

CORRIGENDUM-III,

&

CLARIFICATIONS-II

For

Tender No. AA: GAX:24: TAMS:101, dated 13-12-2024

Date of issuing Corrigendum-III: 14-01-2025

Date of issuing Clarifications-II: 14-01-2025

**References:**

- I. NIT\_87289
- II. Tender ID: 2024\_BHEL\_781645\_1
- III. Corrigendum -I dated 06-01-2025
- IV. Corrigendum -II dated 07-01-2025

- a) Corrigendum -III details are attached (04 pages)
- b) Clarifications -II details are attached (06 pages)

**Notes:**

- a) These corrigendum, addendum and Clarifications along with Revised (R02) Annexures 01 to 17 {Technical Specifications} (43 pages) and Annexure-Z4 (01 page) shall be treated as part of the tender enquiry; hence all the bidders are requested to enclose duly signed & stamped Corrigendum-III and Clarifications - II and all aforesaid ANNEXURES along with Part-I bid.
- b) Rest all terms & conditions and other clauses of NIT No. AA: GAX:24: TAMS:101, dated 13-12-2024 & aforesaid references will remain same.

Thanking you,

For & on behalf of

Bharat Heavy Electricals Ltd.

  
(Meena Thakran)

Manager (HR-GAX & ISMG)  
मीना ठाकरान / MEENA THAKRAN  
प्रबंधक / Manager

कॉर्पोरेट प्रशासन एवं आईएसएमजी. / Corporate Admin. & ISMG  
भारत हेवी इलेक्ट्रिकल्स लिमिटेड / Bharat Heavy Electricals Limited  
बी.एच.ई.एल हाउस, सीरी फोर्ट / BHEL House, Siri Fort  
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CORRIGENDUM - III (Date of ISSUANCE OF CORRIGENDUM III- 14-01-2025)					
Supply, Installation, Commissioning & Maintenance of Biometric System for Access Control and Attendance Recording on lease basis for 5 years for PAN INDIA					
Tender Reference no. AA: GAX:24: TAMS:101					
With reference to above mentioned NIT, following <u>CORRECTIONS</u> herein are being made:					
S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
1	Sl No 3 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	3. CPU: Latest generation Intel Xeon/AMD EPYC processor with minimum 20-cores per processor with minimum base frequency 2.00GHz	Latest generation 4/5th Intel Xeon/AMD EPYC processor with minimum 24-cores per processor with minimum base frequency 2.00GHz  Justification: Request to modify this clause as mentioned for better investment protection.	<b>Revised SI No 3 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 3. CPU: <b>Minimum 5th</b> generation Intel Xeon/ <b>3rd generation</b> AMD EPYC processor with minimum <b>16-</b> cores per processor with minimum base frequency 2.00GHz
2	Sl No 7 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	7. Network Interface: Minimum 10G Ethernet Card - In Redundant Mode. No Single Point of Failure Minimum 4*10G Ethernet Ports per node.	Minimum 10G SFP+ ports - In Redundant Mode. No Single Point of Failure Minimum 4*10G SFP+ Ports per node.  As mentioned in TOR switch specs ports required are fibre. Request you to modify same.	<b>Revised SI No 7 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 7. Network Interface: Minimum 10G <b>SFP+</b> ports - In Redundant Mode. No Single Point of Failure Minimum 4*10G <b>SFP+</b> Ports per node.
3	Sl No 9 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	9. Storage:Minimum 20 TB usable storage capacity for complete HCI solution. Also, Virtual server Instance Data Deduplication and compression feature to be available across the virtualization cluster.	Minimum 20 TB usable storage capacity on SSD for complete HCI solution. Also, Virtual server Instance Data Deduplication and compression feature to be available across the virtualization cluster.  please define this clause with type of drive type as SSD for better performance.	<b>Revised SI No 9 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 9. Storage:Minimum 20 TB usable storage capacity <b>on SSD</b> for complete HCI solution. Also, Virtual server Instance Data Deduplication and compression feature to be available across the virtualization cluster.
4	Sl No 8 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	8. Graphics: Integrated Graphics Controller with 64 MB embedded video SDRAM	Integrated Graphics Controller with 16 MB embedded video SDRAM  64 MB is not available with all major HCI vendors. 16 MB will suffice, request BHEL to change accordingly.	<b>Revised SI No 8 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 8. Graphics: Integrated Graphics Controller with <b>minimum 16</b> MB embedded video SDRAM
5	Sl No 10 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	10. System Cooling/Fan: 4x 80 mm heavy duty fans with PWM fan speed controls. Each node to have dedicated non-shared dual-PSU's with redundant fan.	4x heavy duty fans with fan speed controls. Each node to have dedicated non-shared dual-PSU's with redundant fan.  please modify this clause as this is OEM specific.	<b>Revised SI No 10 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 10. System Cooling/Fan/ <b>PSU</b> : Each node to have dedicated non-shared dual-PSU's with redundant fan.
6	Sl No 11 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	11. PCI Slots:Minimum of 6 * PCI Express Expansion Slots per node should be supported	Minimum of 6 * PCI Express Expansion Slots 5.0 or higher per node should be supported  PCI 5.0 is the latest technology.Request to modify this clause as mentioned for better investment protection.	<b>Revised SI No 11 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 11. PCI Slots:Minimum of <b>3 *</b> PCI Express Expansion Slots <b>5.0 or higher</b> per node should be supported
7	Sl No 12 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	12. HBA: All FC adapters to be min. 8Gbps and in Redundant Mode	Request to change the clause as " All FC adapters to be min. 32 Gbps and in Redundant Mode at the time of supply.  All the latest generation HCI and storage comes with 32GB FC adapters.	<b>Revised SI No 12 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements):</b> 12. HBA: In case, the solution requires FC adapters then min 8Gbps and in Redundant Mode to be supplied.
8	Sl No 13 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	13. Operating Environment: Op Temp Range: 50° to 77° F (10° to 25° C) Non-Op Temp Range: -40° to 158° F (-40° to 70° C) Op Humidity Range (non-condensing): 8% to 90% Non-Op Humidity Range: 5% to 95%	Op Temp Range: 50° to 77° F (10° to 25° C) Non-Op Temp Range: -40° to 158° F (-30° to 60° C) Op Humidity Range (non-condensing): 8% to 90% Non-Op Humidity Range: 5% to 95%  Please modify this clause for better participation.	<b>Revised SI No 13 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements):</b> 13. Operating Environment: Op Temp Range: 50° to 77° F (10° to 25° C) Non-Op Temp Range: <b>-22° to 140° F (-30° to 60° C)</b> Op Humidity Range (non-condensing): 8% to 90% Non-Op Humidity Range: 5% to 95%
9	Sl No 16 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	16. Clustering: Required Clustering Services/Software for supplied OS	This feature is not relevant for HCI.Please remove this point.	<b>Revised SI No 16 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements):</b> 16. Clustering: Required Clustering/ <b>High Availability</b> Services/Software for supplied OS
10	Sl No 24 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	24. Capacity Augmentation :Bidder shall support for incorporating/integrating any additional server node, provided by BHEL, in the existing infrastructure	please delete this clause.  For any HCI appliance the expansion will on the basis of identical node.	<b>Revised SI No 24 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 24. Capacity Augmentation :Bidder shall support for incorporating/integrating any additional <b>identical</b> server node, provided by BHEL, in the existing infrastructure.
11	Sl No 26 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	26. Virtualisation: 1. Latest version of Industry standard Hypervisor to be provided for all the nodes.2. Virtualization software shall provide a virtualization layer that sits directly on the bare metal server hardware with no dependence on a general-purpose OS for greater reliability and security.3. Hypervisor layer should support features like snapshots / cloning of individual virtual machines, non-disruptive Scale-Up & Scale-Out to grow capacity and/or performance whenever required. It should provide ease of use wizard for snapshot scheduling and instant batch cloning of Virtual machines.4. Virtualization software should provide visibility into storage throughput and latency of hosts and virtual machines that can help in troubleshooting storage performance issues. 5. Virtualization management software should support user role and permission assignment.6. Virtualization management software console shall maintain a record of significant configuration changes and the administrator who initiated them.7. Virtualization management software should have integrated Physical Host and Virtual Machine performance monitoring.8. The solution shall provide the ability to create new virtual machines from scratch or based on templates (created from fully configured virtual machines or ISO images).9. The solution shall provide a centralized interface from which virtual machine across data centre can be configured, moved, monitored and administered.10. Virtualization software shall be able to dynamically allocate and balance computing capacity across collections of hardware resources aggregated into one unified resource pool with optional control over movement of virtual machines like restricting or moving VMs to run on selected physical hosts.11. Hypervisor software should support Virtual Machine image like Virtual disk format, OVF, RAW(.img, .raw),ISO.12. Should provide the ability to thin provision disks to avoid allocating all storage space upfront. Full monitoring capabilities & alerts to prevent from accidentally running out of physical storage space should be there.13. Hypervisor must support IPv4, IPv6 and dual stack configuration.14. Virtualization software should be offered with all above features & all the required licenses for operating the offered HCI cluster using a single console.	please change this clause for wider participation. 1. Latest version of Industry standard Hypervisor(Vmware/HyperV) to be provided for all the nodes. 7. Virtualization management software should have integrated <del>Physical Host and</del> Virtual Machine performance monitoring. - please remove this point.  Since this is a virtual environment monitoring should be done by virtualization software. Hence request to modify this clause.	<b>Sub point No. 7 &amp; 11 of of SI. no.26 of Table Mentioned at Annexure 1 is revised as:</b> 26. Virtualisation: 1. Latest version of Industry standard Hypervisor to be provided for all the nodes. 2. Virtualization software shall provide a virtualization layer that sits directly on the bare metal server hardware with no dependence on a general-purpose OS for greater reliability and security. 3. Hypervisor layer should support features like snapshots / cloning of individual virtual machines, non-disruptive Scale-Up & Scale-Out to grow capacity and/or performance whenever required. It should provide ease of use wizard for snapshot scheduling and instant batch cloning of Virtual machines. 4. Virtualization software should provide visibility into storage throughput and latency of hosts and virtual machines that can help in troubleshooting storage performance issues. 5. Virtualization management software should support user role and permission assignment. 6. Virtualization management software console shall maintain a record of significant configuration changes and the administrator who initiated them. 7. Virtualization management software should have integrated <del>Physical Host and</del> Virtual Machine performance monitoring. 8. The solution shall provide the ability to create new virtual machines from scratch or based on templates (created from fully configured virtual machines or ISO images) 9. The solution shall provide a centralized interface from which virtual machine across data centre can be configured, moved, monitored and administered. 10. Virtualization software shall be able to dynamically allocate and balance computing capacity across collections of hardware resources aggregated into one unified resource pool with optional control over movement of virtual machines like restricting or moving VMs to run on selected physical hosts. 11. Hypervisor software should support Virtual Machine image like Virtual disk format, OVF, RAW(.img, .raw),ISO, <b>Qcow</b> . 12. Should provide the ability to thin provision disks to avoid allocating all storage space upfront. Full monitoring capabilities & alerts to prevent from accidentally running out of physical storage space should be there. 13. Hypervisor must support IPv4, IPv6 or dual stack configuration". 14. Virtualization software should be offered with all above features & all the required licenses for operating the offered HCI cluster using a single console.


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S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
12		Suggestions by vendor	All the resources, as envisaged in DC, shall be applicable for DR as well along with periodic sync with DC. In case of disruption at DC, the services to be automatically shifted to DR node	Details regarding DR solution need to be clarified.	Details regarding DR infrastructure included in <b>revised technical specifications in SI No 1.2 of Annexure 1</b> and Annexure 18 (Bill of Quantities-CENTRALIZED INFRASTRUCTURE AND SOFTWARE SERVICES BOQ for Disaster Recovery Site(DR))  <b>Revised Clause 3.7.1</b> (RECOVERY POINT OBJECTIVE (RPO) and RECOVERY TIME OBJECTIVE (RTO) under SECTION III (SPECIAL CONDITIONS OF CONTRACT): RTO, RPO should be as per <b>Annexure Z4 (BUSINESS CONTINUITY PLAN / BACKUP &amp; RESTORE/ RTO/RPO)</b> .
13		Suggestions by vendor	Offered solution shall support the ability to carry simultaneous out bi-directional replication between two data center. HCI solution shall have capability to throttle the replication bandwidth. License for multiple DC replication shall be part of the bid.	<b>Data Replication</b> <b>Reason:</b> for better architecture and investment protection and to ensure that the BHEL's investments are protected and to make sure that DC & DR have the same license type for the sake of reusability.	Details regarding DR infrastructure included in <b>revised technical specifications in SI No 1.2 of Annexure 1</b> and Annexure 18 (Bill of Quantities-CENTRALIZED INFRASTRUCTURE AND SOFTWARE SERVICES BOQ for Disaster Recovery Site(DR))  <b>Revised Clause 3.7.1</b> (RECOVERY POINT OBJECTIVE (RPO) and RECOVERY TIME OBJECTIVE (RTO) under SECTION III (SPECIAL CONDITIONS OF CONTRACT): RTO, RPO should be as per <b>Annexure Z4 (BUSINESS CONTINUITY PLAN / BACKUP &amp; RESTORE/ RTO/RPO)</b> .
14		Suggestions by vendor	The solution must provide failover and fallback with the approach of one button disaster recovery. There shall be no manual process at DR location after executing the one button failover or fallback command.	<b>Disaster Recovery (Failover and fallback)</b> <b>Reason:</b> for better architecture and investment protection.	<b>Please refer Annexure Z4 and revised Clause 4.2.3/ 4.2.4 of SECTION-IV (SCOPE OF WORK)</b>
15		Suggestions by vendor	HCI solution must allow powering on the required VMs at DR location without any manual intervention and must allow changing of IP address of recovered Virtual Servers to match target datacenter There should be a option to test DR failover to separate network with no impact to production workloads In case of problem while failing over the VM to DR location, solution shall re-try the VM to failover before automatically moving to next VM without any manual intervention.	<b>Disaster Recovery (Failover and fallback)</b> <b>Reason:</b> for better architecture and investment protection.	<b>Please refer Annexure Z4 and revised Clause 4.2.3/ 4.2.4 of SECTION-IV (SCOPE OF WORK)</b>
16	SI No 12 of Annexure 8	ANNEXURE 8 (Common Technical Specifications of Facial Recognition Device)	12. Graphical Display: Backlit graphical LCD or advanced display of minimum Resolution: 880 x 620 Pixel and size of min 3.5" IPS Display with Capacitive Touch Panel or higher to show user details or any other information but not limited to name of employee,staff number, photo, punch time , Network connectivity, Device ID & IP etc.	We request the clause to be amended as follows: Backlit graphical LCD or advanced display of minimum Resolution: 880 x 620 Pixel and size of min 5" IPS Display (Instead of 3") with Capacitive Touch Panel or higher to show user details or any other information but not limited to name of employee, staff number, photo, punch time , Network connectivity, Device ID & IP etc. Justification for the Amendment: A 5-inch screen offers improved visibility of facial recognition results, user information, or any additional instructions. This is particularly useful in environments with multiple users or outdoor lighting conditions. A larger display provides more space for a user-friendly interface, making navigation, enrollment, and interaction smoother, especially when inputting data or troubleshooting. No Significant Cost Implications: Despite the larger screen size, advancements in display technology and economies of scale mean there are no substantial cost differences between 5-inch and 3.5-inch displays, ensuring superior features without added expenses.	<b>Revised SI. No. 12 in table mentioned at ANNEXURE 8 (Common Technical Specifications of Facial Recognition Device) may be read as under:</b> <b>12. Graphical Display: Backlit graphical LCD or advanced display of minimum Resolution: 1280 X 720 Pixel and size of min 5" IPS Display</b> with Capacitive Touch Panel or higher to show user details or any other information but not limited to name of employee,staff number, photo, punch time , Network connectivity, Device ID & IP etc.
17	SI No 2 of 5.1 Disk based backup (Annexure 5)	Annexure 5 (Backup Software)	5.1 Disk based backup 2. Backup Software:Latest version of compatible backup software with requisite licenses The software to handle both disk based backup as well as tape library based backup Backup success/failure email intimation Backups to be configured as per prevailing BHEL backup policy Restore testing is to be carried out as per prevailing BHEL backup policy	1. Workloads to Be Backed Up Which specific workloads (e.g., databases, file servers, VMs, applications) are included in the backup scope? 2. Retention Policies What is the defined retention policy for disk-based and tape-based backups, if applicable? 3. Backup Frequency How frequently should backups be taken (e.g., daily, weekly, monthly) for the specified workloads? 4. Data Size What is the total front-end data size (source data) to be backed up? 5. Backup Performance Expectations Are there specific Recovery Time Objectives (RTO) and Recovery Point Objectives (RPO) defined for the backup solution? What is the expected backup window for completing full and incremental backups at both the Data Center (DC) and Disaster Recovery (DR) sites? Are there any concerns or previous issues regarding backup performance that need to be addressed (e.g., bandwidth, deduplication, or restore times)? 6. Backup Solution Details Which backup solution or software is currently being considered or is already in use for this environment? Are there specific requirements for integration with synchronous data replication between the DC and DR sites? Should the solution include WAN optimization features for minimizing network impact during replication? 7. Implementation and Support Requirements Is ongoing partner support required, or will this project involve only one-time implementation? Should the solution include automated testing of backup integrity and restoration? 8. Bandwidth and Network Considerations Are there bandwidth limitations or constraints for the backup and replication process between DC and DR sites? 9. Other Considerations Are there specific encryption standards or compliance measures required for data at rest and in transit? Do you require tailored backup strategies ( 3-2-1 rule) for specific workloads or applications?	<b>No Change in S.No. 2 of 5.1 Disk based backup (Annexure 5) i.e. BACKUP SOLUTION."</b>  <b>For further clarity, refer added Annexure Z4. It is clarified that Back up concept has been elaborated in Annexure-Z4.</b>
18	SI No 3 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	3. CPU: Latest generation Intel Xeon/AMD EPYC processor with minimum 20-cores per processor with minimum base frequency 2.00GHz	Latest generation Intel Xeon/AMD EPYC processor with <b>minimum 24-cores</b> per processor with minimum base frequency 2.20GHz,  Intel Xeon® Silver 4509Y [8 cores / 2.60 GHz] Intel Xeon® Silver 4510 [12 cores / 2.40 GHz] Intel Xeon® Silver 4514Y [16 cores / 2.00 GHz] Intel Xeon® Silver 4516Y+ [24 cores / 2.20 GHz]  There are no 20 core processor available with latest generation.	<b>Revised SI No 3 of table mentioned at Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 3. CPU: <b>Minimum 5th generation Intel Xeon/AMD EPYC processor</b> with minimum <b>16-cores</b> per processor with minimum base frequency <b>2.00GHz</b> .



