. Device shall auto-execute restart routines based on programmable scheduling to ensure operational integrity and must support screen projection through web URL interaction for environments where driverless operation is preferred. Additional functionalities like welcome messaging, file management with classification features, and intelligent screen lock on projection inactivity should be integrated by default.
	Peripheral compatibility shall encompass support for standard and extended USB, HDMI, and Type-C interfaces, offering user interaction through plug-and-play peripherals. Fitting provisions shall include power adapters, screen transmitters (USB, HDMI, or Type-C-based), and remote-control units facilitating AV playback control. Environmental compliance shall be ensured with an operating envelope between 0°C and 40°C with relative humidity between 10% and 90% non-condensing. The system shall include a web-based interface to manage screen output profiles and network configurations, allowing seamless batch coordination and broadcasting control of visual and audio content across connected endpoints. All parameters defined herein are to be treated as Minimum mandatory requirements or better, and must be strictly adhered to. OEM compliance certification and technical documentation must be provided on OEM letterhead with bid submission, inclusive of complete support for stated functionalities and transmission capabilities. Deviation from the aforementioned specifications shall render the offer technically non-compliant.

13	**Supply, Installation, Testing, and Commissioning (SITC) of** supplied interactive visual collaboration unit shall be of large-format construction with a minimum diagonal dimension not less than 110 inches, featuring a zero-bonded panel architecture ensuring minimized parallax deviation and enhanced visual performance with uniform image depth perception across the full viewing envelope. The display matrix shall deliver a native resolution of 3840 horizontal by 2160 vertical pixels, conforming to the UHD 4K standard in a 16:9 aspect ratio, with a visual luminance parameter not below 450 nits or better, contrast ratio shall be a minimum of 1200:1, and the display response time shall be no greater than 8 milliseconds or better. Color depth shall be a minimum 10-bit architecture capable of rendering 1.07 billion color values with full coverage of the viewing area across a horizontal and vertical angle of no less than 178 degrees. The module shall incorporate optical bonding technology coupled with 4mm anti-glare hardened tempered surface glass supporting IR-based interactive operations. Interactive interface shall support a minimum of 20 simultaneous touch points, with accuracy thresholds not exceeding ±1.0mm over 90% of the touchable display field and a latency response not exceeding 10ms, operable through capacitive or non-conductive opaque input tools. Touch input system must allow differentiated dual-pen interaction with simultaneous variable-color rendering, suitable for collaborative scenarios. Hover-enabled contextual control features must be embedded via dynamic GUI elements allowing gesture-based access to customizable tool sets including whiteboard partitioning, annotation overlays, screen locks, and eye-care mechanisms. Screen mirroring capabilities must support multi-device input across wireless protocols, and dual-band Wi-Fi connectivity at 2.4GHz and 5GHz shall be integrated with minimum Bluetooth 5.0 standard.
	Embedded internal player architecture shall be based on an Android operating system, not lower than version 14.0, running on a multi-core processor of Octa-core Cortex-A55 with integrated quad-core graphics engine equivalent to Mali-G52 or better, clocked at not less than 600MHz. System memory allocation must be no less than 8GB RAM and 128GB internal storage flash memory. Power management shall include supply voltage compatibility from AC 100–240V at 50/60Hz, maximum power consumption not exceeding 850W, and standby power draw shall remain under 0.5W. The display module shall support both Android and OPS computing environments over a unified Gigabit Ethernet backbone with shared network architecture, including centralized access to online services and LAN resources. OPS PC module shall be detachable and compatible with a CPU configuration of Intel® Core i5 or i7 (8th, 10th, or 12th generation) of octa-core class, minimum memory allocation of 8GB DDR4 (expandable to 16GB), and internal solid-state storage capacity not less than 256GB (expandable to 512GB SSD or 1TB HDD). The OPS unit shall include a minimum of 6 USB 3.0 Type-A ports, 1 USB Type-C, HDMI output supporting 4K at 30Hz, DisplayPort output, dual-band Wi-Fi antenna connectors, RJ45 Ethernet, and dedicated 3.5mm line-in and mic-in audio interfaces. Rear and front I/O configurations must include, but not be limited to, HDMI-IN x2, VGA with audio, USB-B x1, USB-A (USB2.0 and USB3.0 variants) x4 minimum, RS232 serial control, TF Card Slot, COAX audio, Line OUT, and RJ45 LAN interface. Integrated audio delivery shall be facilitated via stereo loudspeakers with cumulative output not less than 30W (2x15W) embedded within the unit chassis. System shall support seamless plug-and-play operation across Windows, MacOS, Linux, and Android environments.

