ELCOT Adding Value through IT	**Electronics Corporation of Tamil Nadu Limited**
Corrigendum	**Corrigendum No.2 to the Tender Document for the** TENDER TO SELECT SYSTEM INTEGRATOR TO BUILD, OPERATE & MANAGE THIRUKOVIL LIVE STREAMING FROM A CENTRAL VIDEO PRODUCTION CONTROL ROOM (PCR) WITH NETWORK OPERATION CENTER (NOC) **Tender Ref.** **ELCOT/Proc/OT/33468/Thirukovil Live Webstream/2021-22**
	Electronics Corporation of Tamil Nadu Limited **MHU Complex II Floor,** **692 Anna Salai, Nandanam** **Chennai-600035** **Phone: +91-44-66401400 Fax: +91-44-2433 0612** **Email: proctenders@elcot.in Website: www.elcot.in**

CORRIGENDUM TO THE TENDER DOCUMENT

Please note that the clarifications to the Queries 1 to 65 & amendments 1to 24 are part of the Tender and the bidders are requested to include the signed clarifications and Amendments with the Tender document. The bids received without clarifications and amendments will be summarily rejected

S.N	Title of the clause	Query	Clarifications
1.	Page No.43 – Clause No 8.1 Scope of System Integrator: High availability is needed for all the critical infrastructure items such as: o SD-WAN solution hardware/application o LAN Access o Wi-Fi Access	Please clarify whether high availability is required at all Thirukovils or at NOC/PCR.	This is Required at NOC location only. For Thirukovils we will require support for two internet lines (ILL/ Broadband)
2	Page No.44 – Clause No 8.1 Scope of System Integrator: Should have NMS system to manage and monitor all the network Devices on the setup.	Please clarify what is the requirement of NMS system other than managing & monitoring of Network Equipment	NMS system is required to Monitor all installed network equipments in Thirukovils and NOC.
3	Page No.44 – Clause No 8.1 Scope of System Integrator: Should have EMS system to configure and troubleshoot all the Devices in Thirukoil locations and NOC over the network.	Please clarify what devices require EMS	It should be read as NMS system. All network devices should be possible to monitor and manage from NOC over network. Where ever possible it should be done through central NMS software or individual portal of devices.

4	Page No.49 – Clause No 8.7 Equipments/Software at PCR/NoC NMS system shall be used to configure and monitor the devices in Thirukoil and NOC over the network.	Please clarify whether we can have an on premise NMS software with subscription based license for number of hosts to be monitored	yes on premise NMS software is acceptable.
5	General: Entire scope with work flow	Please explain us the entire scope of work with workflow	It is mentioned and Given in Tender.
6	General: On premises or Cloud	Kindly confirm if SaaS model has to be proposed for NMS, EMS & WLC. Also clarify if the videos be hosted on cloud	Both on premise or cloud model is acceptable. Video stream will be pushed to social media platform from NOC. Recorded video for future use will be kept as backup on on-prim storage device or on cloud.
7	Page No.40 – Clause No 8 – Scope of Work Scalable deployment involving multiple Thirukoils (1 to N) controlled by a single NoC-cum-PCR.	Is the BOQ Sized for Scalability for all the 47 temples? Do we need to provision for more?	Currently it is planned as a pilot at one Thirukoil. On successful completion of pilot it will be deployed at 47 temples.
8	Page No.44 – Clause No:8.1 - Scope of System Integrator EMS	Can you provide the Compliance requirement if any for EMS?	It should support health monitoring or network equipments and wherever possible generate critical alerts which will be handled by NOC team in take corrective action and maintain higher uptime of

			system.
9	Page No.43 – Clause No:8.1 - Scope of System Integrator. Video production operator's application?	Do we have any idea on this and the software on the Tablet?	Video production application is for processing the video offline. Video recording received from Thirukoils or special programs recorded on NOC/ Thirukoils will be processed to add ticker, Audio, program guide, merge multiple video etc.. Will be done using video production software. Tablet is used in temple to manage Camera angle, check camera stream, manage Audio equipment. In few case it will be used to record or live stream program in certain location in Thirukoils where Camera is not installed. Tablet should have good quality camera and Audio input.
10	Page No.45 – Clause 8.4 - HR&CE Responsibility. Provision will be provided for a dedicated, secured, and air-ventilated place to install a half-size rack with a	Is this about the NOC room or temples?	NOC Room

	raw power supply with Genset backup as required by system integrators.		
11	Clause 8.4 - HR&CE Responsibility

On-premises DC to accommodate IT Racks and Online UPS with battery bank and precision AC. The DC should have false flooring Room – minimum of 800 Sq. Ft. | Need to check the BOQ, what is provided by the Client | HR&CE Scope is mentioned in the tender and the rest will be in scope of the integrator |
| 12 | Clause No: 8.7 - Equipments/Software at PCR/NoC

High availability is needed for all the critical infra. items. | Please clarify the items where HA is required? | Mainly all networking equipment and network should have HA at NOC |
| 13 | Page No.51 – Clause No: 8.9 Qualification of Man Power