S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
19	SI No 10 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	10. System Cooling/Fan : 4x 80 mm heavy duty fans with PWM fan speed controls. Each node to have dedicated non-shared dual-PSU's with redundant fan.	To be removed.  This should be removed as HCI is heavily Software defined and making it extremely restrictive by mentioning granular details about the underlying hardware	<b>Revised SI No 10 of table mentioned at Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 10. System Cooling/Fan/PSU: Each node to have dedicated non-shared dual-PSU's with redundant fan.
20	SI No 11 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	11. PCI Slots: Minimum of 6 * PCI Express Expansion Slots per node should be supported	Asked config is very limited so 3 PCI slots should be good enough.  Asked config is very limited so 3 PCI slots should be good enough.	<b>Revised SI No 11 of table mentioned at Annexure 1 (1.1 HCI Solution for Data Centre Requirements)</b> 11. PCI Slots: Minimum of <b>3</b> * PCI Express Expansion Slots <b>5.0 or higher</b> per node should be supported
21	SI No 12 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	12. HBA : All FC adapters to be min. 8Gbps and in Redundant Mode	To be amended to:  Bidder to provision FC Adapters in redundant mode, in case HBA is required by the HCI solution.  Suggested language will make it more elaborative and less restrictive	<b>Revised SI No 12 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> <b>12. HBA: In case, the solution requires FC adapters then min 8Gbps and in Redundant Mode to be supplied.</b>
22	SI No 24 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	24. Capacity Augmentation: Bidder shall support for incorporating/integrating any additional server node, provided by BHEL, in the existing infrastructure	To be amended to: Bidder shall support for integrating additional HCI node of any suitable config in future, in case scalability is required in the asked setup.  Suggested language will make it more elaborative and less restrictive	<b>Revised SI No 24 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 24. Capacity Augmentation : Bidder shall support for incorporating/integrating any additional <b>identical</b> server node, provided by BHEL, in the existing infrastructure.
23	SI No 26 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	26. Virtualisation : 1. Latest version of Industry standard Hypervisor to be provided for all the nodes.2. Virtualization software shall provide a virtualization layer that sits directly on the bare metal server hardware with no dependence on a general-purpose OS for greater reliability and security.3. Hypervisor layer should support features like snapshots / cloning of individual virtual machines, non-disruptive Scale-Up & Scale-Out to grow capacity and/or performance whenever required. It should provide ease of use wizard for snapshot scheduling and instant batch cloning of Virtual machines.4. Virtualization software should provide visibility into storage throughput and latency of hosts and virtual machines that can help in troubleshooting storage performance issues. 5. Virtualization management software should support user role and permission assignment.6. Virtualization management software console shall maintain a record of significant configuration changes and the administrator who initiated them.7. Virtualization management software should have integrated Physical Host and Virtual Machine performance monitoring.8. The solution shall provide the ability to create new virtual machines from scratch or based on templates (created from fully configured virtual machines or ISO images).9. The solution shall provide a centralized interface from which virtual machine across data centre can be configured, moved, monitored and administered.10. Virtualization software shall be able to dynamically allocate and balance computing capacity across collections of hardware resources aggregated into one unified resource pool with optional control over movement of virtual machines like restricting or moving VMs to run on selected physical hosts.11. Hypervisor software should support Virtual Machine image like Virtual disk format, OVF, RAW(.img, .raw), ISO.12. Should provide the ability to thin provision disks to avoid allocating all storage space upfront. Full monitoring capabilities & alerts to prevent from accidentally running out of physical storage space should be there.13. Hypervisor must support IPv4, IPv6 and dual stack configuration.14. Virtualization software should be offered with all above features & all the required licenses for operating the offered HCI cluster using a single console.	We request BHEL to remove point 10 , as this can be done for HCI nodes but not for 3rd party hardware.  Secondly, we request BHEL to add Qcow image on point 11, in addition to all the formats mentioned.  Suggested points will make it more elaborative and less restrictive	<b>Sub point No. 7 &amp; 11 of of SI. no.26 of Table Mentioned at Annexure 1 is revised as:</b> 26. Virtualisation: 1. Latest version of Industry standard Hypervisor to be provided for all the nodes. 2. Virtualization software shall provide a virtualization layer that sits directly on the bare metal server hardware with no dependence on a general-purpose OS for greater reliability and security. 3. Hypervisor layer should support features like snapshots / cloning of individual virtual machines, non-disruptive Scale-Up & Scale-Out to grow capacity and/or performance whenever required. It should provide ease of use wizard for snapshot scheduling and instant batch cloning of Virtual machines. 4. Virtualization software should provide visibility into storage throughput and latency of hosts and virtual machines that can help in troubleshooting storage performance issues. 5. Virtualization management software should support user role and permission assignment. 6. Virtualization management software console shall maintain a record of significant configuration changes and the administrator who initiated them. 7. Virtualization management software should have integrated <b>Physical-Host-and-Virtual</b> Machine performance monitoring. 8. The solution shall provide the ability to create new virtual machines from scratch or based on templates (created from fully configured virtual machines or ISO images) 9. The solution shall provide a centralized interface from which virtual machine across data centre can be configured, moved, monitored and administered. 10. Virtualization software shall be able to dynamically allocate and balance computing capacity across collections of hardware resources aggregated into one unified resource pool with optional control over movement of virtual machines like restricting or moving VMs to run on selected physical hosts. 11. Hypervisor software should support Virtual Machine image like Virtual disk format, OVF, RAW(.img, .raw), ISO, <b>Qcow</b> . 12. Should provide the ability to thin provision disks to avoid allocating all storage space upfront. Full monitoring capabilities & alerts to prevent from accidentally running out of physical storage space should be there. 13. Hypervisor must support IPv4, IPv6 or dual stack configuration". 14. Virtualization software should be offered with all above features & all the required licenses for operating the offered HCI cluster using a single console.
24	SI No 8.35 9.3.3 9.1.5 9.2.4 9.5.5	ANNEXURE - 8 (Common Technical Specifications of Facial Recognition Device) & Annexure 9 (Facial Recognition Device))	8.35 :Communication Interface: Relay, TCP/IP, RS485, USB (Optional)  9.3.3 & 9.4.3: Communication Interface: USB, 2 I/O inputs, relay, Wiegand	Is there any specific application of 2 AUX In/Out ports in a single device as every OEM product offerings may differ. As per the industry standard practice 1 AUX In/Out port is widely provided. Consideration - Please consider 1 I/O port or more	<b>REVISED S.No. 35 of table mentioned at Annexure-8 and S.No. 9.3, 3 &amp; 9.4, 3 of Table mentioned at Annexure 9</b>  ANNEXURE- 8 (Common Technical Specifications of Facial Recognition Device) , 35. Communication Interface : <b>1 USB Port, 2 relay output, 1 I/O (input &amp; output) Wiegand</b> ANNEXURE - 9 (Facial Recognition Device): 9.3(Type - III Technical Specifications - Portable Facial Recognition Device with Wi-Fi connectivity (For Access Control at Gates Emergency/ sudden breakdown situation & for Suspend employees), 3. Communication Interface: <b>1 USB Port, 2 relay output, 1 I/O (input &amp; output) Wiegand.</b> 9.4.(Type - IV - Facial Recognition Device reader with cellular connectivity and RFID card reader (For locations in Township where LAN connection is not available), 3. Communication Interface: <b>1 USB Port, 2 relay output, 1 I/O (input &amp; output) Wiegand</b> <b>ADDED</b> <b>ANNEXURE - 9 (Facial Recognition Device):</b> 9.1 (Type I : Technical Specifications of Wall Mount Facial Recognition Device) , 5.Communication Interface: <b>1 USB Port, 2 relay output, 1 I/O (input &amp; output) Wiegand</b> 9.2 ( Type -II Technical Specifications - Facial Recognition Device for Access Control at Gates) , 4. <b>Communication Interface: 1 USB Port, 2 relay output, 1 I/O (input &amp; output) Wiegand</b> 9.5 ( Type-V- Technical Specifications - Face recognition reader with card reader (Access Control at Gates) and Keypad), 5. <b>Communication Interface: 1 USB Port, 2 relay output, 1 I/O (input &amp; output) Wiegand</b>
25	SI No 12 of Annexure 8	ANNEXURE 8 (Common Technical Specifications of Facial Recognition Device)	12. Graphical Display : Backlit graphical LCD or advanced display of minimum Resolution: 880 x 620 Pixel and size of min 3.5" IPS Display with Capacitive Touch Panel or higher to show user details or any other information but not limited to name of employee, staff number, photo, punch time , Network connectivity, Device ID & IP etc.	A 5-inch display enables clearer viewing of content such as user images, text, and graphical interfaces, which enhances user satisfaction. A larger screen provides more space for touch interactions, reducing input errors and increasing accessibility for users with visual or dexterity impairments. Suggestion for Device Display - 5" IPS Display with Capacitive Touch Panel with Gorilla Glass	<b>Revised SI. No. 12 in table mentioned at ANNEXURE 8 (Common Technical Specifications of Facial Recognition Device) may be read as under:</b> 12. Graphical Display: Backlit graphical LCD or advanced display of minimum Resolution: <b>1280 X 720 Pixel and size of min 5" IPS Display</b> with Capacitive Touch Panel or higher to show user details or any other information but not limited to name of employee, staff number, photo, punch time , Network connectivity, Device ID & IP etc.


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S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
26	3.7.1	3.7 RECOVERY POINT OBJECTIVE (RPO) and RECOVERY TIME OBJECTIVE (RTO):	3.7.1 RTO, RPO should be as per prevailing BHEL ISMS policy.	What is the actual RTO/RPO as per BHEL ISMS Policy as the IT systems need to be sized and architected to meet the RPO & RTO, and this has a direct impact on the cost.	Details regarding DR infrastructure already included in technical specifications in Sl No 1.2 of Annexure 1 and Annexure 18 (Bill of Quantities-CENTRALIZED INFRASTRUCTURE AND SOFTWARE SERVICES BOQ for Disaster Recovery Site(DR))  <b>Revised Clause 3.7.1 (RECOVERY POINT OBJECTIVE (RPO) and RECOVERY TIME OBJECTIVE (RTO) under SECTION III (SPECIAL CONDITIONS OF CONTRACT):</b> <b>RTO, RPO should be as per Annexure Z4 (BUSINESS CONTINUITY PLAN / BACKUP &amp; RESTORE/ RTO/RPO).</b>
27	4.2.3	SECTION-IV SCOPE OF WORK	4.2.3 The complete solution to be configured in high availability mode between DC & DR. In case of failure of services at DC, automatic switchover of all the services to DR should happen.	Automatic Failover-This requires Application (SAP) also to be available and installed in DR site. Does BHEL already have this setup at DR site along with respective Software Licences.Can we use Open Source Software (like Jenkins) to build the Automation Required? If yes, do we need to include the infrastructure requirement for the same in the proposal?	<b>Revised Clause 4.2.3 &amp; 4.2.4 under Section IV (Scope of Work) :</b> 4.2.3The complete solution to be configured in high availability mode between DC & DR. In case of failure of services at DC, switchover (with DR automation) of all the services to DR should happen 4.2.4The contractor shall test & demonstrate the following scenarios as part of the installation and commissioning: a)Fail-over test of a Partition or a Server b)Failover of clustered partitions with the applications and their -restoration c)Clustering, High availability features d)The cluster/HA solution should integrate both the server and storage. There should not be any manual intervention required during the failover process of node. e)Asynchronous data replication between DC & DR. f)Backup and Restore as defined in the technical specifications & in Annexure Z4 g)Any other scenario not covered above but envisaged in the BCP plan.
28	4.2.4 b	SECTION-IV SCOPE OF WORK	4.2.4 The contractor shall test & demonstrate the following scenarios as part of the installation and commissioning: b) Failover of clustered partitions with the applications and their automatic restoration	Failover is different from Restoration.What exactly needs to be demonstrated here?	<b>Revised Clause 4.2.3 &amp; 4.2.4 under Section IV (Scope of Work) :</b> 4.2.3The complete solution to be configured in high availability mode between DC & DR. In case of failure of services at DC, switchover (with DR automation) of all the services to DR should happen 4.2.4The contractor shall test & demonstrate the following scenarios as part of the installation and commissioning: a)Fail-over test of a Partition or a Server b)Failover of clustered partitions with the applications and their -restoration c)Clustering, High availability features d)The cluster/HA solution should integrate both the server and storage. There should not be any manual intervention required during the failover process of node. e)Asynchronous data replication between DC & DR. f)Backup and Restore as defined in the technical specifications & in Annexure Z4 g)Any other scenario not covered above but envisaged in the BCP plan.
29	4.2.4 c	SECTION-IV SCOPE OF WORK	4.2.4 The contractor shall test & demonstrate the following scenarios as part of the installation and commissioning: c) Clustering, High availability features	Why OS clustering is required if HCI Solution is being implemented for the Virtual Machines?	<b>Revised Sl No 16 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements):</b>  16. Clustering: Required Clustering/High Availability Services/Software for supplied OS
30	4.2.4 i	SECTION-IV SCOPE OF WORK	4.2.4 The contractor shall test & demonstrate the following scenarios as part of the installation and commissioning: i) Any other scenario not covered above but envisaged in the BCP plan	Who will share the BCP Plan?	<b>Annexure Z4</b> has been added i.e "BUSINESS CONTINUITY PLAN / BACKUP & RESTORE/ RTO/RPO"
31	4.5.2.1.viii	SECTION-IV SCOPE OF WORK	4.5 MANPOWER: 4.5.2 Post implementation Manpower 4.5.2.1 Resident Engineers for DC & DR  viii. RE shall take the backup as per BHEL backup policy.	What is BHEL Backup Policy? How do we know that the Hardware sizing given in the Annexure 5 would be enough to meet the Backup Policies?	<b>Annexure Z4</b> has been added i.e "BUSINESS CONTINUITY PLAN / BACKUP & RESTORE/ RTO/RPO"
32	4.7	SECTION-IV SCOPE OF WORK	4.7 BUSINESS CONTINUITY PLAN (BCP) Documented Business Continuity Plan (BCP) should be in place and BCP testing to be carried out as per BHEL ISMS BCP Policy. All the necessary resources, software, program, etc. required to carry out the Business Continuity Plan shall be included in the scope of supply.	BCP Plan needs to be shared by BHEL	<b>Annexure Z4</b> has been added i.e "BUSINESS CONTINUITY PLAN / BACKUP & RESTORE/ RTO/RPO"
33	1.2 of Annexure 1	ANNEXURE-1 (1.2 HCI Solution for Data Recovery Requirements)	1.2 HCI Solution for Data Recovery Requirements All the resources, as envisaged in DC, shall be applicable for DR as well along with periodic sync with DC. In case of disruption at DC, the services to be automatically shifted to DR node		<b>Revised Clause 1.2 of Annexure 1</b> 1.2 HCI Solution for Data Recovery Requirements All the resources, as envisaged in DC, shall be applicable for DR as well along with periodic sync with DC. In case of disruption at DC, the services to be shifted to DR node

