Corrigendum – Tender Reference No.: DGRPG/Storage_Backup/2021/1					
SN	**Tender / ATC Clause No.**	**Page No.**	**Tender / ATC Clause**	**Tender / ATC clause details / specification**	**Revised Clause**
1	5.2.1: Unified Storage Specification	22	Total configurable Cache (GB) across Controllers	Total configurable Cache (GB) across Controllers – 256 GB DRAM Across Controllers. The System must be supplied **with scalability of at least 512 GB of DRAM Cache for supplied system in scale-up or scale-out architecture.** PCIe Based cache or Cache on external gateways will not be considered as Storage System Cache.	Total configurable Cache (GB) across Controllers – 512 GB DRAM or higher across Controllers. The System must be supplied **with scalability of at least 768 GB of DRAM Cache for supplied system in scale-up or scale-out architecture.** PCIe Based cache or Cache on external gateways will not be considered as Storage System Cache.
2	5.2 Technical Specifications	21	Speed of front-end Ports in Gbps	Speed of front-end Ports in Gbps – **8x 32Gbps ports, 8x10Gbps Ports, 4x40Gbps Ports. In case 40Gbps ports are not available, then 10/25/32/100Gbps ports across dual controllers be provided uniformly to achieve 160Gbps.**	8x 32Gbps FC ports, 8x10Gbps ethernet ports or equivalent Ethernet ports.
3	5.2 Technical Specifications	21	Cache Type	Global/Federated	Global/Federated/Mirrored
4	5.2 Technical Specifications	23	Storage Temp Range	Storage Temp Range: **-30 to 60 degree celcius**	This Clause stands deleted.
5	5.2 Technical Specifications	23	Operating Humidity (Rh)	Operating Humidity - **8 to 80%**	This Clause stands deleted.
6	5.2 Technical Specifications	23	Storage Humidity (Rh)	Storage Humidity – **8 to 90%**	This Clause stands deleted.

Response to Queries (RTQ) – Tender Reference No.: DGRPG/Storage_Backup/2021/1								
SN	**Firm's Name**	**Tender / ATC Clause No.**	**Page No.**	**Tender / ATC Clause**	**Tender / ATC clause details/specification**	**Amendment Sought / Suggestion**	**Justification**	**PSeGS response**

1	Hitachi /HP/ IBM	5.2.1: Unified Storage Specification	22	Total configurable Cache (GB) across Controllers	Total configurable Cache (GB) across Controllers – 256 GB DRAM Across Controllers. The System must be supplied **with scalability of at least 512 GB of DRAM Cache for supplied system in scale-up or scale-out architecture.** PCIe Based cache or Cache on external gateways will not be considered as Storage System Cache.	**Hitachi** - Change To: Total configurable Cache (GB) across Controllers – 512 GB DRAM Across Controllers or higher. PCIe Based cache or Cache on external gateways will not be considered as Storage System Cache. **IBM** :- requested to consider minimum 768 GB Cache Memory to have a level playing architecture across the different Systems, Primary Storage as well as Backup.	**Hitachi** :-Midrange enterprise storages are highly engineered storage systems which are tested and validated with fixed configurations. Upgrading the cache at a later stage will not necessarily improve the storage performance. Hence many OEMs including **Hitachi do not offer cache scalability in midrange storage systems, since that will not improve the performance.** Also In order to match the IOPS generated by SSDs it is recommended to have minimum 512 GB DRAM Cache or higher from day one, to avoid any performance bottlenecks. In case if DGR still wants cache scalability, then please include the controoller addition/upgrade using storage virtualization for the same, for better participation from all the OEMs. **HP** :-Being the rate contract RFP,the specifications doesn't call for any future expandability, in terms of number of controllers, caching, data availability when additional capacity will be added in the array, the performance will be impacted if we add additional capacity within same set of controllers without upgrading to 4 controllers. **IBM** :- It is asked for 256 GB Cache across Controllers. However, this will allow entry level Systems to be qualified and will become a bottleneck in performance. Especially, with Backup Memory ask of 1024 GB (512 GB per Controller), it will mean that **Primary Storage running with less DRAM Cache Memory as compared to Backup Storage.** Hence, it is requested to consider minimum 768 GB Cache Memory to have a level playing architecture across the different Systems, Primary Storage as well as Backup. Department is using DRAM Cache from years, which is de-facto standard across industry including in high end storage for caching. Surprisingly, current RFP is allowing with SSD / Flash caching, which is inferior technology. This will only give advantage to specific OEM. Whereas department will be losing on technology and changing current storage infrastructure road	Refer Corrigendum