	The complete solution must offer on-screen utilities such as dynamic password protection, mirroring permission control, multi-window operation, and wireless USB streaming support. Built-in features for screen rotation (90°, 180°, 270°), device grouping, classroom-mode welcome screens, and application sandboxing must be incorporated for enterprise and educational deployments. Panel life expectancy shall not be less than 50,000 operational hours under normal usage. The system must support remote administration via LAN or Web GUI with centralized configuration and batch device management capabilities. The solution shall be fully mountable using standard VESA configurations or equivalent. All parameters defined herein are to be treated as Minimum mandatory requirements or better, and must be strictly adhered to. OEM compliance certification and technical documentation must be provided on OEM letterhead with bid submission, inclusive of complete support for stated functionalities and transmission capabilities. Deviation from the aforementioned specifications shall render the offer technically non-compliant.
14	**Supply, Installation, Testing, and Commissioning (SITC) of** display solution to be proposed shall comprise a minimum 65-inch diagonal active matrix panel, constructed on In-Plane Switching (IPS) technology and employing a Slim Direct LED (DLED) backlighting mechanism, intended for professional-grade applications in both landscape and portrait orientation, operating continuously under 24x7 environmental conditions. The display shall offer a minimum luminance of 500 candela per square meter or better under standard operating conditions, and shall achieve a typical static contrast ratio not below 1200:1, with a dynamic range performance reaching a minimum of 50000:1 or equivalent, ensuring high-fidelity content reproduction across varying ambient lighting levels. The physical screen shall support Ultra High Definition (UHD) native resolution of 3840 (horizontal) x 2160 (vertical) pixels, presented in a 16:9 aspect ratio with a minimum color reproduction capability of 1.07 billion tones via an 8-bit + FRC processing engine, achieving a minimum 72% coverage of the NTSC color gamut or superior. The display's optical interface shall maintain consistent chromaticity and brightness uniformity across a wide field of view, maintaining minimum 178-degree horizontal and vertical viewing angles with luminance contrast ratio (CR) above 10 at all specified angles (89°U/89°D/89°L/89°R). The display active area shall not be less than 1428.5 mm in horizontal by 803.5 mm in vertical dimensions, and be protected via a high transmission surface structure with a haze level not exceeding 25% to balance ambient reflection control and visual clarity. The operational frame refresh rate shall be no less than 60 Hz and the pixel response time shall not exceed 8 milliseconds under typical load. Panel life expectancy shall be minimum 50000 hours, ensuring long-term deployment viability in commercial-grade indoor usage.
	The integrated system shall be powered by a SoC architecture comprising a minimum Quad-Core ARM Cortex-A55 processor paired with an ARM Mali-G31 MP2 graphical processing unit or equivalent. Memory configuration shall include minimum 2GB DDR4 RAM and 16GB eMMC embedded storage, expandable up to 1TB via microSD interface. The operating platform shall be based on a customized implementation of Android Open Source Project (AOSP), augmented with support for HTML5 content rendering via the Vewd browser framework. Connectivity modules shall include integrated dual-band wireless networking adhering to IEEE 802.11 a/b/g/n/ac protocols (WiFi 5) and Bluetooth 5.1 standards, both supporting IEEE 802.1X authentication, alongside 10/100 Mbps wired Ethernet interface. Display input/output configuration shall include a minimum of 4 HDMI 2.0 video input ports, one HDMI 2.0 video output port, a USB Type-A 3.0 port, and a USB Type-A 2.0 port for auxiliary media or HID input. Audio interfaces shall include 3.5mm headphone output and optical digital SPDIF output. The system shall provide RS232 control via 3.5mm green stereo jack, RJ45 Ethernet port for LAN-based management, and RJ12 port for service-level access and external sensor interconnect. The display shall natively support Miracast-based wireless screen sharing and shall be provisioned for web-based CMS solutions including HTML5 and Android-based content launchers, with failover mechanisms such as Auto-Launch, HDMI-Wakeup, Auto-switch on input signal failure, and No Signal Power Off capabilities for intelligent signal management.