Manpower at Thirukoil
o AV Technician - 2 persons at Thirukovil side | What's our approach for providing such resources in all the 47 locations? | Requirements of Manpower depend on size and need at Thirukoils one or two resources will be deployed for standard working hours when the temple is open. Quote per resource cost. |
| 14 | Appendix 4 Bio data of the proposed manpower deployment | Is it that the bidder/SI will have to provide all the details including passport No? | SI should provide basic experience, qualification, role and responsibility of resource provided. Details of candidate is not required. |

15	Appendix 5 Non-Disclosure Agreement	Is the bidder / Bidder personnel associated with this bid needs to sign this NDA?	Yes NDA needs to be signed by bidder
16	Page No:85, A7.10, Specifications for Network Switch Minimum 12 x 1GbE RJ45 Ports	As per Clause 8.6 , Considering Total no-of Cameras are 4 and 2 AP , 8 Port is recommended for usage. Kindly confirm	12 port or higher POE switch should be quoted so spare network points are available for future use.
17	Page No:86, A7.12, Specifications for SD-WAN Should have 8GB DRAM and 8 GB Flash	Every SD-WAN branch device router should have memory and flash. It is therefore required to mention RAM and Local Storage. Please clarify.	CPU and RAM should be planned accordingly
18	Page No:86, A7.12, Specifications for SD-WAN In case of SDWAN failure or performance challenges, the proposed hardware CPE should be to revert to normal routing software with encryption and should support same performance	This will ensure that only leading & good SWAN vendors who supports both SDWAN & Normal routing will be participating. Kindly include	since we need uninterrupted service we cannot ignore this
19	Page No:92, A7.12, Specifications for SD-WAN The SD-WAN Solution should support Per-Session Encryption using AES256 and per-packet authentication using HMAC-SHA256-128	The SD-WAN Solution should support AES 256 considering functional requirement. All the traffic should encrypted end-end	Hmac is mandatory. The original specs is retained
20	Page No:93, A7.12, Specifications for SD-WAN SDWAN solution should have the ability	Please remove. Extending Broadcast domain across	The original specs is retained - No change

	to extend the Ethernet broadcast domain across multiple sites	branches will defeat the purpose of VRFs and Segmentation. Hence request to remove	
21	Page No:94, A7.12, Specifications for SD-WAN Should support Inflow performance monitoring based on per priority /Per path/ per protocol ad intervals across 10ms/100ms	Should support Inflow performance monitoring based on per priority /Per path/ per protocol Inorder to simplify troubleshooting for application specific issues, the SDWAN solution can monitor if the issue is with ISP or Application server.	Requirements stated in the original specs is retained
22	Page No:94, A7.12, Specifications for SD-WAN The SD-WAN device at the branch should be architecturally highly available with Active-Active cluster for high priority locations	The SD-WAN device at the branch should be architecturally highly available with Active-Active cluster for ~~high priority locations~~ on WAN links. SD-WAN devices at branch location architecturally having redund path on WAN link , Internet, LTE , Broadband , Leased line	Both LAN and WAN high availability is mandated
23	Page No:95, A7.12, Specifications for SD-WAN The SD-WAN Solution is preferred to be on tunnel-free technology and should not leverage IPSEC/GRE/VXLAN for Packet, if IPSEC tunnel is being used as a solution then the performance of the CPE is considered to be 40% higher	The SD-WAN Solution is preferred to be on tunnel-free technology and should not leverage IPSEC/GRE/VXLAN for Packet, if IPSEC tunnel is being used as a solution then the performance of the CPE is considered to be 40% higher performance as mentioned to be provided	Tunnelling technologies options should not impair the performance of the CPE and thus the SD Wan solution should not be bound by specific tunnelling technologies

	performance as mentioned to be provided	SDWAN technology empowers end customers to use low budget broadband and LTE (Internet) links, which means all SDWAN traffic including data and control plane would be use internet as a medium. Considering the safety requirements whilst taking advantage of low budget bandwidths, it is mandatory to enable encryption of both data and management plane. Hence request you to considering the use IPEC encryptions for the traffic.	
24	Page No:107, A7.33, Specifications for Head-End Device at Data Centre. It should have Redundant Power Supplies and min 128GB RAM and 512GB of Local Storage	It should have Redundant Power Supplies and min 8GB RAM and 8GB of Local Storage. Each OEM has specific hardware RAM capacity and Local Storage for running processes optimally. Hence we request to modify suitably	Remains Unchanged.
25	Page No:95, A7.12, Specifications for SD-WAN	Request to add the following features also: 1. The solution should be able to Block malicious domain requests at the DNS-layer 2. The solution should generate the following reports for users accessing the internet via branch	1. optional not mandatory 2. optional not mandatory

		3. Total request	3. optional not mandatory
		4. Activity volume	4. optional not mandatory
		5. Top Domains	5. optional not mandatory
		6. Top Categories	6. optional not mandatory
		7. Top Identities	7. optional not mandatory
		8. Solution must have the capability to block sites that are hosting dynamic dns services. This technology can be used by attackers as an evasion technique against IP blacklisting	8. optional not mandatory
		9. Solution must have capability to block newly seen Domains that have become active very recently and Parked domains without having prior information on the domains.	9. Optional not mandatory
		10. The network used to deliver the DNS security service must have experienced an uptime of at least 99.9% over the last 10 years.	10. Optional not mandatory
26	Page No:105, 106, A7.30, Specifications for NAS Storage.		