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CLARIFICATIONS - III (Date of ISSUANCE OF CLARIFICATIONS II- 14-01-2025)					
Supply, Installation, Commissioning & Maintenance of Biometric System for Access Control and Attendance Recording on lease basis for 5 years for PAN INDIA Tender Reference no. AA: GAX:24: TAMS:101					
With reference to above mentioned NIT, following CLARIFICATIONS herein are being made:					
S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
1	Sl No 18 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	18. System Management Software: A systems management software capable of handling both OEM and non-OEM clients should be available with the HCI Solution.	A systems management software capable of handling both OEM nodes and non-OEM-clients should be available with the HCI Solution.  Every OEM has its own architecture and managing the non HCI nodes can dilute the sanity of the HCI architecture. Hence request you to modify this clause as mentioned.	<b>Already addressed in Corrigendum I of Pre Bid Query 1 (Sl. No. 9)</b> HCI solution should provide one single management console to manage DC and DR HCI setup including Compute, storage and networking.
2		Suggestions by vendor	Replication across locations shall be in low bandwidth mode and use both de-duplication and compression technologies while replicating the data. Vendor shall provide wan optimization device in highly redundant mode in case any of technology, de-duplication and compression is not supported for replication.	<b>Data Replication</b> Reason: for better architecture and investment protection.	<b>NOT TO BE CONSIDERED</b>
3		Suggestions by vendor	HCI solution shall help to create a DR plan file so that authorized users can execute it in case of disaster. Solution DR plan file shall be encrypted and password protected so that only authorized user can execute the DR plan. The solution must allow creation of a Runbook for automating the recovery of Virtual machines in a specified sequence at DR location for data consistency.	<b>Disaster Recovery (Failover and fallback)</b> Reason: for better architecture and investment protection.	<b>NOT TO BE CONSIDERED</b>
4	Sl no 5.1.1	ANNEXURE-5 Backup Solution	5.1 Disk based backup 1. Hardware : Processor:01xIntel Xeon /AMD RPYC with 16Core memory:02x 32GBRDIMM(total 64GB) Storage:02x1TB SSD Raid 1 For OS and software 10X 12TB HDD Raid 5 +HS for backup repository Network IO 02x 10G BaseT Power supply :02 x power supply HBA minimum 8 Gb FC connectivity with Tape library	Offered Disk to disk backup device shall be Modular design to allow configuration, add capacity increase performance. Offered device shall have Minimum of 125TB usable capacity with Raid 6 with 4 x 10/25Gbps SFP IP ports & 4 x 32Gbps ports. License and SFP for all ports shall be offered and configured with Dual power supply.  Reason: To ensure that OEMs don't propose sub-standard storage instead of purpose built backup appliance.	Already mentioned provisions in the NIT under Annexure 5,Sl No 5.1.1 meet the requirement
5	Sl no 5.1.1	ANNEXURE-5 Backup Solution	5.1 Disk based backup 1. Hardware : Processor:01xIntel Xeon /AMD RPYC with 16Core memory:02x 32GBRDIMM(total 64GB) Storage:02x1TB SSD Raid 1 For OS and software 10X 12TB HDD Raid 5 +HS for backup repository Network IO 02x 10G BaseT Power supply :02 x power supply HBA minimum 8 Gb FC connectivity with Tape library	Processor:two active active dual processors memory:02x 24GB cache(total 48GB) Storage 120TB Raw with Raid 5. Network IO 02x 10G BaseT Power supply :02 x power supply HBA minimum 8 Gb FC connectivity with Tape library  Reason: every OEM has its own architecture. Request to modify same.	Already mentioned provisions in the NIT under Annexure 5,Sl No. 5.1.1 meet the requirement
6	Sl no 5.1.1	ANNEXURE-5 Backup Solution	5.1 Disk based backup 1. Hardware : Processor:01xIntel Xeon /AMD RPYC with 16Core memory:02x 32GBRDIMM(total 64GB) Storage:02x1TB SSD Raid 1 For OS and software 10X 12TB HDD Raid 5 +HS for backup repository Network IO 02x 10G BaseT Power supply :02 x power supply HBA minimum 8 Gb FC connectivity with Tape library	Offered Disk to disk backup device shall be Modular design to allow configuration, add capacity increase performance. Offered device shall have Minimum of 125TB usable capacity with Raid 6 with 4 x 10/25Gbps SFP IP ports & 4 x 32Gbps ports. License and SFP for all ports shall be offered and configured with Dual power supply.  Reason: To ensure that OEMs don't propose sub-standard storage instead of purpose built backup appliance.	Already mentioned provisions in the NIT under Annexure 5,Sl No. 5.1.1 meet the requirement
7		Suggestions by vendor	Offered disk-based backup device shall also support immutability and dual authorization for preventing disruptive operations so that hackers shall not be able to execute or complete all critical operations like deletion of backup store, changing system time etc.	Reason: To ensure that OEMs don't propose sub-standard storage instead of purpose built backup appliance.	Already mentioned provisions in the NIT under Annexure 5,Sl No. 5.1.1 meet the requirement
8		Suggestions by vendor	Offered device shall support rated write performance of at-least 60TB per hour.	Reason: To ensure that OEMs don't propose sub-standard storage instead of purpose built backup appliance.	Already mentioned provisions in the NIT under Annexure 5,Sl No. 5.1.1 meet the requirement
9	2.13 OTHER ISSUES	SECTION-II GENERAL CONDITIONS OF TENDER	2.33.3 Consortium Bidding - NOT APPLICABLE. However, during execution of Contract, if tie-up is required with financier for supplying equipment, shall be permitted	Consortium is allowed or not so that we will be able to participate in the tender	<b>NO CHANGE</b> <b>Clause no. 2.33.3 remains same</b> i.e. Consortium Bidding - NOT APPLICABLE. However, during execution of Contract, if tie-up is required with financier for supplying equipment, shall be permitted

  
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S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
10	Sl No 1 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	1. Hyper-Converged Infrastructure: Proposed solution must be based on converged IT infrastructure platform that integrates storage, computer, networking, hypervisor, real-time deduplication, compression, and optimization along with high availability, powerful data management, data protection, and disaster recovery capabilities in a standard x86 server building block	Proposed solution must be based on <u>hyper-converged</u> IT infrastructure platform that integrates storage, computer, networking, hypervisor, real-time deduplication, compression, and optimization along with high availability, powerful data management, data protection, and disaster recovery capabilities in a standard x86 server building block.  Hyper Converged is the industry standard term & define the True HCI Solution providing all the asked functionalities from One Console.	<b>No Change</b> Point no. 1 of Table mentioned at Annexure 1 remains same i.e. 1. Hyper-Converged Infrastructure: Proposed solution must be based on converged IT infrastructure platform that integrates storage, computer, networking, hypervisor, real-time deduplication, compression, and optimization along with high availability, powerful data management, data protection, and disaster recovery capabilities in a standard x86 server building block  The present specifications (Sl No 1 of Annexure 1-1.1 HCI Solution for Data Centre Requirements) already mention Hyper Converged Infrastructure.
11	Sl No 2 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	2. HCI Nodes: Minimum 3 Nodes Configuration with HCI Software Solution with N+1 nodes ensure high availability for achieving usable resources across cluster in the event of 1 physical node failure.	Minimum 3 Nodes Configuration <u>with Additional one node as backup</u> with HCI Software Solution with N+1 nodes ensure high availability for achieving usable resources across cluster in the event of 1 physical node failure.  It will give bidders to configure solution without any ambiguity.	<b>No Change.</b> Point no. 2 of Table mentioned at Annexure 1 remains same i.e. HCI Nodes: Minimum 3 Nodes Configuration with HCI Software Solution with N+1 nodes ensure high availability for achieving usable resources across cluster in the event of 1 physical node failure.  <b>It is clarified that the nodes will be in 2+1 mode to ensure high availability for achieving usable resources across cluster in the event of 1 physical node failure.</b>
12	Sl No 18 of Annexure 1	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	18. System Management Software: A systems management software capable of handling both OEM and non-OEM clients should be available with the HCI Solution.	To be amended to: HCI solution should provide one single management console to manage DC and DR HCI setup including Compute, storage and networking.  Suggested language will make it more elaborative and less restrictive	<b>Already addressed in Corrigendum I of Pre Bid Query 1 (Sl. No. 9)</b>
13		Suggestions by vendor	All the components of HCI, i.e. CPU, RAM, Disks should be physically inside the HCI node and no component should be provisioned from outside the node	Additional point to be incorporated.  This will ensure that true HCI solutions are being provided by the bidders, and make-shift HCI solutions are not proposed to BHEL	<b>NOT TO BE CONSIDERED</b>
14		Suggestions by vendor	FIPS-140, CCC, EAL2	These are very important worldwide-accepted security certifications and must-have for any HCI solution.  These are generic and non-restrictive	<b>NOT TO BE CONSIDERED</b>
15		Suggestions by vendor	Control of East-West TrafficSolution must have Microsegmentation/Distributed Firewall for east & west traffic security natively through HCI	Extremely important clause related to security and must-have for any HCI solution  These are generic and non-restrictive	<b>Not to be Considered/ Not to be included explicitly in technical specs</b> as clause no. 4.1.12 already covers this aspect. For successful implementation, Refer Clause 4.1.12 (Section IV-SCOPE OF WORK) Supply, installation & configuration all other necessary hardware, software & manpower that are not explicitly mentioned in the tender but are required to full-fill the intended specifications and to make the total system successfully operational shall be in the Scope of contractor without any extra cost to BHEL
16		Suggestions by vendor	The cluster should be scalable upto at least 32 nodes and all these 32 nodes should be generic, i.e. consisting of both compute & storage	Basic clause for scalability.  These are generic and non-restrictive	<b>Revised Sl No 24 of Annexure 1 (1.1 HCI Solution for Data Centre Requirements) :</b> 24. Capacity Augmentation :Bidder shall support for incorporating/integrating any additional <b>identical</b> server node, provided by BHEL, in the existing infrastructure.
17		Suggestions by vendor	The HCI solution should be capable of configuring storage in both RF2 and RF3 depending on the need at the time of installation or in future at the time of scaling the infra	Basic clause for replication factor.  These are generic and non-restrictive	<b>NO CHANGE.</b> Point no. 2 of Table mentioned at Annexure 1 remains same i.e. HCI Nodes: Minimum 3 Nodes Configuration with HCI Software Solution with N+1 nodes ensure high availability for achieving usable resources across cluster in the event of 1 physical node failure.  <b>It is clarified that the nodes will be in 2+1 mode to ensure high availability for achieving usable resources across cluster in the event of 1 physical node failure.</b>
18		Suggestions by vendor	The OEM directly or through its resellers must have successfully supplied and configured HCI solution of more than 5 nodes at any central /PSU/state govt. 1 such project in each of the last 5 years should be cited along with their satisfactory installation report. Also, the HCI software OEM should have a direct presence in India for at least last 8 years in the offered solution category including Hypervisor	Basic clause for OEM presence in India.  These are generic and non-restrictive	<b>NOT TO BE CONSIDERED.</b> With respect to make in India & related requirements, sufficient clauses have been mentioned in tender.
19	Sl No 1.1.2	SECTION-VI 6.0 PRE-QUALIFICATION REQUIREMENT (PQR)	1.1.2 Similar work experience:The Bidder shall have experience of having successfully completed similar works or satisfactorily executed similar works for minimum one-year period in a running project, during last 7 years, ending on last day of the month previous to the one in which tender is invited in any one of the following (including GST). The Work order of the project should be in the name of the bidder. The order copies of above-mentioned projects & completion/ experience certificate along with the offer is to be submitted as per Annexure -P. Verification of genuineness of PQR documents shall be obtained by BHEL from the respective customer. The value of the works completed (proof of completion to be submitted) should be as follows:		<b>NO CHANGE</b>
20	Sl No 1.6	SECTION-VI 6.0 PRE-QUALIFICATION REQUIREMENT (PQR)	1.6 : The bidder should not be insolvent. The bidder should submit a bank solvency certificate for not less than Rs. 18.17 Crores. The solvency certificate should not be older than 01 year from the date of issue of NIT. (Annexure- Q along with Insolvency Certificate from Bank)	Clarification on turnover requirement & solvency clause	<b>NO CHANGE</b>