	Additional functionalities shall encompass OSD and UI rotation, videowall tiling, pixel shift for burn-in mitigation, integrated real-time clock for content scheduling, remote management over IP, and SNMP protocol compatibility for enterprise system administration. Mechanical components shall include joystick and rocker-style input interface, detachable power cable assembly, logo detachment provision, and compliance to IP20 ingress protection rating. The built-in audio system shall comprise stereo loudspeaker units with a minimum power output of 2x10W RMS. The entire unit shall be suitable for fixed indoor commercial installations requiring high uptime, broad format flexibility, and integrated smart control features. All parameters defined herein are to be treated as Minimum mandatory requirements or better, and must be strictly adhered to. OEM compliance certification and technical documentation must be provided on OEM letterhead with bid submission, inclusive of complete support for stated functionalities and transmission capabilities. Deviation from the aforementioned specifications shall render the offer technically non-compliant.
15	**Supply, Installation, Testing, and Commissioning (SITC) of** intelligent digital interface switcher solution shall provide comprehensive routing capabilities for a minimum of four independent ultra-high-definition multimedia video sources to a single display output node, incorporating integrated keyboard-video-mouse (KVM) control architecture, wherein simultaneous switching of video and USB HID signals shall be facilitated through embedded signal path synchronization protocols. The switching engine shall support video resolutions extending to a minimum of 4Kx2K at 60Hz in full chroma sampling (4:4:4), with compliance to advanced dynamic range protocols including, but not limited to, HDR10 and Dolby Vision, in strict adherence to HDMI version 2.0 or better and HDCP 2.2 protocols. The video input array shall consist of not less than four female Type-A HDMI connectors, each capable of receiving high-bandwidth signal streams with a minimum aggregate capacity of 18Gbps. A solitary output stream shall be routed via a female Type-A HDMI connector, maintaining identical compliance to full-resolution formats and protocols as the source inputs. The system shall incorporate an analog audio breakout function, allowing for stereo de-embedding through a 3.5mm TRS jack, supporting PCM 2-channel format with a minimum frequency response of 20Hz to 20kHz, sustaining amplitude linearity within ±1dB. The analog audio signal path shall demonstrate a maximum output level of 2.0Vrms ±0.5dB, with total harmonic distortion and noise (THD+N) not exceeding 0.05% across the full bandwidth under maximum level conditions.
	The signal-to-noise ratio shall be maintained above 80dB across the standard audio bandwidth, and crosstalk isolation shall exceed 80dB attenuation at 10kHz input under full-scale signal conditions. Output drive capability shall support resistive loads not less than 1kΩ, and the device shall provide L-R channel level deviation not exceeding 0.05dB. The cumulative system noise floor shall not rise above -80dB under unloaded conditions. Device control functionalities shall be enabled via a combination of micro-USB, USB Type-B (x4), USB Type-A (x3), and RS232 interfaces provided via 3-pin terminal block connectors, enabling integration with external host devices, serial command control systems, and KVM HID peripherals. KVM functionality shall support automatic switching behavior based on TMDS activity or 5V hot-plug detection, and manual override shall be available via physical push-button controls and RS232 command protocol, further extendable via compatible grommet-based desktop interface modules. The device chassis shall include integrated USB peripheral routing allowing simultaneous control of up to four source computers via a unified mouse and keyboard interface. USB 3.0 peripheral sharing must be natively supported to facilitate high-speed data exchange across all connected endpoints. The architecture must remain platform agnostic, ensuring full compatibility across operating environments including Windows, Linux, and Mac OS systems.

	Operational temperature thresholds shall extend between -10°C to +55°C, with storage resilience between -25°C and +70°C. Relative humidity tolerance must not fall below 90% non-condensing during active or passive states. System power shall be derived from an AC input of 100V–240V, delivering a DC output of 12V at 2A. Dedicated USB power output shall maintain 1A current capacity on the Type-A USB power interface. The integrated switching assembly shall embody advanced EDID management capabilities, including embedded profile selections and signal conditioning circuitry via equalization to preserve signal integrity over extended cabling distances. Support for CEC pass-through and firmware upgradeability via micro-USB interface shall be inherent to the system design. The overall implementation shall facilitate reduction in cabling complexity and streamline workstation integration for multimedia command-and-control environments. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
16	**Supply, Installation, Testing and commissioning (SITC)** Video Switcher shall be a high-performance, multi-format matrix switching platform incorporating advanced signal distribution architecture based on HDBaseT transmission standards. It shall integrate a minimum of eight (08) independent HDMI input interfaces conforming to TMDS signalling levels in the range of 2.9V to 3.3V, with a differential input impedance of not less than 100 ohms. The matrix shall support video formats up to a minimum of 4K × 2K resolution at 60Hz refresh rate under 4:2:0 chroma subsampling, with full backward interoperability to legacy HDCP and HDMI formats including HDCP 2.2 and HDCP 1.4 compliance across all channels. Outputs shall include one (01) direct HDMI interface and a minimum of seven (07) HDBaseT channels for long-distance signal extension, each capable of delivering uncompressed video and embedded audio content over single Category 5e or higher UTP cable infrastructure. The maximum transmission distance via HDBaseT shall be no less than 70 meters for 1080p60 and 40 meters for 4K60 4:2:0, whereas the HDMI direct output shall support cable lengths up to 8 meters under the same resolution constraints. The switching latency shall not exceed 200 nanoseconds under full-load operation, and a minimum aggregate video bandwidth of 10.2 Gbps shall be maintained across all channels. The switcher must provide comprehensive EDID management capabilities with factory-loaded presets and manual override functions. The integrated audio processing system shall support both analog and digital outputs, with minimum compatibility for LPCM, Dolby Digital, DTS, and DTS-HD formats. The analog output shall be facilitated via dual-channel RCA stereo connectors and digital via SPDIF optical interface, spanning a minimum frequency response from 20 Hz to 20 kHz.
	Control interfaces shall include TCP/IP-based GUI accessible via RJ45 female Ethernet port, RS232 serial communication via pluggable 3-pin terminal, and bi-directional IR routing through dedicated inputs and outputs, including one IR-EYE and IR-ALL-OUT for global control scenarios. The matrix shall be manageable from front-panel tactile switches, serial commands, remote IR, and browser-based TCP/IP GUI. Firmware upgradability shall be enabled via a dedicated Micro-USB interface. The matrix must utilize PoC (Power over Cable) architecture to energize all HDBaseT receivers directly from the chassis, eliminating the need for external receiver power. LED indicators must be provided to visualize real-time signal switching status across input and output ports. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.