	No. 1 : Populated with 31 x 16TB , SATA ENT 7200 RPM, hot-plug HDDs	In 1 unit maximum is 16Bay and maximum 12TB per drive for top performance	Agreed.
	No3: Supports both Block (iSCSI, FCP, SRP) & File (SMB, NFS, FTP, AFP) protocols	we supports both Block (iSCSI) & File (SMB, NFS, FTP, AFP) protocols and Also NDI for recording(this will unify the over all NDI workflow. Pls confirm)	NDI is only optional
	No.5 : Built-in Snapshot with rollback	Network recycle bin(Network recycle bin server better may be used as networking storage. Kindly confirm)	Not agreed.
	Hardware: No.1 : Dual Intel Xeon processor (10C/20T 2.4G)	Such high spec. HW not required and we can achieve same/better performance using TC hardware	Considering the workload it is mandatory.
	No. 2 : 128GB DDR4 ECC memory.	Such high spec. HW not required and we can achieve same/better performance using TK hardware	considering the workload it is mandatory
	No. 3 : 1+1 Redundant power supplies and 4U form factor	Better PSU as we have 2+1 Redundant PSU with 3RU per 1 unit	considering the workload it is mandatory
27	Page No:42, Scope of SI work		
	providing broadband internet services for PCR and NOC and Thirukoils	Providing MPLS connectivity services for PCR& NOC and Thirukoils.	MPLS is not mandatory feature

		(As it is going to be web telecast, it is important that , a proper secure mode of connectivity is to be provided. Else it can be easily tapped and can create interruption of services.)	
28	Page No:42, Scope of SI work providing multiple ISP fiber connections which can be over head or underground till the rack location	providing MPLS connectivity with RF /fiber solution so that a dedicated Bandwidth will be provided. (reason for including Rf is , creating a fiber connectivity for all the places would not be a cost effective solution , rather , RF with dual connectivity can be used, also the same RF tower can be used for fixing surveillance camera also)	Remains Unchanged.
29	Page No:42, Scope of SI work broadband ISP level has to be seamless, also aggregate link to be of two providers for high availability	MPLS secured connectivity to be provided in seamless way and for high availability at the NOC level, fiber underground with ring connectivity has tobe provided. (this will ensure secured connection , also , Underground ring connectivity on fiber for the Noc will have almost 99.9 % uptime , hence fiber mode at the hub end to be provided.)	Remains Unchanged.
30	Page No:44, Scope of SI work Hub location being a on prime location	Data to be sent to cloud. (Reason for cloud services -= scalable in short period of time and also paying as per usage only.)	Both Cloud and On Premises is acceptable

31	Page No:, A7.15, Should have a built-in battery	Please clarify 2 KVA rack mount UPS with inbuilt batteries (or) standard UPS with external batteries. Please clarify 2 KVA is for internal or external deployment	External batteries only External batteries only
32	As per CORRIGENDUM - 19 point, NAS device is requested to have minimum usable 14TB disk space	a. Specification on A7.30 you have requested to provide - > Populated with 31 x 16TB , SATA ENT 7200 RPM, hot-plug HDDs b. We are not able to understand in such condition how 14TB minimum space is requested c. If requested space is 14TB min and max may be 30TB requested NAS specification are too high compared to required d. At point no 6 in tender document 204 HDD support is requested which is very high specification. e. Why hardware of Intel Xeon processor is requested in NAS any specific reason for same ?	Requirements are retained.
33	General - Eligibility Criteria	Eligibility criterion of 5 years completion should be relaxed to Startup India company or it should be considered up to 31Dec 2021 instead of 31Mar 2021.	Remains unchanged.
34	Page No:80A 7.3 - Specifications for Tablet With Application Software Point No 3 Octa-core CPU (2Ghz, 1.8 Ghz)	Changes requires Quad-core CPU (2Ghz, 1.8 Ghz)resolution	Remains unchanged

35	Page No:80, A 7.3 - Specifications for Tablet With Application Software Point No 6 Wi-Fi 5 & 6 standards support	Kindly make it Wi-Fi 802.11 b/g/n/ ac	Remains unchanged.
36	Page No:80 - A 7.3 - Specifications for Tablet With Application Software point no 8 Video Recording Resolution FHD(1920 x 1820) at 30 fps	For 10" Tablet pc 720 is standard VDO recording at 30fps	1920x1080 is available. (Clarified in Corrigendum 2 to tender document in Page No.24, S.No.3)
37	Page No:86, A7.12, Specifications for SD-WAN All components of SD-WAN should be on-premises. However, the solution should support deployment on Secure Public Clouds such as AWS, GCP & Microsoft Azure.	Does the bidder propose SDWAN-Control plane and management plane components at any of these Cloud based solutions?	Remains unchanged.
38	Page No:86, A7.12, Specifications for SD-WAN SD-WAN devices should have a facility for recording all traffic flows as part of it's audit log functionality and should show all connections that are established and rejected for every source address.		Remains unchanged.