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S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
21	Sl No 1.7	SECTION-VI 6.0 PRE-QUALIFICATION REQUIREMENT (PQR)	1.7: Only Class I & Class II local suppliers are eligible to bid in this tender. For this procurement, the local content to categorise a supplier as a Class I local supplier/Class II local supplier/ Non-local supplier and purchase preference to Class I local supplier, is as defined in public procurement (preference to Make In India, order 2017, dated 19.07.2024 issued by DPIIT. In case of subsequent orders issued by the nodal Ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part II bids against this NIT. Raw materials, components etc. will not be sourced from any bidder representing countries sharing land borders with India, unless such a bidder is registered with the Competent Authority in India. Contractor would be bound by the guidelines of GoI being issued time to time, in this regard. (Bidder need to submit Annexure- R in this regard)	Clarity on Class I/Class II suppliers if many OEMs are involved in the process by System Integrator. Some of the OEMs might be Class I / Class II or do not fall in any of the class specified.	<b>NO CHANGE</b> It is clarified that Class I & Class II applies to the bidder of the tender
22	NOTE	SECTION-VI 6.0 PRE-QUALIFICATION REQUIREMENT (PQR)	Note: 1.No bidder (except Central State PSUs/Government Departments) including MSE, Start Ups shall be given EMD submission waiver, 2.No bidder including MSE, Start Ups shall be given Exemption for Turnover & Work experience	EMD waiver is being given to whom	<b>Already addressed in Corrigendum II of Pre Bid Query 1</b>  <b>Refer :</b> (NOTE 1 under SECTION VI REVISED PQR-CORRIGENDUM II): No bidder (except Central State PSUs/Government Departments) including MSE,Start ups shall be given EMD Submission waiver.
23	Sl No 1.1.2	SECTION-VI 6.0 PRE-QUALIFICATION REQUIREMENT (PQR)	1.1.2 Similar work experience:The Bidder shall have experience of having successfully completed similar works or satisfactorily executed similar works for minimum one-year period in a running project, during last 7 years, ending on last day of the month previous to the one in which tender is invited in any one of the following (including GST). The Work order of the project should be in the name of the bidder. The order copies of above-mentioned projects & completion/ experience certificate along with the offer is to be submitted as per Annexure -P. Verification of genuineness of PQR documents shall be obtained by BHEL from the respective customer. The value of the works completed (proof of completion to be submitted) should be as follows:	Instead of only Bidder's experience please mention Bidder/OEM(or through its Reseller). We request you to please change the clause as below: The Bidder/OEM(or through its Reseller) shall have experience of having successfully completed similar works or satisfactorily executed similar works for minimum one-year period in a running project, during last 7 years, ending on last day of the month previous to the one in which tender is invited in any one of the following (including GST). The Work order of the project should be in the name of the bidder. The order copies of above-mentioned projects & completion/ experience certificate along with the offer is to be submitted as per Annexure -P. Verification of genuineness of PQR documents shall be obtained by BHEL from the respective customer. The value of the works completed (proof of completion to be submitted) should be as follows: i. One similar work of total value not less than INR 9.69 Crore OR ii. Two similar work of total value not less than INR 6.05 Crore OR iii. Three similar work of total value not less than INR 4.84 Crore Definition of Similar Work/s: Similar works shall be defined as: Supply, installation, testing, commissioning and maintenance of Biometric based Access Control & Attendance Management System (including server hardware, networking) and /or Barriers/turnstile covering a minimum of: i) One similar work of total 6750 Users for Central/ State Govt. I PSUs/Public/ Private Limited Companies OR ii) Two similar work of total 4500 Users for Central/ State Govt. I PSUs/ Public/ Private Limited Companies OR iii) Three similar work of total 2250 Users for Central/ State Govt. I PSUs/ Public/ Private Limited Companies. The bidder/OEM(or through its Reseller). shall be required to submit work order and performance certificate. Your favorable consideration of this request will further demonstrate your commitment to supporting local businesses and empowering MSEs.	<b>NO CHANGE IN PQR</b>
24	Sl No 9	ANNEXURE 8 (Common Technical Specifications of Facial Recognition Device)	9. Processor: Minimum ARM Cortex/Intel/AMD Quad Core, 64-Bit, 1.4GHz Processor release year should on or after 2021	We have Cortex A53 Quad Core 1.8 GHz which is better & latest in terms of performance & reliability. Point no. 9 of table mentioned at Annexure-8 remains same. No Change.	<b>No Change is recommended.</b> <b>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.26)</b>
25			Yes	There is No OEM at the moment who is genuinely making 100% Standard Algorithm based Face device in India. This is specific to Singe OEM and that too CCTV based Device. Kindly accept Products from S.Korea with Local Support & Service centres in India. Then Genuine bidders will come in. To avoid Chinese (they show Make in India also) then you can also put in Land Border Clause & Mac Address should have same Name of OEM. This will avoid chinese competiton.	<b>Already addressed in Corrigendum I of Pre Bid Query 1 (Sl. No. 11)</b>
26		Suggestions by vendor	Algorithm should be NIST listed, Kindly accept this suggestion.	No change / Not to be considered .	<b>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.31)</b>
27		Suggestions by vendor	the device should have IK06 vandal protection rugged protection as it is expensive device and enhances its longevity, making it suitable for high-traffic or exposed environments, kindly accept this suggestion.	No change / Not to be considered .	<b>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.32)</b>
28		Suggestions by vendor	Components not used from countries, which sharing land border with India, Kindly accept this suggestion.	In this regard, a compliance to Order dated 19 July 2024 issued by DPIIT and bidder condition representing related to Raw countries materials, sharing land components borders etc. with Insourcing dia.has from been any made mandatory in PQR clause no. 1. 7 of Section -VI , Annexure-R submission is mandatory and also covered in Point no. (vi) of clause 5.5 of section-V. OEM factory/manufacturing unit / project site at any stage of evaluation & during currency of contract. Bidder shall co-ordinate and facilitate the same. Travelling & lodging (if any) expenses for such visit shall be borne by BHEL.Further, Annexure Z3 DECLARATION CERTIFICATE has also been added additionally in tender; covering this point.	<b>Already addressed in Addendum I of Pre Bid Query 1 (Sl. No.4 &amp; S.No. 5)</b>
29		Suggestions by vendor	The readers should be GDPR Compliant, Kindly accept this suggestion.	Tender already states compliances with all relevant legal provisions. Annexure 1 (Ifon Disclosure Agreement Each Party will comply with all applicable data protection laws and regulations. I	<b>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No. 30)</b> <b>Tender already states compliances with all relevant legal provisions.</b>  <b>Annexure- I (Non Disclosure Agreement) -Each Party will comply with all applicable data protection laws and regulations.</b>

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S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
30		Suggestions by vendor	The Device should be able to support the Walk-through feature, Kindly accept this suggestion.	No change / Not to be considered .	<u>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.33)</u>
31		Suggestions by vendor	The device should have up to 25000 lux, Kindly accept this suggestion.	No change / Not to be considered .	<u>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.34)</u>
32		Suggestions by vendor	Face Reader should have 20,000 Image logs capacity which enables tracking changes in a user facial expression making it more efficient and reliable to work so Kindly accept this suggestion.	No change / Not to be considered .	<u>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.35)</u>
33		Suggestions by vendor	The device should support multi face authentication which can reduce false rejections or acceptances, improving overall accuracy and reliability, kindly accept this suggestion.	No change / Not to be considered .	<u>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.36)</u>
34		Suggestions by vendor	The tender is governed by Government of India (GOI) Rules and Regulations like General Financial Rules (GFR), DPIIT Policies etc. Bidders to ensure all GOI guidelines are followed. Bidders while selecting OEMs of equipment's, Hardware and Software (proposed to be supplied for this tender) are to ascertain the documents submitted by OEMs carefully as they shall be held accountable for submitting any False Claims/Representations made by ANY OEMs of equipment's, Hardware and Software (proposed to be supplied for this tender) as per GOI guidelines. Bidders to read / well versed with the GFR of GOI.	Suitably covered in Annexure-Z "Compliance to Restrictions Under Rule 144 (Xi) Of GFR 2017" and Annexure-V "DECLARATION BY AUTHORISED SIGNATORY OF BIDDER", Annexure-Z3 DECLARATION CERTIFICATE has also been added additionally in tender.	<u>Already addressed in Addendum I of Pre Bid Query 1 (Sl.No. 9)</u>
35		Suggestions by vendor	Bidders while selecting OEMs of equipment's, Hardware and Software (proposed to be supplied for this tender) to ensure that OEMs must be genuine and as per definition below: A. OEM is defined as a company that has its own manufacturing setup for the production of equipment's (not assembly / white labeled) required in this tender and is currently manufacturing the offered models under their own brand in their own manufacturing setup. B. OEM getting 3rd party manufacturing for offered products will not be considered as eligible OEM. C. Buyer reserves the rights to check that the models quoted are currently being manufactured at the OEM own facilities for manufacturing by visiting the premises, design and IPR's held in the name of OEM's name and may ask for any supportive documents for verifying the claims.	No Change	<u>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.37)</u>
36		Suggestions by vendor	OEM should have been manufacturing offered / similar technology equipment's for at least 5 Years (proof to be submitted).	already covered suitably in PQR	<u>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.38)</u>
37		Suggestions by vendor	Bidders while selecting OEMs of equipment's (proposed to be supplied for this tender) to ensure that OEMs must not be: A. Blacklisted/Delisted/Debarred with any Government Entity in India. B. Getting 3rd party manufacturing/ OEM /ODM (which includes branding and reselling products manufactured by any 3rd party) from any company that is Blacklisted/Delisted/Debarred with any Government Entity in India or any other country sharing land border with India. C. Importing Equipment (in Semi Knocked Down Kits/Complete Knocked Down kits and re-assembling them under their brand), sub-assemblies from any company that is Blacklisted/Banned/Debarred with any Government Entity in India or any other Country sharing land border with India.	Annexure-Z3 DECLARATION CERTIFICATE (enclosed) is added.	<u>Already addressed in Addendum I of Pre Bid Query 1 (Sl.No. 8)</u>
38		Suggestions by vendor	Bidders to give an affidavit that while selecting OEMs of equipment's, Hardware and Software (proposed to be supplied for this tender) they have ensured that the Hardware, Software and Firmware (proposed to be supplied for this tender) selected are actual manufacturers and are not getting 3rd party manufacturing like branding and reselling in India through importing/trading and rebranding such equipment from country that shares a land border with India.	In this regard, a compliance to Order dated 19 July 2024 issued by DPIIT and condition related to Raw materials, components etc. sourcing from any bidder representing countries sharing land borders with India has been made mandatory in PQR clause no. 1. 7 of Section -VI , Annexure-R submission is mandatory and also covered in Point no. (vi) of clause 5.5 of section-V. Further, Annexure-Z3 DECLARATION CERTIFICATE has also been added additionally in tender,covering this point ..	<u>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.39)</u>
39		Suggestions by vendor	OEM to submit an affidavit that they own the source code of the Software and Firmware being supplied for all the models being supplied against this tender and does not reside in any country that shares a Land Border with India.	In this regard, a compliance to Order dated 19 July 2024 issued by DPIIT and condition related to Raw materials, components etc. sourcing from any bidder representing countries sharing land borders with India has been made mandatory in PQR clause no. 1. 7 of Section -VI , Annexure-R submission is mandatory and also covered in Point no. (vi) of clause 5.5 of section-V. Further, Annexure-Z3 DECLARATION CERTIFICATE has also been added additionally in tender,covering this point ..	<u>Already addressed in Clarification I of Pre Bid Query 1 (Sl. No.40)</u>


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S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
40	Sl No 1.1.2	SECTION-VI 6.0 PRE-QUALIFICATION REQUIREMENT (PQR)	1.1.2 Similar work experience:The Bidder shall have experience of having successfully completed similar works or satisfactorily executed similar works for minimum one-year period in a running project, during last 7 years, ending on last day of the month previous to the one in which tender is invited in any one of the following (including GST). The Work order of the project should be in the name of the bidder. The order copies of above-mentioned projects & completion/ experience certificate along with the offer is to be submitted as per Annexure -P. Verification of genuineness of PQR documents shall be obtained by BHEL from the respective customer. The value of the works completed (proof of completion to be submitted) should be as follows: i. One similar work of total value not less than INR 9.69 Crore OR ii. Two similar work of total value not less than INR 6.05 Crore OR iii. Three similar work of total value not less than INR 4.84 Crore Definition of Similar Work/s: Similar works shall be defined as: Supply, installation, testing, commissioning and maintenance of Biometric based Access Control & Attendance Management System (including server hardware, networking) and /or Barriers/turnstile covering a minimum of: i) One similar work of total 6750 Users for Central/ State Govt./ PSUs/ Public/ Private Limited Companies OR ii) Two similar work of total 4500 Users for Central/ State Govt./ PSUs/ Public/ Private Limited Companies OR iii) Three similar work of total 2250 Users for Central/ State Govt./ PSUs/ Public/ Private Limited Companies. The bidder shall be required to submit work order and performance certificate.	We request you to delete this portion as this is very specic. The Bidder is well expereined in executing similar Projects but count of users are not always availble. Even in this particular Tender count of user is not specied by you. The same is followed by most Govt. Departments. Bidder's similar credential should be ok for this kind of a requirement.	<b>NO CHANGE</b>
41		Suggestions by vendor		Clarification: We hope arranging the link / connectivity between DC, DR and other sites are responsibility of BHEL and not of the Bidder.	<b><u>It is clarified that link / connectivity between DC, DR and other sites are responsibility of BHEL.</u></b>
42	4.11. b	SECTION-IV SCOPE OF WORK	4.11 CIVIL & ELECTRICAL WORK (INDICATIVE BUT NOT LIMITED TO):  b) Ferruling /labelling of cables /wires/passive networking for easy identification, Supply of all cable laying accessories including MS conduits, PVC pipes, supporting structures, clamps, identification tags, ferules etc. required for laying of cables shall be within the scope of contractor.	How to arrive at cost of Passive Cabling Works?	<b><u>It is clarified that cabling work is a separate line item at Sl No 2 of Part B - Outright purchase of ANNEXURE-18 (BILL of QUANTITIES).</u></b>  Estimated quantity/rate provided in the tender & accordingly the bidder has to quote in % age (above/ below/at par with the BHEL estimate of total project). (These charges should be valid for entire contract period).
43	4.1.20	SECTION-IV SCOPE OF WORK	4.1.20 Contractor shall submit escalation matrix with complete contact details to BHEL up to L3 level. Any update in matrix shall be updated to BHEL from time to time. Post Go-Live, Contractor shall assign a dedicated account manager for the project to BHEL. A quarterly meeting or as and when required by BHEL, shall be planned for discussion on performance and issues.	Dedicated Account Manager to BHEL. Where this person should be based out of? And what are the overall expectations,scope and deliverables of this person?	<b><u>It is clarified that Account Manager can be based anywhere.</u></b> A quarterly meeting or as and when required by BHEL, shall be planned for discussion on performance and issues.
44	4.2.2 i	SECTION-IV SCOPE OF WORK	4.2 SERVERS: 4.2.2 Installation of Server  i) Installation of Anti-virus	Who will supply the Anti Virus Software? Anit-Virus is NOT mentioned in the Bill of Materials	All the Operating Systems installed by bidder needs to be compatible with the antivirus supplied by BHEL(Current antivirus: Checkpoint). <b>In case BHEL supplied antivirus is not compatible in future with the installed OS, bidder will have to provide suitable enterpsise class antivirus; after taking clearance from BHEL.</b>
45	4.2.4 e	SECTION-IV SCOPE OF WORK	4.2.4 The contractor shall test & demonstrate the following scenarios as part of the installation and commissioning: e) The failover and failback should happen automatically	For failover Automation,who will share the critera to decide as to when to initiate the failover? What events should trigger the failover? Failback should never be automatic.Why automatic Failback is being requested?	<b><u>It is clarified that CRITERIA will be decided at the time of implementation of project; with the contractor in phase I itself.</u></b>
46	4.9 f	SECTION-IV SCOPE OF WORK	4.9 LEASE PERIOD MAINTENANCE: Maintenance shall cover the following:  f) Additions/Improvements/Changes in the software due to changes in existing Business Rules as per respective BHEL unit, to be done free of cost during entire contract period along with lease period	How can additional Software licences be included at NO extra cost during the lease period,espeacilly due to change in BHEL Policies or Govt. Policies which is beyond the control of Bidder/Contractor?	<b><u>Clause no. 4.9 f remains same i.e. LEASE PERIOD MAINTENANCE:</u></b> Maintenance shall cover the following:  f) Additions/Improvements/Changes in the software due to changes in existing Business Rules as per respective BHEL unit, to be done free of cost during entire contract period along with lease period  <b><u>It is clarified that the changes in existing Business rules refer to the BHEL HR Business rules regarding attendance /access control in the repsective BHEL locations not the change in Govt. policies change.</u></b>
47	4.15	SECTION-IV SCOPE OF WORK	4.15 PAN BHEL IMPLEMENTATION: Resource Mobilisation Period: of 01 month in each phase for each location	Resource Mobilisation Period on 01 month may be insufficient for IT hardware,as hardware deliveries typically take 6-8 weeks.	<b><u>Clause no. 4.15 of Section IV remains same i.e.</u></b> Resource Mobilisation Period: of 01 month in each phase for each location It is clarified that the resource mobilisation period is in addition to the timelines for go-live in Phase I & Phase II.