17	**Supply, Installation, Testing and commissioning (SITC)** receiver unit to be deployed the HDBaseT signal transmission infrastructure shall be engineered to decode and reconstruct digital video/audio signals with fidelity conforming to the HDMI 1.4 and HDCP 1.4 standards or better. The unit shall incorporate a single input interface based on HDBaseT protocol, utilizing a female RJ45 connector integrated with status indication via LED indicators, and shall be capable of receiving high-bandwidth audio visual signals over standard twisted-pair cabling. The HDMI output interface shall be singular and must be a female HDMI connector supporting resolutions up to a minimum of 4K×2K at 60Hz frame refresh, while maintaining backward compatibility for lower formats including but not limited to 1080p at 60Hz.The system shall ensure minimum transmission fidelity equivalent to 10.2Gbps signal bandwidth without frame loss or degradation. The signal integrity must be preserved over a maximum linear distance not less than 70 meters for 1080p60 and 40 meters for 4K60 resolution over Cat5e/Cat6 twisted-pair cabling infrastructure. The unit must support control functionality through infrared signal pathways, incorporating one IR input and one IR output port via 3.5mm mini-jack connectors, enabling bi-directional IR transmission between source and display.
	Power supply to the receiver shall be provisioned through integrated Power originate from the central 4K matrix switching apparatus. No external power adapters shall be required, and power draw must be inherently managed by the transmission backbone for minimal heat dissipation and streamlined installation. The operational envelope of the device shall span ambient temperature ranges from 0°C to +50°C, with relative humidity tolerance between 10% and 90%, non-condensing. The receiver unit must function without active cooling and be optimized for passive thermal dispersion in typical concealed or rack-integrated installations. This equipment shall conform to commercial-grade AV transmission standards and shall be deployable in professional AV matrix distribution systems requiring ultra-high-definition signal integrity and long-distance routing over structured cabling infrastructure. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
18	**Supply, Installation, Testing and commissioning (SITC) of** HDMI Distribution Amplifier unit proposed for signal distribution in AV applications shall incorporate a single high-speed digital video input interface based on HDMI Type-A female connector configuration, compliant to a minimum HDMI Version 2.0 standard, and shall be capable of receiving video signal resolutions up to a minimum of 4K at 60Hz with 4:4:4 chroma subsampling and 8-bit color depth or better. The input channel must support HDCP authentication protocol, conforming to version 2.3 and downward compatible with legacy HDCP 1.4, ensuring integration with a wide spectrum of source devices requiring content protection. The device shall replicate and transmit the incoming signal simultaneously across a minimum of four HDMI output interfaces, each conforming to HDMI Type-A female connector specification, and supporting resolutions identical to the input, i.e., up to 4K@60Hz 4:4:4 or better. Each output must also conform to HDMI V2.0 or higher with support for HDCP in both Active and Passive pass-through modes. The equipment shall provide embedded 5V output power at each HDMI interface not less than 200mA, suitable for use with compatible HDMI AOC (Active Optical Cable) transmission solutions. The splitter must support advanced signal compatibility features such as automatic resolution down-scaling where a 4K input signal may be dynamically converted to 1080p on any output channel connected to a non-4K display, preserving visual integrity across heterogeneous display ecosystems. Signal integrity shall be maintained through the inclusion of internal equalization and amplification circuitry, eliminating the effects of cable attenuation and ensuring stable transmission within a minimum bandwidth capacity of 18Gbps.