39	We have observed multiple changes are done on SD-WAN solution and we will require to re-work on these devices. This will take time to evaluate such SD-WAN device	Request you to please share Make and model used to create specifications.	Requirements are ambiguous.
40	We are not able to quote NAS device with specification requested.	Request you to please share Make and model used to create specifications.	Requirements are ambiguous
41	Page No.86-A 7.12 -Specifications for SDWAN - Corrigendum 1 Should have a minimum of 6x 1G Copper ETH, 6 X 1G SFP, 2x 10G SFP+ ports with SDWAN IPSec throughput of minimum 10Gbps and NGFW throughput of 3 Gbps	Should have a minimum of 6x 1G Copper ETH,6 X 1G SFP, 2x 10G SFP+ ot 6x1/10G SFP+ ports with SDWAN IPSec throughput of minimum 10Gbps and NGFW throughput of 10 Gbps (HPE Aruba SilverPeak support 6x10G Fiber interfaces on 10G throughput box, recommend to keep SDWAN throughput and Firewall throughput on same bandwidth.)	Remains unchanged.
42	Page No:78 - A7.1 Specifications for Broadcast Quality PTZ Camera	These specifications are pointing towards specific OEM, kindly amend this specifications and make the specifications generic in order to have participations from multiple OEM's	Please refer Page No.21 of corrigendum 2 to tender document.
43	Page No:81 to 83 - 7.4 , 7.5, 7.7, 7.8 Specifications for Audio devices & Mics	These specifications are pointing towards specific OEM, kindly amend this specifications and make the specifications generic in order to have participations from multiple OEM's	Please refer Page No.24,25,26 of corrigendum 2 to tender document.

| 44 | Page No:107, A 7.35Specifications for 10KVA Online UPS

Protects connected loads from surges, spikes, lightning and others. | Kindly confirm whether "Lightning protection" is a must since we need to consider additional cost for SPD as add on items. In General electronic protection will be available in UPS(Input, output - Low and High, Short circuit, Over load, Surge etc) | Yes |
|---|---|---|---|
| 45 | Page No: 79 Specifications for A 7.1PTZ camera

Weatherproof enclosure(IP68) to mount camera for outdoor applications | As per the Industry standard the Enclosures are not available with this Broadcasting cameras | If the enclosures are not available, custom made needs to be proposed wherever required. |
46	Page No: 86 Specifications for A 7.11Wireless Access Point	The Wireless Access point specification called for Outdoor Wireless Access Point. The temple side Wireless access point is mandatory to be Outdoor Wireless Access Point where as NOC side does not require Outdoor Access Point. Please confirms can we propose indoor Access Point.	Agreed.
47	Page No: 95 Specifications for A 7.15Specifications for 2KVA Online UPS	Type of UPS indoor/Outdoor? Incase outdoor means IP 68 rack scope?	On Prem requires Indoor. At branch location, it is outdoor/indoor
48	Page No: 95 Specifications for A 7.15Specifications for 2KVA Online UPS	2kVA is for internal application or external application.	Internal
49	Page No: 96 Specifications for A 7.16 Specifications for Video Production application with Multiviewer & Social Media Publishing	Need to Find the product category for the minimum and maximum video production at NOC, Because for Every NOC we can handle around 30	Currently, we are looking for implementing Pilot project with scalable option which is clearly mentioned in the

		cameras seamlessly	tender
50	Page No:40, Scope of Work This facility should be state of an art setup, deploying new technologies with a hybrid setup approach involving on-premises equipment, cloud-based software services, and managed services	Kindly advise us " Can the bidder can propose SD-WAN solutions management component fully resides on Cloud based ?	Yes. If you may so prefer
51	Page No: In corrigendum-page no:5 Specifications for A 7.2PTZ camera controller NDI may be consider as optional	Need Encoders and decoders for the PTZ cameras. Incase we are offering the Non NDI technology, we can reduce the bandwidth per camera and also having reliable data transmission at Temple and NOC	NDI is only optional
52	Page No: In corrigendum-page no:14 Specifications for Clause:46SD-WAN	The Corrigendum calls for support of 500 branches from day one. As per the RFP, maximum no. of branches can be below 50 Considering the scalability, request reduce the day one requirement to 100 to avoid unnecessary upfront investment.	Currently it is planned as a pilot at one Thirukoil. On successful completion of pilot it will be deployed at 47 temples.
53	Page No:85, A7.10, Specifications for Network Switch 2x 1/10GbE SPF+ Ports	2x1GbE SFP Ports or more As per Clause 8.6 , Considering no-of Cameras and AP the uplink 1G uplink recommended for usage. Kindly confirm amendment	if switch has 1 Gb up line port SFP is optional. However in few location if network cable length is more than 100m we will require to use 1Gb Optical uplink. So it should be read as