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S. NO	Clause/ Section No.	Section No.	Specification	Suggestion/ Query / Recommendation	Reply from BHEL
48	Sl No 2 (HCI Nodes)	ANNEXURE-1 (1.1 HCI Solution for Data Centre Requirements)	Minimum 3 Nodes Configuration with HCI Software Solution with N+1 nodes ensure high availability for achieving usable resources across cluster in the event of 1 physical node failure.	For HCI Solution-How many simultaneous Disk Failures redundancy is required?	<b>S.No.2 of Annexure-1 remains same</b> i.e. Minimum 3 Nodes Configuration with HCI Software Solution with N+1 nodes ensure high availability for achieving usable resources across cluster in the event of 1 physical node failure.  <b>It is clarified that Node level redundancy already specified in Sl No 21 ( HCI Nodes) ) of Annexure 1. Disk failure redundancy is not required.</b>
49	Sl No 2 of Annexure 2	ANNEXURE-2	2. Database Licenses: The bidder shall provide all required database licenses for this deployment at DC and DR. All the licenses required for proper running of the setup shall be provided from Day 1.	How many DB Licences are required?	<b>S.No.2 of Annexure-2 remains same</b> i.e. Licenses: The bidder shall provide all required database licenses for this deployment at DC and DR. All the licenses required for proper running of the setup shall be provided from Day 1.  <b>It is clarified that bidder has to decide the number of license (bidder needs to take/provide) for successful implemenation of the solution.</b>
50	Sl No 2 of Annexure 5	ANNEXURE-5 (Backup Solution) 5.1 Disk based backup	5.1 Disk based backup 2.Backup Software: Latest version of compatible backup software with requisite licenses The software to handle both disk based backup as well as tape library based backup Backup success/failure email intimation Backups to be configured as per prevailaing BHEL backup policy Restore testing is to be carried out as per prevailaing BHEL backup policy	Is Backup Solution required at DR site as well? If yes, do we need to provide additional Backup Server,Tape Library and Backup software licences to accommodate the same in the DR site? If No, how will you take Backups when the DC site has been failed over to DR site,and how will you maintain SLAs,Uptime,RPOand RTOs in case of Failover and actual disaster scenario?	<b>Details regarding backup solution at DR already included in technical specifications in Annexure 5 and Sl. No. 5 &amp; 6 of Annexure 18 (Bill of Quantities-CENTRALIZED INFRASTRUCTURE AND SOFTWARE SERVICES BOQ for Disaster Recovery Site(DR))</b>
51		Clarification sought by vendor		NMS Software for monitoring of Hardware & Software? Who will provide this NMS? If Bidder has to provide,then should the infrastructure requirement and manpower requirement for the same be included in the proposal? How many years of monitoring data data needs to be maintained online in the system?	<b>NOT REQUIRED</b>
52		Clarification sought by vendor		What is the WAN connectivity/Interconnectivity between the various BHEL sites? We need complete WAN network architecture,with individual components,port -level connectivity and architecture diagram	<b>It is clarified that BHEL will provide MPLS Connectivity of bandwidth 1Gbps between various BHEL sites/Units/Locations</b>
53		Clarification sought by vendor		If additional WAN bandwidththis required to achieve and maintain the uptime,SLAs,RPO and RTOs,who will procure the bandwidth? Will BHEL provide the same?	<b>BHEL will provide the additional bandwidth, in case it is required to meet the SLAs, RTO, RPO</b>
54		Clarification sought by vendor		Do the IT Equipment also need to be covered under Insurance (Hardware and Software)?	<b>Bidder shall refer to clause no. 5.4 in this regard. Insurance already covered suitably in tender.</b>
55		Clarification sought by vendor		Is Professional Liability and General Liability Insurance required for the Manpower? If Yes, what is the aomunt of coverage required?	<b>It is clarified that this contract is not related to manpower hiring. All workforce working under this project will be on roll of bidder or will be their responsibility so as per respective governement guidelines, bidder may proceed for insurances. Bidder shall refer to clause no. 2.15, 2.48 (d), 2.49.3, 2.56, 5.4 in this regard.</b>
56		Clarification sought by vendor		Supply of 42U Rack in DC and DR-Not Clear (Who will supply)	<b>BHEL will supply 42U Rack in DC and DR.</b>
57		Clarification sought by vendor		Network Switch required for connecting Face Readers-who will supply	<b>BHEL will provide Network switch for connecting Face Readers</b>

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## ANNEXURE- 1 TO 17 DETAILS (REVISION 02)

Sl. No.	ANNEXURE	DESCRIPTION
1	Annexure 1(R02)	HCI Solution for Data Centre/ Data Recovery Requirements
2	Annexure 2 (R02)	Database
3	Annexure 3 (R02)	Load Balancer
4	Annexure 4 (R02)	TOR & Management Switches
5	Annexure 5 (R02)	Backup Solution
6	Annexure 6 (R02)	Centralized Software
7	Annexure 7 (R02)	Enrollment Unit
8	Annexure 8 (R02)	Common Technical Specifications of Facial Recognition Device
9	Annexure 9 (R02)	Facial Recognition Device
10	Annexure 10 (R02)	Turnstile
11	Annexure 11 (R02)	Boom Barrier
12	Annexure 12 (R02)	Tower Lights
13	Annexure 13 (R02)	Smart Card
14	Annexure 14 (R02)	Miscellaneous Items
15	Annexure 15 (R02)	Installation and Commissioning
16	Annexure 16 (R02)	Auto Swing Barriers
17	Annexure 17 (R02)	EM Lock

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## ANNEXURE-1 (R02)

### 1.1 HCI Solution for Data Centre Requirements

SR NO	Characteristic	Specification	Compliance
	Make & Model	to be specified by vendor	
1	Hyper-Converged Infrastructure	Proposed solution must be based on converged IT infrastructure platform that integrates storage, computer, networking, hypervisor, real-time deduplication, compression, and optimization along with high availability, powerful data management, data protection, and disaster recovery capabilities in a standard x86 server building block	
2	HCI Nodes	Minimum 3 Nodes Configuration with HCI Software Solution with N+1 nodes ensure high availability for achieving usable resources across cluster in the event of 1 physical node failure.	
3	CPU	Minimum 5th generation Intel Xeon/3rd generation AMD EPYC processor with minimum 20 16-cores per processor with minimum base frequency 2.00GHz	
4	Processors	Minimum 2 Processors per node	
5	Cache	30 MB Cache or higher	
6	Memory	Minimum 128 GB per node	
7	Network Interface	Minimum 10G SFP+ ports - In Redundant Mode. No Single Point of Failure Minimum 4*10G SFP+ Ports per node.	
8	Graphics	Integrated Graphics Controller with minimum 16 MB embedded video SDRAM	
9	Storage	Minimum 20 TB usable storage capacity on SSD for complete HCI solution. Also, Virtual server Instance Data Deduplication and compression feature to be available across the virtualization cluster.	
10	System Cooling/Fan/PSU	Each node to have dedicated non-shared dual-PSU's with redundant fan.	
11	PCI Slots	Minimum of 3 * PCI Express Expansion Slots 5.0 or higher per node should be supported	
12	HBA	In case, the solution requires FC adapters then min 8Gbps and in Redundant Mode to be supplied.	
13	Operating Environment	Op Temp Range: 50° to 77°F (10° to 25°C) Non-Op Temp Range: -22° to 140°F (-30° to 60°C) Op Humidity Range (non-condensing): 8% to 90% Non-Op Humidity Range: 5% to 95%	
14	Chassis type	Rack	
15	Supported Operating System	The following operating systems should be supported on the server: - Latest version of Microsoft Windows Server/Linux-preconfigured, with requisite enterprise licenses	
16	Clustering	Required Clustering/High Availability Services/Software for supplied OS	

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SR NO	Characteristic	Specification	Compliance
17	Remote Facility	<p>1. Offered Hyper-converge solution shall support VM-centric management through a single pane of glass via the virtualization manager of given hypervisor.</p> <p>2. Virtualization Manager of given Hypervisor shall be able to manage single or multiple clusters through single management console of hypervisor.</p> <p>3. Offered hyper-converge appliance shall have the ability to manage all aspects of the Hyper-convergence for all sites through Virtualization Manager of a given Hyper-Converge.</p> <p>4. Offered Hyper-converge shall be able to expose / connect to existing customer servers for hosting VMs and applications while taking advantage of the functionality of the solution</p> <p>5. Offered Hyper-converge shall be able to globally manage Backup Policies per Datastore or per VM and shall be able to control all of them directly through virtualization manager of given hypervisor.</p> <p>6. Hyper-converge solution should have single upgrade management console to simplify upgrade of Hyper-converge Software, hypervisor and ability to roll back upgrades.</p>	
18	System Management Software	HCI solution should provide one single management console to manage DC and DR HCI setup including Compute, storage and networking.	
19	Pre-Failure Notifications	Pre-Failure alerts covering processor, memory, HDD, Power Supplies and Fans	
20	Guest VM OS	Latest version of Microsoft Server OS/Enterprise Linux with back to back support from OEM for the entire contract period and all the required licenses from day 1.	
21	Software Licenses	Bidder to provide all the licenses for managing HCI Solution, monitoring of server health, Databases, VM Operating Systems and any other application deployed from day 1	
22	Security	Bidder shall be responsible for periodic Vulnerability Assessment, Penetration Testing and Server hardening of all the associated servers and applications.	
23	Patches and upgrades	Bidder shall be responsible to apply OS/Service pack/Patch upgrades periodically/as and when available in all the associated servers, operating systems, databases and applications. Highest priority is to be given to critical patches and to be applied immediately on release.	
24	Capacity Augmentation	Bidder shall support for incorporating/integrating any additional identical server node, provided by BHEL, in the existing infrastructure	

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SR NO	Characteristic	Specification	Compliance
25	Redundancy & Business Continuity	<p>(a) Proposed solution should have replication software to DR site. Licenses for applicable VMs replication should be made available. If any additional hardware, software or/and licenses are required for this functionality, these should be provided by the bidder at no additional cost to BHEL.</p> <p>(b) Replication should be possible locally (within same datacentre) and/or remote site (between DC &amp; DR).</p> <p>(c) Third party Replication software (not from appliance OEM) are acceptable, however, these should integrate with the hypervisor.</p>	
26	Virtualization	<p>1. Latest version of Industry standard Hypervisor to be provided for all the nodes.</p> <p>2. Virtualization software shall provide a virtualization layer that sits directly on the bare metal server hardware with no dependence on a general-purpose OS for greater reliability and security.</p> <p>3. Hypervisor layer should support features like snapshots / cloning of individual virtual machines, non-disruptive Scale-Up &amp; Scale-Out to grow capacity and/or performance whenever required. It should provide ease of use wizard for snapshot scheduling and instant batch cloning of Virtual machines.</p> <p>4. Virtualization software should provide visibility into storage throughput and latency of hosts and virtual machines that can help in troubleshooting storage performance issues.</p> <p>5. Virtualization management software should support user role and permission assignment.</p> <p>6. Virtualization management software console shall maintain a record of significant configuration changes and the administrator who initiated them.</p> <p>7. Virtualization management software should have integrated Virtual Machine performance monitoring.</p> <p>8. The solution shall provide the ability to create new virtual machines from scratch or based on templates (created from fully configured virtual machines or ISO images).</p> <p>9. The solution shall provide a centralized interface from which virtual machine across data centre can be configured, moved, monitored and administered</p> <p>10. Virtualization software shall be able to dynamically allocate and balance computing capacity across collections of hardware resources aggregated into one unified resource pool with optional control over movement of virtual machines like restricting or moving VMs to run on selected physical hosts.</p>	

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SR NO	Characteristic	Specification	Compliance
		11. Hypervisor software should support Virtual Machine image like Virtual disk format, OVF, RAW(.img,.raw),ISO, Qcow. 12. Should provide the ability to thin provision disks to avoid allocating all storage space upfront. Full monitoring capabilities & alerts to prevent from accidentally running out of physical storage space should be there. 13. Hypervisor must support IPv4, IPv6 or dual stack configuration. 14. Virtualization software should be offered with all above features & all the required licenses for operating the offered HCI cluster using a single console.	
27	Support Warranty &	OEM's Premium 24x7 support for the entire contract period should include remote and onsite support, labour, parts warranty.	

## 1.2 HCI Solution for Data Recovery Requirements

All the resources, as envisaged in DC, shall be applicable for DR as well along with periodic sync with DC.

In case of disruption at DC, the services to be shifted to DR node

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## ANNEXURE-2 (R02)

### 2. Database

		Compliance
Database	Latest version of Enterprise class Oracle/Microsoft SQL	
Licenses	The bidder shall provide all required database licenses for this deployment at DC and DR. All the licenses required for proper running of the setup shall be provided from Day 1.	
OEM Support	OEM's Premium 24x7 support for the entire contract period should include remote and onsite support, labour, parts warranty.	

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## ANNEXURE-3 (R02)

## 3. Load Balancer

SR NO	Characteristic	Specification	Compliance
	Make & Model	to be specified by vendor	
1	Solution	ADC Solution for HCI to optimize the availability, performance and security of cloud services and enterprise applications while reducing cost and complexity in the data center. ADC to be deployed in HA in DC and DR.	
2	Application Performance	Dynamic detect - Client connection persistence - Connection multiplexing - TCP buffering - IEEE 802.3ad link aggregation	
3	SSL Acceleration	Hardware SSL processing - SSLv3 and TLSv1 - 4096-bit maximum cipher key size (RSA or ECC) - End-to-end security (Server-side SSL communication) - SSL session reuse and timeout control - Cipher strength reduction - Customizable cipher suite order - Customizable SSL error pages - Sharable to multiple SLB services - SSL self check - Server name indication (SNI)	
4	Platform and performance	1. ADC to have 3Gbps of L7 throughput scalable to 10Gbps with license upgrade. 2. ADC to handle upto 6000 SSL TPS 3. ADC to have Minimum L7 Concurrent connections: 1.5M for 30,000 Users.	
5	Compression	Hardware or software accelerated - Virtualized compression - Inline HTTP processing - Compresses HTML, XML, Java scripts and CSS - Compresses Microsoft file formats (DOC, XLS, PPT) and PDF	
6	Caching	Virtualized, memory-based cache - HTTP 1.1 compliant, policy-based cache	

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SR NO	Characteristic	Specification	Compliance
7	Application Security	Hardened OS - Secure access only, access control based on client certificate; information and access method - Customer configurable SSL/TLS version; cipher suite and minimum cipher strength - Tamper-proof key and certificate protection; ADC should support WAF feature on same ADC OS version through license upgrade; Proxy-based firewall; TCP syn-flood protection; Flash and surge event protection; DoS protection; HTTP access method control; URL filtering; HTTP/DNS cache for mitigating DDoS; Deep application data inspection for dealing with attacks such as SQL injection and cross-site scripting; Detects and responds to known application vulnerabilities; Programmable to deal with future threats	
8	Secure Application Access	AAA support for Security Assertion Markup Language (SAML), LDAP, RADIUS and Open Authorization (OAuth) protocols - Supports definition of multiple AAA methods for multifactor authentication - Supports web single sign-on (SSO) and web single logoff (SLO) - Serves as a SAML SP (service provider) - Supports restriction on number of sessions, session timeout and session reuse	
9	Client Server Management, Auth and Authorization	CSR and private key generation - Self-signed certificate support - Import certificate and private key - Import certificate format - Extensive certificate support - Certificate backup and restore - Wildcard certificate support - Server Name Indication (SNI) Turbo client certificate verification - Root and intermediate CA import - Basic client certificate verification - Certificate chain support - Certificate revocation list (HTTP, FTP, LDAP) - Online certificate status protocol (OCSP, HTTP/HTTPS) - Certificate based access control - Inside SSL server, two-way certificates	

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SR NO	Characteristic	Specification	Compliance
10	Application Integration	Parse client certificate field information with different language/encoding - Pass individual field/group and field/customer format to back-end applications - HTTP header, URL and cookie - Integrated with proxy rewrite - Detailed SSL statistics	
11	System Management	Centralized cluster management - Secure CLI, WebUI and SSH remote management - XML-RPC for integration with 3rd party management and monitoring - SNMP V2/V3 and private MIBs - Syslog (UDP or TCP) - Administrator and operator account management - E-mail, paging and alerting capability - Multiple configuration files and unit configuration synchronization - Online troubleshooting - Real-time monitoring - Role-based administration control - HTTP/2 support - Top 10 statistics for users of IP, TCP, UDP and ICMP traffic	
12	Support Warranty &	OEM's Premium 24x7 support for the entire contract period should include remote and onsite support, labour, parts warranty.	

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#### ANNEXURE-4 (R02)

#### 4. TOR & Management Switches

SR NO	Characteristic	Specification	Compliance
	Make & Model	To be specified by vendor	
1	Solution Requirements	Managed Switches for Implementation of HCI Solution and part of HCI Infrastructure and configuration, quantity should be as per requirement of solution	
2	TOR Switch	Form factor: 1U Fiber Ports: Minimum 24 x 10G SFP+ HA Mode: Switches to be configured in High Availability mode All the required SFP modules for connecting TOR switch to HCI nodes to be provided by the bidder	
3	Management Switch	This switch will be used for configuring management interface of HCI and TOR switch nodes. Formfactor: 1U Copper Port: 24 x 1G Base-T Fiber Ports: 02 x 1G SFP	
4	Support & Warranty	OEM's Premium 24x7 support for the entire contract period should include remote and onsite support, labour, parts warranty.	
5	Connectivity	All the cables required for connecting switches to be provided by bidder.	