	The system should integrate EDID control via a 4-position DIP switch, providing selectable EDID management from multiple preloaded profiles, enhancing negotiation between source and display. CEC (Consumer Electronics Control) protocol must be transparently passed through between source and sink devices. A micro-USB interface shall be provided for firmware upgrade operations, enabling lifecycle extension and feature enhancement. Cable length support shall be no less than 5 meters for 4K@60Hz 4:4:4, 15 meters for 4K@60Hz 4:2:0, and 20 meters for 1080p signals when used with certified HDMI cabling. Environmental operational tolerances shall range from a minimum of -5°C to +55°C, with storage capabilities between -25°C and +70°C, and the relative humidity operation threshold shall range from 10% to 90% non-condensing. Visual LED indicators shall be embedded within the chassis to signal operational state and port activity in real time. The complete assembly must be engineered for high reliability, signal fidelity, and robust integration into commercial-grade AV matrix or point-to-multipoint signal distribution infrastructure. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
19	**Supply, Installation, Testing, and Commissioning (SITC) of** network switching apparatus to be proposed shall conform to a 1U form factor suitable for standard rackmount installations and shall incorporate a configuration comprising a minimum of twenty-four copper interfaces operating at 1GBASE-T standard, each supporting PoE++ delivery, augmented by two additional copper ports of the same bandwidth specification. Optical uplink capacity shall be facilitated by a provision of no fewer than four SFP-based 1G fiber interfaces. A dedicated out-of-band 1G port shall be available for isolated management operations, with physical console access options provided via both RJ45 (RS232 standard) and USB Type-C, while additional USB-A and USB-C interfaces shall be embedded for auxiliary functions such as storage or LED control. The internal processing engine shall integrate a quad-core ARMv8 CPU architecture operating at no less than 1.8 GHz, accompanied by 2GB system RAM and flash storage not less than 256MB. Packet buffer allocation shall be a minimum of 16MB. Switching performance shall meet or exceed 60 Gbps of line-rate throughput, with minimum forwarding rates of 44.64 Mpps. Frame latency shall not exceed 1.141 microseconds on optical and 2.139 microseconds on copper at 64-byte frame size. The address database must accommodate a minimum of 16,000 MAC entries with support for up to 4093 VLANs concurrently.
	Layer-3 and multicast routing support shall include static, RIP, PIM-SM/DM/SSM, and IGMPv3/MLDv2 snooping and proxy with 2K multicast groups per IPv4 and IPv6 protocol. DHCP Server support shall allow minimum 256 IPv4 and 16 IPv6 pools. The system shall provide preconfigured profiles for AV over IP protocols including Dante, Q-SYS, and AES67, and shall offer zero-touch auto-configuration for such use cases. IEEE 802.1BA AVB shall be supported with trunking, LAGs, PTPv2, and multiple QoS and ACL enforcement strategies. Security and protocol compliance shall extend to 802.1X, MAB, Captive Portal, storm control, DAI, TACACS+, RADIUS, DoS protection, MAC locking, and IP Source Guard. Power budget shall support up to 1734W under maximum load and comply with applicable safety certifications including CE, FCC Class A, UL, and IEC standards. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.

20	**Supply, Installation, Testing, and Commissioning (SITC) of** wireless local area network (WLAN) access device to be deployed shall be designed as a dual-radio transmission unit compliant with IEEE 802.11ax (WiFi 6) standards, supporting operation across both the 2.4 GHz and 5 GHz ISM bands. The access device shall incorporate a dual-stream (2x2) radio configuration on each frequency band, with minimum support for 20 MHz and 40 MHz channel widths on the 2.4 GHz band and a minimum of 20/40/80/160 MHz channel width flexibility on the 5 GHz band, ensuring high spectral efficiency under varying deployment densities. Theoretical maximum data throughput shall not be less than 0.6 Gbps on the 2.4 GHz interface and shall achieve not less than 2.4 Gbps on the 5 GHz interface, offering total aggregate throughput suitable for high-density user environments. Antenna gain performance shall be no less than 2.94 dBi for the 2.4 GHz band and shall be a minimum of 2.84 dBi for the 5 GHz band. The system shall support maximum wireless transmission output levels of not less than 29.35 dBm for the 5 GHz band and not less than 20.03 dBm for the 2.4 GHz band, subject to regulatory domain constraints. The unit shall accommodate a minimum of 256 addressable client devices, with capability to manage no fewer than 60 concurrent user connections without performance degradation, rendering the solution ideal for small-to-medium business (SMB) deployments.
	The network interface shall consist of a high-speed 2.5 Gigabit Ethernet (2.5GbE) port to ensure uplink bandwidth sufficiency. Power provisioning shall be supported through Power over Ethernet (PoE) compliant with IEEE standards, eliminating the need for local AC adapters. The device shall offer centralized or standalone control with management interfaces via integrated cloud-based architecture, accessible through proprietary Insight platform or in an autonomous configuration without cloud dependency. Remote diagnostics, monitoring, and third-party network management integration shall be natively supported, including interoperability with external systems such as Domotz or similar. The device must be capable of long-term deployment within enterprise indoor environments, maintaining consistent performance under standard business operational conditions. All plywood surfaces shall be finished to create a water-level perfect mounting area for the video wall. Any areas of the framework outside of the video wall display zone must be fully masked with black material to provide a seamless and professional aesthetic. The contractor shall ensure that all fabrication, installation, and finishing work adheres to the highest industry standards and meets all safety, functional, and aesthetic requirements.
21	**Supply, Installation, Testing and commissioning (SITC) of** Fiber optic HDMI cable, boasting a length of 20 meters and equipped with connectors, shall be capable of maintaining a 90-degree cable angle, thereby ensuring a precise and nuanced signal transmission. This high-speed HDMI to HDMI cable, with a bandwidth of 18Gbps, shall support subsampling rates of 4:4:4/4:2:2/4:2:0, thereby facilitating the transmission of high-definition video signals, including HDTV, 3D, and 2160p/1080p resolutions. Furthermore, this cable shall be compatible with HDCP2.2, Ethernet, ARC, HDR, Ultra HD, and UHD 4K, thereby ensuring a high degree of versatility and compatibility. The cable shall support high-speed data transfer rates of 18Gbps, with capabilities for HDR, CEC, EDID, and HDCP2.2, thereby guaranteeing a precise and reliable signal transmission. Additionally, the cable shall support uncompressed audio and video sync, with a maximum resolution of 4K@60Hz, and a maximum audio sampling rate of 1536KHz OEM authorization alongside the technical bid, certifying that the equipment meets all necessary specifications and standards. ensuring that only high-quality, reliable components are used. This adherence to specified makes and standards will ensure that the system functions at peak efficiency and reliability, meeting the demanding needs of professional environments. All technical parameters as stated herein must be strictly adhered to, and no deviations shall be accepted. The device shall conform to the highest standards and be delivered in compliance with the aforementioned specifications. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.