			2x1GbE/ 10GbE/ SPF ports. (any one is mandatory)
54	Page No:85, A7.10, Specifications for Network Switch 64 Gbps of Switching capacity or better	20 Gbps of Switching capacity or better. The switching capacity has been revised according to downlink 8 port and 2xG Uplink , considering line-rate throughput for deployment. Kindly confirm amendment	This point is modified Ensure switch has minimum 1GbE switching per port.
55	Page No:86, A7.12, Specifications for SD-WAN Should have a minimum of 6x 1G Copper ETH, 2x 10G SFP+ ports, and 1x LTE module with IMIX performance of minimum 1Gbps.	Should have following port configuration - 1 x 10/100/1000 WAN, 1 x SFP WAN and 1xintegrated LTE module. SDWAN CPE performance of 90Mbps with SDWAN & Security features enabled. As per the solution ask for both SD-WAN and Security performance it is required to mention explicitly considering no-of users and bandwidth. It is therefore requested to amend the clause.	SD-WAN Requirement SD-WAN device will be used for PTZ cameras Streaming of max ten Cameras along with other data movement. There will be max 20 users (Including PTZ Camera/ Tablet/ and computer). Bandwidth to be considered as minimum 50 Mbps. SD WAN should support following. * Bandwidth shaping (application and user , IP wise bandwidth control) * Firewall * Antivirus * VPN support. * Security features. * Monitoring of threats and alerts.

			Hardware should have minimum following. * 2 SFP WAN ports * Minimum 4 x 1 GbE LAN ports. * 1 WAN 1GbE Port
56	Page No:88, A7.12, Specifications for SD-WAN The solution should be implemented as true software-defined WAN network architecture SD-WAN network architecture should have a clear separation of management, control and data plane functions Management and control plane should be centralized with the capability to be separated for each VRF/Tenant in such a way that management, control, and data traffic are not intermingled	Management and control plane should be a separate functional entity and not inter dependency should be there. It should not be intermingled	yes and same that was asked for
57	Page No:88, A7.12, Specifications for SD-WAN Should support VRF Learning via BGP and support Tenant to VRF Mapping	For creating an SD-WAN overlay and exchanging routing information it is not necessary to learn routes only through BGP	BGP is recommended solution
58	Page No:88, A7.12, Specifications for SD-WAN . The proposed solution should be in the form of Virtual Appliance or hardware	SD-WAN solution should in the form of hardware and not in form for virtual appliance	Virtual appliance with the exact matching functionality and features and performance of the hardware will be considered

	and should be able to support HA for Branch CPE and Central Location Device		
59	Page No:89, A7.12, Specifications for SD-WAN SD-WAN solution should have the ability to detect whether the traffic is already encrypted using TLS/HTTPS or by IPsec and If the application traffic is already encrypted, router shall not re-encrypt the packet thus eliminating the overhead associated with double encryption	Remove this Point. SD-WAN encryption is applied to ensure protection for Data in Motion and a static encryption may not be trusted to provide the same level of protection	Given the nature of data and keeping in mind the delivery requirements, double encryption may dither the performance, hence the original spec is retained
60	Page No:90, A7.12, Specifications for SD-WAN The SD-WAN should have capabilities to terminate multiple physical links and should not have any limitations on the number of physical links	The SD-WAN should have capabilities to terminate minimum 3 WAN including LTE link from Day 1Its very im	The specs in RFP subsumes the requirements and it stays, hence no change
61	Page No:90, A7.12, Specifications for SD-WAN The SD-WAN solution should be able to distribute the sessions across all the links to effective use and load balance of the links The SDWAN should support min 150 users with min performance of branch 100 Mbps	As per the solution ask for both SD-WAN and Security performance it is required to mention explicitly considering no-of users and bandwidth. Hence request to amend this clause	Min of 100Mbps is required post security feature implemented

62	Page No:91, A7.12, Specifications for SD-WAN The SD-WAN should support IPv4 & IPv6 from day one	Since asked support IPv4 and IPv6 Logo , it mandatory to mention IPv6 logo and certified by https://www.ipv6ready.org	Not mandatory.
63	Page No:91, A7.12, Specifications for SD-WAN The SDWAN should have capabilities to provide adaptive encryption for identifying encrypted traffic like Voice, Internet applications and does not re-encrypt over the WAN without any split tunnelling mechanism.	Split tunnelling sending part of traffic through a VPN and part of it through the open network. But full tunnelling it encrypts all your traffic and it is more secure than split tunnelling	Irrespective of nature of application data pay load encryption should be mandated for split tunnelling mode as well
64	Page No:91, A7.12, Specifications for SD-WAN SD-WAN solution should have the intelligence to calculate "MOS" (Mean Opinion Score) or equivalent for very peer path, as a composite metric derived from path latency, loss, and jitter	Mean Opinion Score specification to proprietary to single OEM	Any performance metric similar to mean opinion score is preferred
65	Page No:91, A7.12, Specifications for SD-WAN The system must be able to make virtual private network paths dynamically on power on without using any routing protocols on the WAN side	Please use SDWAN approach with segmenting traffic by tunnel for better security and bandwidth separation.	the requirement stated in the RFP subsumes what the vendor is suggesting.