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**ANNEXURE-5 (R02)**  
**Backup Solution**

**5.1 Disk based backup**

SR NO	Characteristic	Specification	Compliance
1	Hardware	<p>Processor: 01 x Intel Xeon/AMD EPYC with 16 Cores</p> <p>Memory: 02 x 32GB RDIMM (Total: 64 GB)</p> <p>Storage: 02 x 1TB SSD RAID1 - For OS and Software 10 x 12TB HDD RAID 5 + HS - For Backup Repository</p> <p>Network I/O: 02 x 10G Base-T</p> <p>Power Supply: 02 x Power Supply</p> <p>HBA: Minimum 8 Gbps FC connectivity with Tape Library</p>	
2	Backup Software	<p>Latest version of compatible backup software with requisite licenses</p> <p>The software to handle both disk based backup as well as tape library based backup</p> <p>Backup success/failure email intimation</p> <p>Backups to be configured as per prevailing BHEL backup policy</p> <p>Restore testing is to be carried out as per prevailing BHEL backup policy.</p>	
3	OS	Latest version Windows Server/Linux - with requisite licenses from day 1	
4	Cables & Accessories	all necessary cables - FC, power & accessories should be supplied	
5	Support & Warranty	OEM's Premium 24x7 support for the entire contract period should include remote and onsite support, labour, parts warranty.	

**5.2 Tape Library based backup**

S. No.	Parameters / Feature	Detailed Specifications	Compliance
1	Make		
2	Model		
3	Tape library	Proposed Tape Library shall be from the industry leading OEMs.	
4	Capacity	2 Nos. of LTO9 tape drives with minimum 40 cartridge slots	
5	Connectivity	Minimum 8 Gbps FC connectivity with Backup Server	
6	Management	Web Based Management	
7	Scalability	4 Drives and 100 slots	
8	Performance	Minimum 300 MB/s per drive	
9	Redundancy	No single point of failure including Power Supply, FAN etc.	

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S. No.	Parameters / Feature	Detailed Specifications	Compliance
10	Cartridge Tapes	Barcode labels, 60 Nos. of Cartridge Tapes along with 2 nos. of cleaning Tapes	
11	Mounting	Tape Library must be rack mounted. Rack mounting kits and accessories should be supplied.	
12	Cables & Accessories	all necessary cables - FC, power & accessories should be supplied	
13	Support & Warranty	OEM's Premium 24x7 support for the entire contract period should include remote and onsite support, labour, parts warranty.	

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**ANNEXURE-6 (R02)**  
**Centralized Software**

**6.1 Time & Attendance Recording Software**

Sl no.	BHEL Specification	Compliance (Yes/No)
1	The Time & Attendance recording software to be developed and deployed by the vendor with the provision to configure unit-wise specific/different business rules.	
2	Configuration of time & attendance rules (Annexure-16) for the units/locations as per Annexure-14 added at a later stage to the centralized setup or modification to the existing rules, to be carried out by vendor without any additional cost implication.	
3	Attendance data interface API to be provided by vendor for various requirements like payroll processing etc. as per specifications mentioned in 1.5	
4	Management Information Reports to be available in the proposed Time & Attendance recording software as per Annexure-13. Provision to develop additional reports to be made available in the software.	
5	Role-based (Employee, Manager, HR, IT, Time Office, Unit/HR Heads, etc.) dashboards and reports to be made available for analysis. Sample templates are available at Annexure-15	
6	The key components include (not limited to): <ul style="list-style-type: none"> <li>- Time Management linked to Biometric devices providing real-time visibility to workforce</li> <li>- Leave management</li> <li>- Absence Management</li> <li>- Clock-in and Clock-out Management</li> <li>- Scheduling, Shift Management</li> <li>- Provisions for adhoc hierarchical reporting</li> <li>- Overtime Calculation</li> <li>- Late Night Shift Allowances</li> <li>- Holiday Management</li> <li>- Employee-wise weekly offs</li> <li>- Compensatory Off</li> </ul>	
7	The software to have the capability to record attendance regularizations by employees. After approval by competent authority as per extant business rules, schedules and timesheet of employees to be updated.	
8	Proposed software to have complete audit trail capabilities of changes made to employee's shift, attendance, regularization, access records etc. including information on who made the changes and when	
9	The software to provide the option to restrict entries to inactive/ terminated/ retired/ suspended employees on the attendance readers as well as access control readers. Software to check deduplication (already enrolled as a different entity) & Blacklist/ suspended person.	

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Sl no.	BHEL Specification	Compliance (Yes/No)
10	Provision for time-based escalations or reminder notifications for a given task in the approval process	
11	Provision to create unlimited shift patterns like AB, ABC, BAC, CAB etc.	
12	Provide the ability to schedule shifts that cross multiple days (e.g. start at 6:00 p.m. on day one and complete at 2:00 a.m. on day two).	
13	Provision to create shift patterns of varying durations like weekly, monthly, fortnightly, daily or any other Adhoc duration	
14	Provision to schedule shift patterns to be automatically repeated, or rolled forward to future weeks	

## 6.2 Access Control Software

Sl no.	BHEL Specification	Compliance (Yes/No)
1	The Access control software to capture employee Biometric punch data transactions alongwith facial log both for in-swipe and out-swipe and transfer the data to server for further processing. Vendor to integrate all access control devices at the gates with access control software.	
2	Configuration of access control rules (Annexure-15) for the units/locations as per Annexure-13 added at a later stage to the centralized setup or modification to the existing rules, to be carried out by vendor without any additional cost implication. There should be provision to increase or decrease threshold value in facial device to control FAR situation (if occurs)	
3	Software to support central monitoring and control. If communication to the central control fails, readers shall continue providing access based on the predefined security configuration. Until communication is regained, all event logs and alarms shall be stored locally (based on reader / controller capacity). These events shall be sent to the central server when the communication is regained	
4	Local and global Anti Pass back feature to be available.	
5	Each user to be validated / invalidated for a given period by setting the start date and end date.	
6	It shall be possible to assign one or more access groups for each user.	
7	The system to support all the different combinations of identification modes for users as defined in specification of all access control devices	

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Sl no.	BHEL Specification	Compliance (Yes/No)
8	Software to support central monitoring and control. Provision to provide rights to Unit-level administrator to add/delete/modify/update records (shifts, access, reports, etc.) pertaining to their own unit.	

### 6.3 Meal Booking & Canteen Access Software

Sl. no.	BHEL Specification	Compliance (Yes/No)
1	Vendor shall integrate canteen management software with turnstiles and Biometric Access control based system. The Application would be developed and deployed by the vendor in the Application server. Any modification/customisation to the existing software to be carried out by vendor without any additional cost implication.	
2	Vendor shall provide provision for customising the software so as to cater to different types of users & available canteens.	
3	Provision for booking meals in advance to be made in the online system/mobile app for all users.	
4	Online Dashboard to monitor Daily / weekly/ monthly analysis of meal taken (summary and detailed), Canteen expenditure, Meal planning report and options to add / deduct meals from individuals.	
5	Canteen wise / shift wise meal analysis and reconciliation	
6	Solution should be able to handle multiple counters with different meal rates	
7	Provides salary-debit facility for employees in credit scheme, for canteen facilities used via Integration with existing SAP based payroll system	
8	Facility to maintain various type of masters for Menu, rates, categorization of employees, canteen types, Meal timings	
9	Online dashboard for employees to monitor their daily meal consumptions and allied details	

### 6.4 Visitor Management Software

Sl. no.	BHEL Specification	Compliance (Yes/No)
1	Integrated with ACS and RFID cards	
2	Software to be accessible from desktop/laptop and to have access to printer and webcam (provided by BHEL)	
3	Provision for Visitor Registration (RFID card details, personal details, area/official to be visited, nature of visit, etc) with advanced/real-time approvals by BHEL employees	

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Sl. no.	BHEL Specification	Compliance (Yes/No)
4	Software and hardware controlled entry & exit building wise and floor wise. Provision to update access privilege and authorizations of visitors.	
5	Rule engine for visitor entry / exit, total hours, access location and time	
6	Frequent visitor, regular visitor, VIP visitors, also clear bifurcation of domestic and international visitors	
7	Quick gate pass generation facility for regular and frequent visitor	
8	Provision for single / multiple entry in a day or in multiple days	
9	VMS shall be installed on application server and will be accessible from PCs installed at BHEL Premises.	
10	Retention of visitor details and access details for a period of minimum 2 years	
11	Provision for printing visitor slip	
12	Evacuation management and alerts and notification to all visitors	
13	Security consideration for visitor data, all visitor data to be encrypted	

#### 6.5 API specifications

Sl. no.	BHEL Specification	Compliance (Yes/No)
	Vendor to provide APIs meeting the following requirements not limited to:	
1	Access time and attendance data unit-wise, employee-wise, cadre-wise, grade-wise, shift-wise, date-wise, etc.	
2	Read, add, modify, delimit employee data	
3	Read, modify employee shift, weekly-off, compensatory-off, holiday calendar, leave data etc.	
4	Read, modify, delimit/revoke user access privileges	
5	Assign, transfer & revoke biometric templates to reader/group of readers	
6	Read/check status of readers/devices/machines	
7	Access employee biometric template in raw format	
8	Provides salary-debit facility for employees in credit scheme, for canteen facilities used via Integration with existing SAP based payroll system	

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## 6.6 Device Control Application

Sl no	BHEL Specification	Compliance (Yes/No)
1	The software should have a central management module to remotely manage all the attendance and access control readers/devices/machines deployed across all the locations.	
2	The software to check the status of the readers / controllers on regular intervals.	
3	Provision to add & integrate new readers/devices to the existing setup.	
4	Assign, transfer & revoke devices to one or multiple groups	

## 6.7 Common Points for Centralized Software

Sl no.	BHEL Specification	Compliance (Yes/No)
1	The software developed shall conform to the latest cyber-security norms.	
2	All data over the network between the reader/ controller and the server to be encrypted and secured through SSL.	
3	Transmissions from the web-based application are to be kept secure through SSL	
4	All software/firmware/security upgrades to be downloadable through the network to the reader / controller.	
5	There can be multiple operators/administrators with hierarchical controls. System to be accessible only after valid authentication.	
6	Remediations of the non-conformities identified in Vulnerability Assessment/Penetration testing of the solution conducted by BHEL/Vendor/Third Party at periodic intervals to be addressed immediately by the vendor.	
7	The system to be accessible to all users based on their rights over the web/ mobile app by entering a user id and password. The Software to be user-friendly & web/ mobile app based so that the administrator / operator / user can access the software console from any location within BHEL Network or Outside BHEL via mobile app. The customized mobile app has to be provided by vendor to provide data like punch records, unauthorized absence, leave data etc. to employees.	
8	To support report scheduling and delivery of scheduled reports either through e-mail or file system share. Auto mailer for reporting based on users rights and roles	

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Sl no.	BHEL Specification	Compliance (Yes/No)
9	To support Visualization tools such as maps, gauges, and charts, indicators. Graphical Reports (like bar charts, pie charts) to be available.	
10	Provision for giving selective user rights	
11	All reports to support export to external files (device) in known formats like MS Excel, CSV, PDF etc.	
12	Provision to send customized reports by selecting fields and by entering customized messages to a select group/department/individual using email	
13	That part of the software including reporting module developed using BHEL Business rules will be property of BHEL. System documentation should be provided and any changes should be updated accordingly. This Software along with source code, customization code / objects / libraries shall be handed over to BHEL.	
14	There should not be any transaction data loss	
15	The data archival and back up shall be part of the system architecture and process.	
16	The software shall support a fault tolerant server i.e. in the event of a server failure, the system shall automatically switch over to HA node from the primary node without impeding the operation of the software.	
17	The software to support an import utility that provides importing of user information into the attendance database from BHEL database	
18	The software to do bulk user addition	
19	The software to store user information along with photographs for each user.	
20	The software to allow data to be imported or exported in real time or as a batch operation.	

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# ANNEXURE 7 (R02)

## 7. Technical Specifications of Enrollment Unit

Sl no.	Description	BHEL Specification	Compliance (Yes / No)
	Make & Model	To be specified by Vendor.....	
1	Usage	Enrollment station shall be used for various administrative function like creating / deleting system operators and managing their profiles / passwords, hardware management, smart card programming / preparation, capture template for all types of readers, card enrollment, card/user modification, system configurations, photo badging & smart card printing, system archiving etc.	
2	Requirements	Each enrollment station shall include a laptop (as per Point no.11), imaging printer, facial recognition enrollment kit, smart card encoder/programmer, HD Quality digital photo camera (as per Point no.10) along with photography setup & photo card preparation module, relevant software.	
3		It should be possible to import previously captured images	
4		Facial pattern template per employee shall be registered and stored in system	
5	Encoder/ Programmer Card Compatibility	Mifare or HiD iClass-has been mentioned in the smart card unit	
5.1	Card Encoding Time	Less than 5 seconds	
6	Communication Interface	High speed USB 2.0 or better	
7	Frequency	Minimum 13.56 MHz	
8	Facial Recognition template capture	Camera	
8.1	Capture formats	Facial image templates	
8.2	Facial Recognition Enrollment time	< 10 secs	
9	Card Preview and Printing	Vendor should be able to print the card on the printer after image has been accessed and layout selected. It should have print preview option before printing	

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Sl no.	Description	BHEL Specification	Compliance (Yes / No)
9.1	Card Printer	High Definition - Dye Sublimation / Resin Thermal transfer; 300 dpi Print Resolution; 16.7 million colour or better; Print Speed 30 seconds/card for CMYKO (Cyan, Magenta, Yellow, Black, Overlay) printing; Washable, Replaceable card cleaning rollers; CR80 (2.125" H x 3.375" W) Card Stock; Print within 2mm of Card Edge; Card Hopper Feeder with Minimum 100 Card Capacity; Simultaneous Dual Sided Lamination; Capable of buffering cards queued for printing	
9.2	Print Cartridges	Sufficient number of cartridges to prepare Smart Cards as mentioned in the tender scope	
10	Camera Enrolment	for HD Quality (1920 x 1080 or higher) Digital Camera	
11	Laptop	<p>1. X-86 Architecture Based, 64-Bit Supported Microprocessor with minimum 8 cores and 12 Threads, base frequency of 1.7 Ghz or higher, turbo boost of 4.2Ghz or higher, 15W TDP (or lower).</p> <p>2. 12MB Cache or Higher</p> <p>3. Matching Chipset for the quoted Processor</p> <p>4. On-board Graphics feature compatible with supplied OS</p> <p>5. Minimum 16 GB RAM 3200MHz SDRAM upgradeable to 32 GB.</p> <p>6. 512 GB PCIe NVMe SSD M.2 Hard Drive or higher</p> <p>7. Minimum 14" high definition anti-glare LED back lit Screen</p> <p>8. Spill proof/Resistant; backlit keyboard with full size keys</p> <p>9. Integrated High definition audio with integrated speakers and volume control (Hardware/Software). Single audio jack (single pin) for connecting ear phones and mic</p> <p>10. Integrated 100/1000 Mbps port</p> <p>11. Integrated Wi-Fi 6, supporting industry standard IEEE 802.11ax + Bluetooth 5.0 or higher</p> <p>12. Minimum 2 x USB 3.1 Ports, 1 x Type C, Stereo headphone/ microphone combo jack, 1 x HDMI Port. 1 x RJ - 45</p> <p>13. Minimum 3-cell battery capable of providing 6 hours or more backup in standard business environment, ACPI Compliant.</p> <p>14. OEM AC Adaptor suitable for 230V supply</p> <p>15. Should come pre-installed with Windows 11 Professional Edition or latest version with 64bit latest service pack. The latest system drivers should be available on OEM's website for the manager</p>	

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Sl no.	Description	BHEL Specification	Compliance (Yes / No)
		entire contract period. 16. OEM carry bag to be supplied. 17. Certification: (a) OS Certification from Microsoft (b) For OEM: ISO 9001 (Latest version) 18. OEM warranty including battery (labour, parts, on-site) for the entire contract period	
12	Body Type	The system to be Impact resistant, scratch resistant, weather durable and corrosion free.	
13	Stand	Proper stand shall be provided to mount the camera on LCD including universal clips for Monitor and laptop	
14	Signature Pad & Pen	Digital Signature Pad & Pen along with compatible software for digitizing employee signature, USB Interface	
15	Unicode Compatibility	System should be Unicode compatible so that entries/printing can be made in Hindi also	
16		Photography, facial recognition enrollment, card preparation and lanyard with Card Holder shall be in the scope of successful bidder	
17	Data Transfer	The system should have facility of transferring the data to central server for storage and retrieval and report generation	
18	Certifications	CE, FCC, RoHS, BIS	
19	Enrollment Application	Smart UI / UX for Enrollment and Registration Application, Step wise enrollment process and biometric login facility for Operators, Capable to Enroll Employee, Visitor, Contractor Staff etc in single application and Operator can use based on rights given to various desk	
20	Image Quality	High Quality image in dry, wet and dirt conditions.  The software should accept images with high quality levels , or accept best of five attempts.	