22	**Supply, Installation, Testing and commissioning (SITC) of** Fiber optic HDMI cable, boasting a length of 10 meters and equipped with connectors, shall be capable of maintaining a 90-degree cable angle, thereby ensuring a precise and nuanced signal transmission. This high-speed HDMI to HDMI cable, with a bandwidth of 18Gbps, shall support subsampling rates of 4:4:4/4:2:2/4:2:0, thereby facilitating the transmission of high-definition video signals, including HDTV, 3D, and 2160p/1080p resolutions. Furthermore, this cable shall be compatible with HDCP2.2, Ethernet, ARC, HDR, Ultra HD, and UHD 4K, thereby ensuring a high degree of versatility and compatibility. The cable shall support high-speed data transfer rates of 18Gbps, with capabilities for HDR, CEC, EDID, and HDCP2.2, thereby guaranteeing a precise and reliable signal transmission. Additionally, the cable shall support uncompressed audio and video sync, with a maximum resolution of 4K@60Hz, and a maximum audio sampling rate of 1536KHz OEM authorization alongside the technical bid, certifying that the equipment meets all necessary specifications and standards. ensuring that only high-quality, reliable components are used. This adherence to specified makes and standards will ensure that the system functions at peak efficiency and reliability, meeting the demanding needs of professional environments. All technical parameters as stated herein must be strictly adhered to, and no deviations shall be accepted. The device shall conform to the highest standards and be delivered in compliance with the aforementioned specifications. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
23	**Supply, Installation, Testing and commissioning (SITC) of** Fiber optic HDMI cable, boasting a length of 5meters and equipped with connectors, shall be capable of maintaining a 90-degree cable angle, thereby ensuring a precise and nuanced signal transmission. This high-speed HDMI to HDMI cable, with a bandwidth of 18Gbps, shall support subsampling rates of 4:4:4/4:2:2/4:2:0, thereby facilitating the transmission of high-definition video signals, including HDTV, 3D, and 2160p/1080p resolutions. Furthermore, this cable shall be compatible with HDCP2.2, Ethernet, ARC, HDR, Ultra HD, and UHD 4K, thereby ensuring a high degree of versatility and compatibility. The cable shall support high-speed data transfer rates of 18Gbps, with capabilities for HDR, CEC, EDID, and HDCP2.2, thereby guaranteeing a precise and reliable signal transmission. Additionally, the cable shall support uncompressed audio and video sync, with a maximum resolution of 4K@60Hz, and a maximum audio sampling rate of 1536KHz OEM authorization alongside the technical bid, certifying that the equipment meets all necessary specifications and standards. ensuring that only high-quality, reliable components are used. This adherence to specified makes and standards will ensure that the system functions at peak efficiency and reliability, meeting the demanding needs of professional environments. All technical parameters as stated herein must be strictly adhered to, and no deviations shall be accepted. The device shall conform to the highest standards and be delivered in compliance with the aforementioned specifications. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.