S.N	Title of the clause	Existing	Amendment/To be read as
1	Page No. 78 - A7.1 -Specifications for Broadcast Quality PTZ Camera	1. 1/2.3",1/2.8", Full HD(1920x1080) MOS/CMOS/EXMOR or better sensor PTZ camera.	1. 1/2.3",1/2.5", 1/2.8", Full HD(1920x1080) MOS/HD CMOS/EXMOR or better sensor PTZ camera.
		2. 30x super resolution zoom	2. 20x super resolution zoom
		3. 16x digital zoom	3. 10x digital zoom
		4. IP/RS-422/RS-232C control	4. DVIP/IP/RS-422/RS-232C control
		5. Multiple streaming outputs	5. Dual/Multiple streaming outputs
		6. MicroSD card recording	6. Removed.
		7. PoE compatible / optional NDI/HX compatibility.	7. PoE compatible
		8. Remotely control Pan, Tilt, and Zoom from PCR/NOC, Prefer to control from the vision mixer directly	8. Remotely control Pan, Tilt, and Zoom from PCR/NOC,
		9. IP Video (Embedded audio) transmission, remote camera control & Power in a single cable.	9. Embedded audio should be available in IP Stream and SDI output
		10. For distant cameras (exceeding 75 mtsrs), need to extend that camera signals over hybrid fiber cable (with power). Include necessary fiber converters	10. Removed.

| 2 | Page No. 79 - A7.2 -Specifications for PTZ Camera controller & Multi-Viewer | 1. 100 camera control thru IP port

2. 100 preset memories for pan-tilt-zoom-camera settings .

3. PTZ Controller with joystick, panel through NDI, Visca over IP, PoE

4. For easy one handed control of Pan, Tilt, and Zoom is possible with the 3-Way Joystick.

5. This camera control system should support monitoring of available sources and control of remote cameras.

6. Able to create custom macros/presets to call different functions.

7. Support multiple NDI, SRT, and other IP video standard inputs.

8. Multi-view system to provide multiple layout options, Multiview Outputs, preset layouts.

9. To detect sources on network automatically & monitor multiple sources with Audio levels, tally, Source labels | 1. Minimum 20 camera control thru IP port

2. Minimum 10 preset memories for pan-tilt-zoom-camera settings .

3. PTZ Controller with joystick/Visca over IP/Sony VISCA

4. Provision to control of Pan, Tilt, and Zoom with Joystick and knob.

5. This camera control system should support monitoring of available sources and control of remote cameras with additional software

6. Able to create custom presets

7. Support multiple NDI/ SRT/IP video steam inputs with additional software

8. Multi-view system to provide multiple layout options, Multiview Outputs, preset layouts with additional software
9. To detect sources on network automatically & monitor multiple sources with Audio levels and Source labelling with additional software |

| 3 | Page No. 80 - A7.3 -Specifications for Tablet With Application Software | 1. Octa-core CPU (2Ghz, 1.8 Ghz)

2. Wireless Connectivity – Wi-Fi Only 2.4G + 5GHz (non-LTE)

3. Wi-Fi 5 & 6 standards support
4. Video Recording Resolution FHD(1920 x 1820) at 30 fps

Specification for Control application executing on the above Tablet A 7.3.1

1. Support for NDI HX Protocol
2. Intuitive and easy to master
3. Fast navigation with view groups and overview
4. Quick setup with factory and user-definable presets
5. Access Limiting allows flexible customization of the user interface and prevents unwanted adjustments from other users.
6. Quickly access channel processing, signal routing, and a suite of great sounding effects with presets to get started
7. Export presets, shows and complete system backups via Dropbox, email and more Include Over the Ear Headphone as per the specification mentioned in the Headphone section | 1. Octa-core CPU (2Ghz, 1.8 Ghz) or better
2. Wireless Connectivity – Wi-Fi Only 2.4G + 5GHz

3. Wi-Fi support
4. Video Recording Resolution FHD(1920 x 1080) at 30 fps

Specification for Control application executing on the above Tablet A 7.3.1

1. Support for NDI/HX/LRT/SRT/RPT/RTSP
2. Intuitive and easy to use
3. Removed.

4. Removed.

5. Removed.

6. Removed.

7. User-definable presets.

8. Include Over the Ear Headphone as per the specification mentioned in the Headphone section |

| 4 | A 7.4 Specifications for Lapel Microphone: | 1. 20Hz – 20kHz Frequency Range

2. 110db SPL (Max) or better

3. Include a suitable large-sized headset mount

4. 67dB signal to noise ratio and 27dB equivalent noise

Specifications for Wireless System for Lapel Mic

1. Compact clip-on wireless microphone transmission and reception system
2. Should have LCD/OLED display to show battery levels, signal strength, etc.
3. Wireless transmission

4. Wireless range of 70 mtrs or better.

5. 3.5mm jack for Mic input on Transmitter with phantom power support.

6. 3.5mm jack for Audio output on Receiver

7. 50Hz – 20kHz frequency range

8. +3dBu Output Level or better

9. 100dB SPL 1000kz at 1m or better | 1. 50Hz – 18kHz Frequency Range

2. 100db SPL or better

3. Removed.

4. Removed.

Specifications for Wireless System for Lapel Mic
1. Compact wireless microphone transmission and reception system
2. Should have LCD/OLED display/led indicator to show battery levels, signal strength, etc.
3. Removed.
4. Wireless range of 50 mtrs or better.