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# ANNEXURE 8 (R02)

## 8. Common Technical Specifications of Facial Recognition Device

Sr No.	Description	BHEL Specification	Remarks	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....		
2	Authentication Modes	Facial Recognition/ Card / Facial Recognition + card		
3	Authentication Method	1:1 and 1: N		
4	Device Type	Facial recognition reader with Smart Card Reader		
5	Camera	Dual Camera (Color & IR) ,2MP Surveillance Grade		
6	Camera Operation Sensor	It should be capable of authenticating users of different heights. It must be capable of detecting and authenticating the face either through device capability or inbuilt LED light in extreme dark/ daylight environment.		
7	Live Face Detection Method	System should be intelligent enough to accept only live faces and prevent security breach by a face in a recorded video, live stream, a photograph or any other means.		
8	Face Authentication Distance	50-120 cm with Auto face detection, Wide angle detection for users of different heights		
9	Processor	Minimum ARM Cortex/Intel/AMD Quad Core, 64-Bit, 1.4GHz Processor release year should on or after 2021		
10	RAM	Minimum LP-DDR4, min 2 GB & above (for 5000 & 15000 Face Templates).		
11	FAR / FRR	<0.001% FAR (False acceptance ratio) ; <0.01% FRR (False rejection ratio)		
12	Graphical Display	Backlit graphical LCD or advanced display of minimum Resolution: 1280 X 720 Pixel and size of min 5" IPS Display with Capacitive Touch Panel or higher to show user details or any other information but not limited to name of employee, staff number, photo, punch time , Network connectivity, Device ID & IP etc.		
13	Transaction Storage	Min 2,50,000 transactions (Each transaction consists of date, time, card number, key code, error code, device mode, reader number, slno, facial log etc.).		
14	Card Reader	Card reader shall be capable of reading the selected card technologies (HID iClass / Mifare within 13.56 MHz range). The protocol of data from the reader shall be an open format and non-proprietary. There should be provision to increase or decrease threshold value of matching facial data in facial device to control FAR situation (if occurs)		
15	Card Read Range	within 50 mm		
16	Body Type	Minimum Requirement is IP 65 Protection. The system has to be Impact resistant, scratch resistant, weather durable and corrosion free. Canopy/shed type enclosures are to be provided wherever required.		

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Sr No.	Description	BHEL Specification	Remarks	Compliance (Yes/No)
17	Mounting	The readers to be mounted on SS Pedestal/ MS pole (stand) / wall for ease of operation and accessibility.		
18	Spares	Sufficient spares to be maintained to meet contingencies to maintain uptime. Fault of one reader should not affect the operations of other readers in the network.		
19	Quality	Reader shall be manufactured using the latest and most accurate state of the art biometric technology like Auto Face detection, Fake Face Detection, Auto Push, real time face recognition, multi-threading and shall support high speed processing.		
20	Seamless operation	Template uploading from Central server shall not affect the normal working of Reader.		
21	Communication with Server	Reader should communicate with central server using TCP/IP protocol over Ethernet or Internet, 10/100 Mbps or higher auto sensing Ethernet with DHCP, SSL, IPv4 and IPv6 Support (Optional)		
22	Fault Detection	In the event of reader failure / malfunction / tempering, it shall be capable of being detected by the server and appropriate alarms shall be generated at workstations/ server. Fault of one reader should not affect the operations of other readers in the network. Also mail to ADMIN/ Superuser shall be triggered		
23	A/V Indicators	A/V Indicators must provide a unique tone (in range of 25-70 dB) or tonal sequence for various status conditions, including attendance marked/denied, reader power status, etc., with multi-color (red & Green) LED indications. Tone range should be audible and adjustable as per respective BHEL unit instructions. Green LED for allow/permitted condition, Red LED for Access denied.		
24	Centralised Monitoring	It should be possible to configure, manage and diagnose multiple geographically dispersed readers from a central desktop application without custom programming		
25	Clock	Shall have built-in RTC (real time clock) Calendar. Should be able to sync the clock with the central server / NTP server.		
26	Power	Shall have built-in or external power supply required for internal operations. Should be able to work with 220-240V single phase power supply		
27	Battery Backup Battery Refresh	SMF (Sealed Maintenance Free) Batteries for backup of min. 4 hours. Should be able to control EM locks. 01 EM lock should be provided by the vendor. Lithium battery to maintain data in RAM and supply power for the on-board RTC etc. The bidder shall compulsorily replace all the batteries after 3 years and as and when the batteries get faulty during the entire lease period		

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Sr No.	Description	BHEL Specification	Remarks	Compliance (Yes/No)
28	Environmental	Device shall have working temperature range of 0 to 50 degree C and humidity range of 10% to 80% RH non-condensing		
29	Availability of Data	The solution should be able to download punch information of employees from the readers in auto-push real-time mode. There should be no batch process required. Also, if required in case of LAN network failure, Power outage or any other possible interruption in DB Server etc., communications with server should be performed at regularly scheduled intervals or preset times, or on an "on demand" or "when available" basis.		
30	Software / Firmware Updates	Software/Firmware updates should be possible through network/communication Port and Software/Firmware updates to be provided free of cost during lease period.		
31	Replacement	Should be of Plug and Play Type. Should be possible to replace the faulty reader/ sensor or camera module without needing to reprogram the control unit.		
32	Biometric Modalities	The device should support Face+Mifare card/HID iClass card based solution The reader, face detection cameras, battery or any other components are to be enclosed in the same unit		
33	ESD	>=1 kV. (All the devices should be properly earthed).		
34	Certifications	CE, FCC, RoHS, BIS		
35	Communication Interface	1 USB Port, 2 relay output, 1 I/O (input & output) Wiegand		
36	Integration with Tower Lights	The Tower lights being procured should be installed with these Readers and should indicate "GREEN" colour for access granted and "RED" colour for access denied		
36	Data Security	Minimum AES 128-bit data encryption		
37	REMOVED			
38	Operating system	Linux / Android		
39	Bi-directional access	Provision to use same reader for both IN as well as OUT in multi-shift environment on 24x7 basis i.e. in same workplace there may be different shifts going on and logic to be built based on shift timings of a particular employee / group of employees		

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Sr No.	Description	BHEL Specification	Remarks	Compliance (Yes/No)
40	Functionality in offline modes	The readers should function in 100% offline mode without dependency on network both at the gates and work places. The biometric validation should be done within the reader in 100% offline mode. When the employee faces the reader, reader authenticates the templates with already available templates in the reader's memory and accordingly decision is made. Access (IN/OUT) movements should be provided only after validation of business rules even in offline mode ( no network).It should be able to send all events once connectivity is re-established (employees must be able to punch- in/ out for shift or lunch break during offline condition). Should work on First-In-First-Out mode.		
41	Reader Dump	There should be a facility for getting reader dump (of all the transaction data) online directly, by-passing the management software with proper authentication (username/password).		
42	MAC Address	MAC (Media Access Control) addresses of the quoted devices should be registered in the name of OEM		

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**ANNEXURE - 9 (R02)**  
**Facial Recognition Device**

**9.1 Type I : Technical Specifications of Wall Mount Facial Recognition Device**

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....	
2	Device	High End Standalone Wall Mount Facial Recognition Device for Attendance Recording	
3	Users Storage	Min. 5000	
4	Card Authentication Time	(1:5000) <2 secs	
5	Communication Interface	1 USB Port, 2 relay output, 1 I/O (input & output) Wiegand	

**Face Recognition Reader**

Refer Annexure 8 for Facial Recognition Device technical specification

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Authentication Time for face recognition	(1:5000) <2 secs	
2	User Turnaround Time for face recognition	Less than 3 Second per user (1:5000) including capture, matching and audio / visual validation	

**9.2 Type -II Technical Specifications - Facial Recognition Device for Access Control at Gates**

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....	
2	Device	High End Standalone Facial Recognition Device for Gate Access Recording	
3	Users Storage	Each machine individually should be capable of storing employee information/ employee profile/ master data (Min 15,000 users) for local validation.	
5	Communication Interface	1 USB Port, 2 relay output, 1 I/O (input & output) Wiegand	

**Face Recognition Reader**

Refer Annexure 8 for Facial Recognition Device technical specification

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Authentication Time for face recognition	(1:15000) <2 secs	
2	User Turnaround Time for face recognition	Less than 3 Second per user (1:15000) including capture, matching and audio / visual validation	

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**9.3 Type - III Technical Specifications - Portable Facial Recognition Device with Wi-Fi connectivity (For Access Control at Gates Emergency/ sudden breakdown situation & for Suspend employees)**

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....	
2	Device	High End Standalone Wall Mount Facial Recognition Device for Attendance Recording for Breakdown	
3	Communication Interface	1 USB Port, 2 relay output, 1 I/O (input & output) Wiegand	
		TCP/IP using RJ45 and in-build Wi-Fi	
		Device should support IEEE 802.11a/b/g/n compatible networks with Security	

**Face Recognition Reader**

**Annexure 8 for Facial Recognition Device technical specification**

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Authentication Time for face recognition	(1:15000) <2 secs	
2	User Turnaround Time for face recognition	Less than 3 Second per user (1:5000) including capture, matching and audio / visual validation	

**9.4 Type - IV - Facial Recognition Device reader with cellular connectivity and RFID card reader (For locations in Township where LAN connection is not available)**

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....	
2	Device	High End Standalone Wall Mount Facial Recognition Device with cellular connectivity for Attendance Recording	
3	Communication Interface	It should support cellular connectivity for wireless communication with application server web interface through https protocol.  1 USB Port, 2 relay output, 1 I/O (input & output) Wiegand  TCP/IP using RJ45, Cellular Connectivity	

**Face Recognition Reader**

**Annexure 8 for Facial Recognition Device technical specification**

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Authentication Time for face recognition	(1:5000) <2 secs	
2	User Turnaround Time for face recognition	Less than 3 Second per user (1:5000) including capture, matching and audio / visual validation	

**9.5 Type-V- Technical Specifications - Face recognition reader with card reader (Access Control at Gates) and Keypad**

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Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....	
2	Device	High End Standalone Wall Mount Facial Integration Recognition Device for Gate Access Recording	
3	Users Storage	Each machine individually should be capable of storing employee information/ employee profile/ master data (Min 15,000 users) for local validation.	
4	Reader Special Key Functionality	For the special key code operations i.e. 01 to XX, the reader will validate whether the employee has permission to avail that particular special movement at that moment and accordingly accept or reject the request. The complete details and logic for validation of the special movements 01 to XX will be a part of HR business rules.	
5	Communication Interface	1 USB Port, 2 relay output, 1 I/O (input & output) Wiegand	

#### Face Recognition Reader

Refer Annexure 8 for Facial Recognition Device technical specification

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Authentication Time for face recognition	(1:15000) <2 secs	
2	User Turnaround Time for face recognition	Less than 3 Second per user (1:20000) including capture, matching and audio / visual validation	

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## ANNEXURE-10 (R02)

## Turnstile

## 10. Technical Specifications of Turnstile

Sr No.	Description	BHEL Specification	Compliance (Yes/No)	Vendor's Remarks
1	Make & Model	Please Specify		
2	Tripod Turnstile	Three Cylindrical Arms of Stainless Steel		
3		Motorized drive mechanism (Motorized with either Servo Motor or Direct Drive Technology (Electro Mechanical and Only Mechanical are not accepted) 100% duty cycle high performance high torque motorised drive system providing bi-directional control of pedestrian passage in excess of 10 million maintenance free cycles of operation or a minimum of 7 years in a pedestrian gate application, integrated resolver for precise positioning feedback, high output torque for fast acceleration and deceleration. The above has to be certified by OEM on his letter head. Tripod should perform with Normally Close condition. References of vendor sites where the proposed model is working for last 4 years or more should be provided.		
		Stainless steel SS304; ; stainless steel face panel for mounting of peripheral components such as card readers, etc		
4		Mechanism to have Rotating Speed Adjustable/ Configurable		
5		Allows only one user to enter at a time.		
6		The tripod arms should not have the sharp ends to catch clothing		

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Sr No.	Description	BHEL Specification	Compliance (Yes/No)	Vendor's Remarks
7	Rotation	Rotate 120 Deg and Stop. Rotate 3 x 120 degree pivot arms and stop/locked in normal position. It should not get locked in improper position. The turnstile should get unlocked for rotation by user only after successful validation. In all other situations/conditions, the turnstiles should be in locked position only and user should not be able to rotate the turnstile. In case the turnstiles gets locked in improper position (other than home position), an alternate mechanism should be provided physically at the turnstile housing to bring to home position.		
8	Operation	Bi Directional Super smooth arm movements with minimal force and no kickback for utmost safety - will not spring forward at end of travel (i.e. hit child in back of head) Forced entry/exit and impact detection Card readers/keypad mounting plates standard (Flush Mounted) - The power and network cables connected to readers should be completely concealed and not available for access to users. Card readers/keypad mounting plates standard (Flush Mounted) - The power and network cables connected to readers should be completely concealed and not available for access to users. High speed, noise free and maintenance free operation The turnstiles should have drop arm feature during emergency situations Easy to program controller for common lane configurations Adjustable hold and open time		
9	Walk way	515 mm passage width + 50 mm clearance		
10	Integration	Should be integrable / configurable with the Gate Access Face.		
11	Fail Safe Mode / Fail Lock Mode	Fail safe Mode: In the event of power failure or switched off, tripod arms will be free to rotate in either direction/should drop and allow free passage for both directions Fail Locked mode: Tripod arms can be locked in case of power failure or switched off		

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Sr No.	Description	BHEL Specification	Compliance (Yes/No)	Vendor's Remarks
12	Anchoring	Turnstile Bolted to the floor using anchor bolt		
13		Dust proof body covering the mechanical system ensuring long life.		
14	Safety	The gates are electrically insulated to avoid electrical shock. (complete body of turnstile should be earthed)		
15	Locking	Locking mechanism to prevent tripod rotating in the opposite direction once it has travelled 25 degree past the rest position.		
16	Seamless operations	Self-centering mechanism should be smooth. No hydraulic damper or mechanical limit switch should be used		
17	Security	Positive action lock to prevent two passage at one time.		
18	Certification	CE Certified against Electrical & EMC Safety		
19	Height of rotor arm from ground	Min 840mm. Total system height and length of rotating arm shall be suitable according to walkway dimension.		
20	Opening Time	< 2 secs		
21	Protection Level	IP 54, TUV/BIS certificate for IP rating to be submitted		
22	Temperature	0 to 50 degree C		
23	Humidity	Humidity: 10% to 80% (non-condensing)		
24	Power	220-240 VAC Single phase @50Hz		
25	Quality	The case work must be of corrosion resistant stainless steel grade 316/304		
26	Housing Dimension (L X W X H)	(1200-1300) x (220-260) x (1000- 1050) mm approximately.		
27	Construction	One standard width dual pedestal housing with minimum 400mm arm length, 3 x 120 degree pivot arms, high performance high torque Motorised drive system designed for an excess of 10 million maintenance free cycles of operation, 100% duty cycle, 0.5s open/close time, minimum 30 persons per minute. Should have lane indicator. Dust proof body covering the mechanical system ensuring long life. Semi-Outdoor. To be installed under a canopy / RCC structure		

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Sr No.	Description	BHEL Specification	Compliance (Yes/No)	Vendor's Remarks
28	Controller	Motor Controller using the latest Micro processor technology allowing for very accurate control of torque, speed, acceleration and deceleration parameters of the motor in any position resulting in highly dynamic operation; extremely fast reactions in abnormal situations such as impact detection or forced entry/exit attempts; closed loop operation for precise positioning; ramping up and ramping down configuration; fully adjustable speed; resolver input for position feedback; LED indicators for operation and error diagnostics		
29	Performance Requirement	MCBF (Mean Cycles Before Failure)- 10 Mil Cycles. MTTR (Mean Time To Repair/Rectify)- 30 Minutes. For the above 2 points, references of vendor sites where the proposed model is working for last 7 years or more should be provided.		