24	**Supply, Installation, Testing and commissioning (SITC) o**f high-performance twisted-pair cabling medium conforming minimally to the structured format of Category 6A transmission class, constituted of four (4) twisted conductor pairs individually encompassed within foil screening elements, encapsulated overall within a sheath conforming to LS0H (Low Smoke Zero Halogen) or PVC typology, incorporating an internal drain wire mechanism composed of tinned copper, with a stipulated conductor base of 23 AWG solid copper, enabling symmetrical impedance and maintaining longitudinal uniformity across extended distances as mandated for full-duplex data transmission systems operating at throughput not less than 10 Gigabit Ethernet protocols (10GBASE-T), tested and proven operational up to and including frequencies of 500 MHz or better across full 4-connector structured channel topologies. The insulation profile shall be established using a dielectric compound of Polyolefin or Polyethylene with physical consistency ensuring dimensional stability and minimization of dielectric discontinuities, while the individual pair shielding, constituted of laminated aluminium foil, shall encompass each twisted pair independently to mitigate mutual and external interference, thereby satisfying advanced electromagnetic immunity benchmarks and superior Alien Crosstalk (AXT) suppression requirements for high-density installations. Propagation characteristics of the deployed medium shall exhibit electrical capacitance nominally capped at 40 pF/m at 1 KHz, DC loop resistance restricted to ≤72 ohm/km under ambient operational parameters, mean impedance constrained within 100 ohm ±6 across 1 MHz to 500 MHz frequency domain, delay skew not exceeding 45 nanoseconds per 100-meter length segment within operating spectrum of 1–500 MHz, and propagation delay capped under a composite envelope of 514 + 36√f nanoseconds per 100 meters, where f denotes frequency in MHz, as certified by applicable testing methodologies.
	The cable's sheath shall be composed of a compound compliant with IEC 60332-1 flame propagation parameters and thermally stable under installation temperature range of 0°C to +50°C and operational ambient window of -20°C to +60°C, embedded with an outer diameter not less than 7.2mm. Nominal Velocity of Propagation (NVP) shall not fall below 75% and shall preferably reside within the range of 75-77% or better. Coupling Attenuation shall not be inferior to 45dB within 30 to 100 MHz and shall follow the expression 40 – 20log(f/100) within the extended frequency band of 100 to 500 MHz, conforming to signal integrity thresholds under electromagnetic coupling evaluation. The structural format shall adopt a cross-filler (+) based isolation layout or comparable isolating architecture between twisted pairs to ensure compliance with transmission uniformity. Each cable length shall be subjected to and verified through 4-connector end-to-end channel compliance testing conducted by accredited third-party laboratories (ETL Intertek or UL) with mandatory submission of channel compliance certification and complete test report as integral to the technical proposal shall be RoHS Directive compliant and material construction must not include any restricted substances beyond permissible limits. Full ETL or UL verification to ANSI/TIA/EIA-568-C.2 Category 6A standard shall be evidenced through accompanying certification documentation within the offer documentation submitted. Cabling must be conformant to the industry standards specified and shall under no circumstances deviate from minimum required test limits, shield structure, conductor type, insulation compound, or performance frequency thresholds. Only cable constructions tested and verified under real-world multi-connector environments shall be considered acceptable.

25	**Supply, Installation, Testing and commissioning (SITC)** of Signal Cable Supply, Installation, Testing, and Commissioning (SITC) of shall be of Minimum 2 Core Shielded Signal transmission configuration or better, incorporating a Minimum outer PVC jacket or better with a diameter of no less than Minimum ø 8.80 mm or better, finished in marine blue or equivalent shade. Shielding integrity shall be ensured through a Minimum dual-layered shield construct or better, where Shield No. 1 and Shield No. 2 shall each consist of bare copper wires of Minimum 0.10 mm diameter or better, maintaining a Minimum 100% coverage or better across the entire length of the cable. The internal layer shall consist of a Minimum thermally bonded polyester nonwoven tape or better, double-sided with aluminum coating, functioning both as a conductor shield layer and as a separation layer. The space between conductors shall be filled with a Minimum viscose-based filler material or better, to ensure roundness and dielectric uniformity across operational frequencies. Each conductor shall be individually shielded with a Minimum polyester nonwoven aluminum-coated shield layer or better, and the conductor group shall include a dedicated conductor copper shield with bare copper wires of Minimum 0.10 mm diameter or better, maintaining a Minimum 100% shielding coverage or better for maximum signal integrity and RFI/EMI suppression. The insulation of the signal conductors shall be of Minimum cellular polyethylene (PE) or better, having a Minimum outer diameter of ø 2.00 mm or better and color-coded in Minimum 4 different colours or better to facilitate signal identification. Each conductor shall be constructed of stranded bare low-capacitance oxygen-free copper (LCOF) wires with a Minimum strand count of 64 x 0.10 mm or better, achieving a Minimum cross-sectional area of 0.50 mm^2 or better. All parameters as defined above shall be regarded as Minimum performance requirements or better and must be fully adhered to without exception. All described parameters shall be interpreted as minimum thresholds or better, and no deviation, substitution, or partial compliance shall be accepted. Bidders shall furnish complete OEM compliance certification, datasheet with technical references, and explicit authorization for the offered equipment model at the time of technical bid submission. Failure to comply in totality with the above technical and procedural requirements shall result in summary rejection of the bid.
26	**Providing, laying, connecting, testing and commissioning of** 20 Mtr length minimum required high-speed USB extender interface solution, consisting of one end terminated with minimum Type-A Male and the other with minimum Type-A Female connector, designed for dedicated support of USB 3.0 compliant devices exclusively (excluding backward compatibility with USB 2.0/1.1), ensuring minimum sustained data transfer throughput of 5Gbps or better, which shall facilitate high-bandwidth peripheral interfacing over extended physical lengths without degradation in data integrity. Said extender must incorporate minimum active optical transmission medium to achieve minimum operational reach of up to 100 meters or better, providing complete immunity from electromagnetic interference, crosstalk and ground loops via embedded fiber-optic architecture. The construction shall offer plug-and-play functionality requiring no proprietary drivers, software stack, or firmware flashing, and must operate without the requirement of external power sources, strictly for integration with self-powered USB 3.0-compliant devices only. Device shall be compatible with and must natively support major operating systems including but not limited to minimum Windows, MacOS, and Linux-based environments ensuring cross-platform interoperability. All structural and functional parameters such as distance, data transmission rate, protocol layer handling, and noise immunity should be guaranteed as per the specified thresholds, and must be achieved under standard operational ambient conditions without performance drift. The cable system must inherently eliminate the need for repeaters or signal boosters by virtue of its minimum integrated fiber-based signal transmission core and shall ensure bidirectional signal propagation within latency-free USB 3.0 transmission standards. All specifications shall be strictly adhered to without use of OEM-dependent references and shall conform to vendor-neutral industry-grade deployment norms.