5. 3.5mm/xlr jack for Mic input on Transmitter with phantom power support.

6. 3.5mm/xlr jack for Audio output on Receiver

7. 50Hz – 15kHz frequency range

8. Removed.

9. 110dBA input noise/signal to noise |

5	A 7.5 Specifications Shotgun Microphone	1. Super- Cardioid condenser microphone 2. 20hz-20khz frequency range 3. 139 dB spl (max) or better 4. 50 Ω output Impedance or better 5. 18 db equivalent noise **Specifications Wireless System for Shotgun Microphone** 1. Wireless range of 100mtrs or better 2. 50Hz - 20Khz frequency range 3. 112 dB dynamic range or better 4. 1000 Ω input impedance or better 5. Should have digital display to show battery levels, signal strength, etc **Specifications for Shotgun Receiver** 1. Compact receiver with belt-clip mounting support 2. 3.5mm jack for Mic output on the receiver 3. 300Ω output impedance or better 4. Battery operated or USB Powered. 5. Should have digital Display to show battery levels, signal strength, etc	1. hyper/Super- Cardioid condenser microphone 2. 40hz-20khz frequency range 3. 132 dB spl (max) or better 4. 1000 Ω output Impedance or better 5. Removed. **Specifications Wireless System for Shotgun Microphone** **1.** Wireless range of 90mtrs or better **2.** 80Hz - 17Khz frequency range **3.** ≥110 signal to noise ratio **4.** 1800 Ω input impedance or higher **5.** Should have digital display/LED Indicator to show battery levels, signal strength, etc. **Specifications for Shotgun Receiver** **1.** Compact receiver with belt-clip/back pack/camera mounting support **2.** 3.5mm/xlr jack for Mic output on the receiver **3.** 32Ω output impedance or better **4.** battery operated/ USB Powered/ external power supply **5.** Should have digital display/LED Indicator to show battery levels, signal strength, etc.

6	Page No:83, A 7.7 Specifications for Boundary Mic / Surface Mount wired/ceiling Microphone	1. Frequency range : 40 Hz to 20 Hz 2. Sensitivity: 16mV/Pa	1. Frequency range : 100 Hz to 18 KHz 2. Sensitivity: 10mV/Pa
7	Page No:84, A 7.8 Specifications for Audio Mixer	1. 8 fully-assignable XLR outputs plus a headphone output 2. Industry-leading Master Fader control app 3. 16x16 USB recording 4. 16 input channels with 4-band PEQ + HPF, gate, compression and RTA/Spectrograph 5. 13 output busses with 4-band PEQ + HPF/LPF, 31-band GEQ, comp/limiter, alignment delay and RTA/Spectrograph 6. 6 stereo-linkable aux sends 7. 6 stereo-linkable subgroups 8. Main L/R bus 9. 6 VCAs and 6 mute groups 10. Full I/O routing with A/B sources per channel 11. Assignable oscillator including pink/white noise and sine waves 12. Modern and Vintage options for comp/gate and EQ	1. 1. 6 fully-assignable output XLR outputs 2. Master Fader control app 3. 16x16 USB recording, Recording 34 tracks, Playback 34 tracks 4. 16 input channels with 16 mic/line + 1 stereo line 5. 16 output channels. 6. Removed. 7. Removed 8. Removed 9. Removed. 10. Removed. 11. Removed 12. Removed. 13. 16 mic/line + 1 stereo line inputs and 16 outputs 14. Automatic gain control for speech applications

8	A 7.9 Specifications for wireless handheld mics	1. Wireless handheld Unidirectional Dynamic microphone with transmitter & Mic stand/Holder, windshield	1. Wireless handheld cardiod Dynamic microphone with transmitter & Mic stand/Holder, windshield 2. AF frequency response : 80 to 16,000 Hz 3. Operating time : 10 hours 4. Signal-to-noise ratio : ≥ 100 dBA
9	A 7.17 Specifications for Headphone	1. Frequency response of 21 to 18Khz or better 2. 108 db SPL or better	1. Frequency response of 100hz to 17Khz or better. 2. 90 db SPL or better
10	A 7.18 Specifications for Audio Speaker	1. 52 hz - 35000hz freq response 2. 110 dB Maximum SPL 3. 10000Ω Output Impedance or better	1. 60 hz - 19Khz freq response 2. 100 dB Maximum SPL 3. Removed
11	A 7.19 Specifications for Microphone for Narration or Voice Recording	1. 100Ω Output Impedance 2. 137dB SPL Maximum SPL	1. 50Ω Impedance 2. 132dB SPL Maximum SPL