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**ANNEXURE -11(R02)**  
**Boom Barrier**

**11.1 Technical Specifications of 6m Boom Barrier**

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....	
2	Lane width	Max. 6.0 m	
3	Opening/closing time	maximum 6 sec, TUV/BIS certificate for open/close time to be submitted	
4	Power consumption	Maximum 150 W	
5	Voltage	AC110V or AC220V, 50/60 Hz	
6	Duty cycle	100%	
7	Housing dimensions (W x D x H)	(300-350) x (280-360) x (900-1100)mm	
8	Enclosure rating	IP 54, TUV/BIS certificate for IP rating to be submitted	
9	Temperature range	-5 °C to +50 °C or better range	
10	Integrated 2-channel detector for induction loops	Standard	
11	Modular expansion of control system	Freely expandable	
12	Variable I/O assignment	Standard	
13	No. of digital inputs	8	
14	No. of relays/digital outputs	6/4	
15	Input with test for safety light barrier/ Laser scanner	1	
16	Selectable closing speed	Standard	
17	Barrier Weight	Minimum 40 Kg (except Boom)	
18	Built-in delay auto-closing and reverse on obstacle in case of resistance	Yes	
19	Certifications	CE Certified against Electrical & EMC Safety	

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### 11.2 Technical Specifications of 4m Boom Barrier

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....	
2	Lane width	Max. 4.0 m	
3	Opening/closing time	maximum 5 sec TUV/BIS certificate for open/close time to be submitted	
4	Power consumption	Maximum 120 W	
5	Voltage	AC110V or AC220V, 50/60 Hz	
6	Duty cycle	100%	
7	Housing dimensions (W x D x H)	(300-350) x (280-360) x (900-1100)mm	
8	Enclosure rating	IP 54, TUV/BIS certificate for IP rating to be submitted	
9	Temperature range	-5 °C to +50 °C or better range	
10	Integrated 2-channel detector for induction loops	Standard	
11	Modular expansion of control system	Freely expandable	
12	Variable I/O assignment	Standard	
13	No. of digital inputs	8	
14	No. of relays/digital outputs	6/4	
15	Input with test for safety light barrier/ Laser scanner	1	
16	Selectable closing speed	Standard	
17	Barrier Weight	Minimum 35 Kg (except Boom)	
18	Built-in delay auto-closing and reverse on obstacle in case of resistance	Yes	
19	Certifications	CE Certified against Electrical & EMC Safety	

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### 11.3 Technical Specifications of 1m Boom Barrier

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....	
2	Lane width	Max. 1.0 m	
3	Opening/closing time	maximum 5 sec TUV/BIS certificate for open/close time to be submitted	
4	Power consumption	Maximum 100 W	
5	Voltage	AC110V or AC220V, 50/60 Hz	
6	Duty cycle	100%	
7	Housing dimensions (W x D x H)	(300-350) x (280-360) x (900-1100)mm	
8	Enclosure rating	IP 54, TUV/BIS certificate for IP rating to be submitted	
9	Temperature range	-5 °C to +50 °C or better range	
10	Integrated 2-channel detector for induction loops	Standard	
11	Modular expansion of control system	Freely expandable	
12	Variable I/O assignment	Standard	
13	No. of digital inputs	8	
14	No. of relays/digital outputs	6/4	
15	Input with test for safety light barrier/ Laser scanner	1	
16	Selectable closing speed	Standard	
17	Barrier Weight	Minimum 30 Kg (except Boom)	
18	Built-in delay auto-closing and reverse on obstacle in case of resistance	Yes	
19	Certifications	CE Certified against Electrical & EMC Safety	

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**ANNEXURE - 12 (R02)**  
**Tower Lights**

**12. Technical Specifications of Tower Lights**

Sr No.	Description	BHEL Specification	Compliance (Yes/No)
1	Make & Model	To be specified by Vendor.....	
2		2-in-1, Tower Light	
3	Integration	Should support integration with Type III, IV, V based reader as mentioned for all gate access device.	
4	Mounting	Should be mountable on top of above mentioned readers/ scanners/ Reader Stand	
5	Light Source/Lamp Style	LED based light	
6	Operating Temperature	0 to 50 Degree C	
7	Rating	IP65	
8	Quality	Vibration resistant	
9		configurable to steady or flashing mode	
10	Requirement	Pre-wired and pre-assembled with min 100mm pole (excluding height of Light)	
11	Diameter of Light	Min 80 mm	
12	Height of Light	Min 60 mm	
13	Light Colors	Red and Green in the same lens	
14		LED Lamp, Pipe Mount Base and Flasher	
15	Certification	CE & UL / BIS Compliant	

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**ANNEXURE -13 (R02)**  
**Smart Card**

**13. Technical Specifications of Employee Smart Cards**

Sr No.	Description	BHEL Specification	Compliance (Yes/No)	Vendor's Remarks
1	Make & Model	To be specified by Vendor.....		
2	Memory	Card shall have minimum 4 KB memory and to be compatible with Mifare or HID iClass platform for storing and accessing data items		
3	Quality	Card shall be laminated and color coded as per the type of user. Colour fading and card damage due to inferior quality lamination shall be replaced by vendor.		
4	Encryption	Shall support DES, TDES, 3KT DES & AES cryptography. Data inside the card shall be secured with minimum 64 bit encryption so that data can't be modified or accessed until the card and the reader have completed mutual authentication		
5	Material	Card shall be durable, made of PVC and meet ISO 7810 standard for length, width, thickness and construction. Card shall be resistant to alcohol, Fuel, sweat etc. It should be capable of direct two sided dye-sublimation or thermal transfer printing so that cardholder information / images, instructions shall be printed directly onto card.		
6	Standard Compliance	Compliance to ISO/IEC 14443A		
7	Frequency	Contactless smart chip operating at 13.56 MHz		
8	Others	Smart card shall be supplied with 1 meter lanyard (with BHEL logo preprinted at defined distance intervals) and a solid / rigid plastic card holder with slots for clip or lanyard with Card Holder		
9	Warranty	Card shall be warranted against defect in material and workmanship for lifetime		
10	Environmental	Temperature 0 to 50 degree C; 10% to 80% RH non-condensing		
11	Additional Cards	Additional cards along with preparation, if any will be on the same rates		

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Sr No.	Description	BHEL Specification	Compliance (Yes/No)	Vendor's Remarks
12	Distance Recognition	of The card can be used as proximity card within a distance of 50 mm from surface of the reader.		
13	Operation	Compatible with swing barrier gates & EM locks		
14	Multiple Access	The same card should permit user to enter different work premises as per requirement		

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**ANNEXURE -14 (R02)**

**14. Technical Specifications of Miscellaneous Items**

Description			Compliance (Yes/No)	Vendor's Remarks
<b>14.1. Specifications of UTP (Unshielded twisted pair) Cable / RJ45 Connectors</b>				
Make	To be specified by Vendor.....			
1	Cat 6	Should meet minimum Category 6 requirements		
2	Type of Conductors	4 Pair 23 AWG Conductors		
3	Frequency	Characterized to 250 MHz		
4	Standards	TIA/EIA 568B, ISO Class E 11801-2002		
5	Gigabit Requirements	Should meet or exceed Gigabit Ethernet Requirements at 100 mtrs		
6	Connectors	Compatible with cable		
7	Length of the cable	As per the requirement		
8	Qty. of the connector	As per the requirement		
<b>14.2. Specifications of PVC Conduit</b>				
Make	To be specified by Vendor.....			
1	1" PVC Pipe, Medium Strength. ISI Mark			
2	Length of the conduit pipe	As per the requirement		
<b>14.3. Specifications of MS Conduit Pipe</b>				
Make	To be specified by Vendor.....			
1	1" MS Pipe, Medium Strength, ISI Mark, Minimum Wall Thickness 1.6mm			
2	Length of the conduit pipe	As per the requirement		
<b>14.4. Specifications of Power Cable</b>				
Make	To be specified by Vendor.....			
1	3 Core Multi-strand Flexible Copper Power Cable of size 1.5 Sqmm Suitable for Connecting readers / controllers / barriers			
2	Length of the cable	As per the requirement		

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# ANNEXURE-15 (R02)

## 15.1. Installation and Commissioning

Sl. no.	Description	BHEL Specification	Compliance (Yes/No)
1	Installation and commissioning	Project installation is in the scope of vendor ATP (Acceptance Test Plan) is in the scope of BHEL Commencement of contract period will be after ATP	
2	Manpower	Maintenance personnel viz. Hardware Engineers and Software Engineers (as per BoQ) shall be stationed at BHEL locations during contract period, for upkeep and maintenance of the equipment and for developing and maintaining the attendance recording, access control and canteen management systems and for Adhoc Management Information Reports generation.	

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**ANNEXURE-16 (R02)**

**16. Auto Swing Barriers**

**16.1 Auto Swing Barriers 1-Lane PWD**

Sl no.	Description	BHEL Specification	Compliance (Yes/No)
1	Automatic Swing Barriers Gates (1 lane) and make it compatible with Face recognition Devices (and through RFID card also) physically handicapped (PH) compatible	1. Material : Stainless Steel Grade 304 and scratch proof / laminated acrylic flap 2. Dimension (Range) : (L)       -       1200       -       1500       mm (W)       -       180       -       200       mm (H)       -       980       -       1100       mm 3. Flap Size : 425 mm - 450 mm 4. For Access width - 900 mm 5. Compatible with Face recognition device (access control) 6. Swing direction : Two ways 7. Pass rate : 20 - 30 person / minute 8. SOFTWARE CONTROLLED ENTRY & EXIT 9. PROVISION FOR MANUAL KEY (EMERGENCY) 10. In case of emergency/power failure, swings should be fully open 11.(REMOVED) 12. LED indicator for entry & no entry 13. Mean Cycle between failure (MCBF) : Minimum 50,00,000 14. Power Supply : 230 Volt / 50 Hz	

**16.2 Auto Swing Barriers 2-Lane PWD**

Sl no.	Description	BHEL Specification	Compliance (Yes/No)
1	Automatic Swing Barriers Gates (2 / Multi lane) and make it compatible with Face recognition Devices (and through RFID card also) and physically handicapped (PH) compatible	1. Material: Stainless Steel Grade 304 and scratch proof / laminated acrylic flap 2. Dimension (Range): (L)       -       1200       -       1500       mm (W)       -       180       -       200       mm (H)       -       980       -       1100       mm 3. Flap Size: 250 mm - 300 mm & 425 mm - 450 mm 4. For Access width - 600 mm on one side and 900 mm on second side 5. Compatible with Face recognition device (access control) 6. Swing direction: Two ways 7. Pass rate: 20 - 30 person / minute 8. SOFTWARE CONTROLLED ENTRY & EXIT 9. PROVISION FOR MANUAL KEY (EMERGENCY) 10. In case of emergency/power failure, swings should be fully open 11. (REMOVED) 12. LED indicator for entry & no entry 13. Mean Cycle between failure (MCBF): Minimum 50,00,000 14. Power Supply: 230 Volt / 50 Hz	

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### 16.3 Auto Swing Barriers 1-Lane

Sl no.	Description	BHEL Specification	Compliance (Yes/No)
1	Automatic Swing Barriers Gates (1 lane) and make it compatible with Face recognition Devices (and through RFID card also)	1. Material : Stainless Steel Grade 304 and scratch proof / laminated acrylic flap 2. Dimension (Range): (L) - 1200 - 1500 mm (W) - 180 - 200 mm (H) - 980 - 1100 mm 3. Flap Size: 250 mm - 300 mm 4. For Access width - 600 mm 5. Compatible with Face recognition device (access control) 6. Swing direction: Two ways 7. Pass rate: 20 - 30 person / minute 8. SOFTWARE CONTROLLED ENTRY & EXIT 9. PROVISION FOR MANUAL KEY (EMERGENCY) 10. In case of emergency/power failure, swings should be fully open 11. REMOVED 12. LED indicator for entry & no entry 13. Mean Cycle between failure (MCBF) : Minimum 50,00,000 14. Power Supply : 230 Volt / 50 Hz	

### 16.4 Auto Swing Barriers 2-Lane

Sl no.	Description	BHEL Specification	Compliance (Yes/No)
1	Automatic Swing Barriers Gates (2 / Multi lane) and make it compatible with Face recognition Devices (and through RFID card also)	1. Material: Stainless Steel Grade 304 and scratch proof / laminated acrylic flap 2. Dimension (Range): (L) - 1200 - 1500 mm (W) - 180 - 200 mm (H) - 980 - 1100 mm 3. Flap Size: 250 mm - 300 mm & 250 mm - 300 mm 4. For Access width - 600 mm on both sides 5. Compatible with Face recognition device (access control) 6. Swing direction: Two ways 7. Pass rate: 20 - 30 person / minute 8. SOFTWARE CONTROLLED ENTRY & EXIT 9. PROVISION FOR MANUAL KEY (EMERGENCY) 10. In case of emergency/power failure, swings should be fully open 11. (REMOVED) 12. LED indicator for entry & no entry 13. Mean Cycle between failure (MCBF) : Minimum 50,00,000 14. Power Supply : 230 Volt / 50 Hz	

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## ANNEXURE-17 (R02)

## 17. EM Lock

Sl no.	Description	BHEL Specification	Compliance (Yes/No)
1	EM locks for Door Access Control (Double Door) and make it compatible with Face recognition Devices (and through RFID card also)	1. Holding Force: minimum 300 kg 2. operating temp.: -10 to 50-degree C 3. Compatible with face recognition device (access control) 4. (REMOVED)	
2	EM locks for Door Access Control (Single Door) and make it compatible with Face recognition Devices (and through RFID card also)	1. Holding Force: minimum 300 kg 2. operating temp.: -10 to 50-degree C 3. Compatible with face recognition device (access control) 4. (REMOVED)	
3	Door Buzzer for access-controlled doors compatible with EM locks	1. Compatible with EM locks 2. (REMOVED)	

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## ANNEXURE Z4

### BUSINESS CONTINUITY PLAN / BACKUP & RESTORE/ RTO/RPO

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IT Infrastructure: IT infrastructure shall mean HCI and allied infrastructure and applications

Business Continuity: Business continuity means continuation of business operations in the event of any outage or breakdown in IT infrastructure.

Following are the major components of BCP:

1. Identification of events: For IT infrastructure, probable causes or events shall be identified and listed that may lead to outage, breakdown or disruption in the system.
2. A Standing Operation Procedure (SOP) shall be formulated to restore the service in the event of occurrence of any such identified events.
3. Plan to fulfil RTO and RPO requirements as defined
4. BCP Testing

#### A. BCP Implementation:

- a. Contractor shall carry-out Identification of events and preparation of SOP at the time of installation and configuration of IT infrastructure. The SOP document shall contain the step-by-step procedure with screenshots for restoration of the services for each identified event. SOP shall also include the responsibility matrix with contacts details.
- b. A plan shall be formulated at the beginning of the installation/configuration of the IT infrastructure for fulfilling the RTO/RPO requirements as defined. The plan shall include:
  - i. DC/DR replication: to be carried out at least once in every 10 minutes to meet the RPO requirement
  - ii. Failover from DC to DR: Within 30 minutes after manual invocation (with DR automation)
- c. BCP Testing: Testing of BCP shall be carried out periodically to check the adequacy, effectiveness, and suitability of the BCP. Contractor shall prepare a quarterly schedule for BCP testing of IT infrastructure:
  - i. During BCP testing, DR will be invoked and all the operations will continue from DR for at least one week
  - ii. After testing period of 1 week, the solution will Fallback & all the operations will continue to run from DC
- d. Backup: The backup solution/software to have following provisions:
  - a. Database backup
    - i. Full back up: Provision for daily/weekly/monthly full database backup
    - ii. Incremental: Provision for daily incremental backup
    - iii. Archive log backup: Provision for hourly backup
  - b. Application backup: Backup solution/software shall have the provision for daily full and incremental backup at file system level
  - c. Server Configuration Files backup: Full backup, initially on installation and subsequently on every configuration change
  - d. Backup shall be available on Disk as well as on Tape as per 3-2-1 backup principle
  - e. De-duplication: Disk backup shall have the provision for de-duplication
- e. Backup Restore: The BCP plan shall also include step by step procedure to restore the data/files as and when required. Testing for this activity shall be carried out at-least once a year. The data from backup will be used to set-up a parallel up and running system.
- f. RTO/RPO:
  - a. Recovery Time Objective (RTO):  $\leq 30$  mins
  - b. Recovery Point Objective (RPO):  $\leq 10$  mins

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