27	**Providing, laying, connecting, testing and commissioning of** 5 Mtr length minimum required high-speed USB extender interface solution, consisting of one end terminated with minimum Type-A Male and the other with minimum Type-A Female connector, designed for dedicated support of USB 3.0 compliant devices exclusively (excluding backward compatibility with USB 2.0/1.1), ensuring minimum sustained data transfer throughput of 5Gbps or better, which shall facilitate high-bandwidth peripheral interfacing over extended physical lengths without degradation in data integrity. Said extender must incorporate minimum active optical transmission medium to achieve minimum operational reach of up to 100 meters or better, providing complete immunity from electromagnetic interference, crosstalk and ground loops via embedded fiber-optic architecture. The construction shall offer plug-and-play functionality requiring no proprietary drivers, software stack, or firmware flashing, and must operate without the requirement of external power sources, strictly for integration with self-powered USB 3.0-compliant devices only. Device shall be compatible with and must natively support major operating systems including but not limited to minimum Windows, MacOS, and Linux-based environments ensuring cross-platform interoperability. All structural and functional parameters such as distance, data transmission rate, protocol layer handling, and noise immunity should be guaranteed as per the specified thresholds, and must be achieved under standard operational ambient conditions without performance drift. The cable system must inherently eliminate the need for repeaters or signal boosters by virtue of its minimum integrated fiber-based signal transmission core and shall ensure bidirectional signal propagation within latency-free USB 3.0 transmission standards. All specifications shall be strictly adhered to without use of OEM-dependent references and shall conform to vendor-neutral industry-grade deployment norms.
28	**Supply, Installation, Testing and commissioning (SITC) of** 32 U Equipment rack Construction The standard rack shall be constructed with a welded frame comprising four pillars made of 1.5 mm thick Cold Rolled Close Annealed (CRCA) sheet, utilizing a five-fold profile for enhanced structural integrity. The frame shall be reinforced through welding from the top to the bottom and connected to top and bottom covers featuring air-cooled ventilation to facilitate the exhaust of hot air. The front door shall incorporate provisions for both glass and perforation, ensuring adequate ventilation, while the rear door shall also be perforated for optimal airflow. Both side panels shall be fitted with slam latches to allow for easy removal. Frame The rack shall utilize a 1.5 mm CRCA multi-fold fabricated frame designed to achieve high structural strength, capable of supporting a load of up to 1250 kg. The design shall facilitate easy assembly with a semi-knocked-down (SKD) configuration. Doors The rack shall feature a single front perforated dual door and a rear dual perforated door to provide efficient airflow. Support Channels Support channels shall be screw-fixed directly to the front and rear frames, providing high-strength support and allowing for the distribution of load across the robust welded frame. Top Panel The top panel shall be constructed of 1.2 mm CRCA and concealed from exterior view, allowing for the mounting of up to four fans. It shall also support the installation of a cable tray. 19" Rails The rack shall include four U-marked rails made of 2 mm CRCA sheet, adjustable to accommodate varying depths. All technical parameters as stated herein must be strictly adhered to, and no deviations shall be accepted. The device shall conform to the highest standards and be delivered in compliance with the aforementioned specifications.

29	**Supply, Installation, Testing and commissioning (SITC) of** installation of system interconnects shall include, but not be limited to, male and female XLR connectors, jack pin EP to RCA connectors, and all other necessary interconnects as required for the complete functionality of the system. These interconnects must be securely and reliably installed, ensuring proper signal flow and high-quality connections for the entire system. All interconnecting cables and connectors must be of suitable specifications to handle the required signal and power loads without interference or degradation in performance. Furthermore, the connectors must meet industry standards for signal integrity and durability, with each connection appropriately matched to the corresponding inputs and outputs in the system configuration. The work shall also include routing and securing of these interconnects, ensuring that all components are neatly arranged, and all cabling is protected against physical damage, electromagnetic interference, and environmental factors. Each interconnect shall be properly tested and confirmed to be operational before final handover, ensuring complete system functionality and readiness for use on site.
30	Programming and Calibration Charges of Confrance Room Systems

Sd/-

Seal & Signature of Contractor

Executive Engineer (E)

Deendayal Port Authority