12	A 7.22 Specifications for 16 Channel Digital Mixer	1. 8 fully-assignable XLR outputs plus a headphone output 2. Industry-leading Master Fader control app 3. 16x16 USB recording 4. 16 input channels with 4-band PEQ + HPF, gate, compression and RTA/Spectrograph 5. 13 output busses with 4-band PEQ + HPF/LPF, 31-band GEQ, comp/limiter, alignment delay and RTA/Spectrograph 6. 6 stereo-linkable aux sends 7. 6 stereo-linkable subgroups 8. Main L/R bus 9. 6 VCAs and 6 mute groups 10. Full I/O routing with A/B sources per channel 11. Assignable oscillator including pink/white noise and sine waves 12. Modern and Vintage options for comp/gate and EQ	1. 6 fully-assignable output XLR outputs 2. Master Fader control app 3. 16x16 USB recording, Recording 34 tracks, Playback 34 tracks 4. 16 input channels with 16 mic/line + 1 stereo line 5. 16 output channels. 6. Removed. 7. Removed 8. Removed 9. Removed. 10. Removed. 11. Removed 12. 16 mic/line + 1 stereo line inputs and 16 outputs. 13. Automatic gain control for speech applications 14. 16-channel Rack-mountable Digital Audio Mixer with App control

13	A 7.23 Specifications for AV Equipment Control Software at NOC	1. Intuitive and easy to master 2. Quick setup with factory and user-definable presets 3. Fast navigation with view groups and overview 4. Access Limiting allows flexible customization of the user interface and prevents unwanted adjustments from other users 5. Quickly access channel processing, signal routing, and a suite of great sounding effects with presets to get started 6. Export presets, shows and complete system backups via Dropbox, email and more	1. Intuitive and easy to use 2. Quick setup and user-definable presets 3. Removed 4. Removed 5. Removed 6. Removed 7. To control AV equipment in the PCR/NOC
14	A 7.29 Specifications for 65"Display	1. 65 Inch 4K Commercial Series TV/display 2. HDMI In HDMI 1.4 (Type A) × 2 (4K@30Hz) 3. HDMI 2.0 (Type A) ×1 (4K@60Hz) 4. HDMI Out HDMI Type A Connector × 1	1. 65 Inch 4K TV/display 2. HDMI In HDMI 1.4 (Type A) × 2 3. HDMI 2.0 (Type A) ×1 4. Removed.
15	A 7.32 Specifications for Audio mixer	1. USB based audio mixer to interface with vision mixer 2. Include suitable recording and editing software	1. Audio mixer to interface with vision mixer/server 2. Removed.
16	Page No:85, A7.11, Specifications for Wireless access point	Support Power over Ethernet, and PoE+ and PoE++ (IEEE 802.3af, 802.3at and 802.3bt)	POE is enough. Consider this as POE/ 24V/ 12V
17	Page No:107, A7.33, Specifications for Head-End Device at Data Centre	The device should have min 2x 10 GE Fiber with an IMIX performance of minimum 10Gbps.	The device should have min 2x 10 GE Fiber with an IMIX performance of minimum 4Gbps.

18	Page No:95, A7.12, Specifications for SD-WAN		1. Proposed solution should prevents branch users and guests from accessing inappropriate content and known malicious sites. That might contain malware and other security risks. It should intercept DNS requests and redirect them to DNS resolvers which provide DNS security. 2. The solution must have ability to Protect against malware, phishing, ransomware, C2 callbacks, Cryptomining and DNS tunneling for all guests, employees, and devices accessing internet using branch router.
19	Page No:105, 106, A7.30, Specifications for NAS Storage	1. Supports up to 36 hot-swap SAS/SATA LFF/SFF HDDs/SSDs in same enclosure and up to 204 HDDs/SSDs using add-on JBODs	1. Supports up to 16 hot-swap SAS/SATA LFF/SFF HDDs/SSDs in same enclosure and upto 80 HDDs/SSDs using add-on JBODs
20	Page No:95, A7.15, Specifications for 2KVA Online UPS		1. Backup time:30 Minutes
21	Page No:107, A 7.35Specifications for 10KVA Online UPS		1. Backup time:30 Minutes 2. In & Out configuration : 3 Phase In, One Phase Out
22	Page No:91, A7.12, Specifications for SD-WAN	SD-WAN solution must support Hub-Spoke, Full-Mesh, Spoke-Hub-Hub-Spoke, Partial mesh	SD-WAN solution must support Hub-Spoke, Full-Mesh, Spoke-Hub-Hub-Spoke, Partial mesh & On demand dynamic tunnel

23	Page No.90-A 7.12 Specifications for SDWAN - Corrigendum 1	The SDWAN device at branch should support SDWAN IPSec throughput of 2Gbps or above, should have 500Mbps of NGFW throughput, and should have minim 5X 1G ports with a support for LTE traffic	The SDWAN device at branch should support SDWAN IPSec throughput of 2Gbps or above, should have 500Mbps of FW throughput
24	Page No.94-A 7.12 Specifications for SDWAN - Corrigendum 1	Both NOC device and Edge device should have Next Generation Firewall capabilities like IPS, Gateway Anti-Virus, Application Control, Web & Video Filtering, Anti-Bot, Anti-Spam from day one to protect the network from attacks	Both NOC device and Edge device should have Next Generation Firewall capabilities like IPS, Web & Video Filtering, from day one to protect the network from attacks