2	Hitachi /Dell	5.2 Technical Specifications	21	Speed of front-end Ports in Gbps	Speed of front-end Ports in Gbps – **8x 32Gbps ports, 8x10Gbps Ports, 4x40Gbps Ports. In case 40Gbps ports are not available, then 10/25/32/100Gbps ports across dual controllers be provided uniformly to achieve 160Gbps.**	**Hitachi** :- 8 x 32 Gbps FC, 4 x 10G iSCSI Ports and 8 x 10G NAS (NFS/CIFS) ports. **Dell** :- Request you to remove 4X40Gbps port requirement for us to qualify. **IBM** :- RFP ask is for 40 Gbps ports from storage system, which only specific OEM can provide.	**Hitachi** : 160 Gbps front end throughput on a midrange storage system (having 256/512 GB cache) favors particular OEM. Please note that the requested 2,00,000 IOPS can be achieved alone by 2 x 10G Ports only. Hence having more than 8 x 10G Ports (which can deliver more than 6 times the requested IOPS), will only restrict some OEMs including Hitachi from the participation. Request to please change the same for better participation from all the OEMs. **Dell** : The throughput generated from the asked capacity will be very much supported with 8x32 Gbps ports and 8x10Gbps ports, therefore we recommend DGR to make this requirement optional for additional 160Gbps.	Refer Corrigendum
3	Hitachi	5.2 Technical Specifications	23	Storage management software for configuration and **multipathing** (part of the supply).	Storage management software for configuration and native multipathing (part of the supply) – Yes	**Query** : Kindly confirm if the native multipathing refers to the native multipathing software from the storage OEM or the native multipathing software provided by host OS vendor.	**Query** : Kindly confirm if the native multipathing refers to the native multipathing software from the storage OEM or the native multipathing software provided by host OS vendor.	Native multipathing software from the storage OEM.

4	Dell	5.2 Technical Specifications	21	Cache Type	Global/Federated	Global/Federated/Mirrored	In Dual Controller architecture, Global cache does not matter, so you will not find any reference of Global cache in our documentation but we do mirror all writes across all controllers. Requesting you to allow offering Mirrored write cache for high availability. Global/ Federated is applicable in case of more than 2 controller. Since the required capacity is sufficient with two controllers so request you to ammend this point.	Refer Corrigendum
5	Dell	5.2 Technical Specifications	22	3-DC Zero Data Loss Support	3-DC Zero Data Loss Support -(Yes)	Understand DGR is looking for Single Array, How DGR intends to setup 3 DC Zero RPO solution. Generally Financial institutes ask for such solutions where even single transaction loss can cause huge commercial loses. Aside to storage supporting 3 DC replication, DGR needs to invest in high speed low latency network. Therefore we recommend DGR to make this requirement optional.	Understand DGR is looking for Single Array, How DGR intends to setup 3 DC Zero RPO solution. Generally Financial institutes ask for such solutions where even single transaction loss can cause huge commercial loses. Aside to storage supporting 3 DC replication, DGR needs to invest in high speed low latency network. Therefore we recommend DGR to make this requirement optional or else elaborate the use case so that proper solution can be offered.	As per Tender Document
6	Dell	5.2 Technical Specifications	23	Storage Temp Range	Storage Temp Range: **-30 to 60 degree celcius**	Request DGR to change this to -10 to 30C for wider participation.	Request DGR to change this to -10 to 30C for wider participation.	Refer Corrigendum
7	Dell	5.2 Technical Specifications	23	Operating Humidity (Rh)	Operating Humidity - **8 to 80%**	Request DGR to change this to 20% to 80% for wider participation	Request DGR to change this to 20% to 80% for wider participation	Refer Corrigendum
8	Dell	5.2 Technical Specifications	23	Storage Humidity (Rh)	Storage Humidity – **8 to 90%**	Request DGR to change this to 20% to 80% for wider participation	Request DGR to change this to 20% to 80% for wider participation	Refer Corrigendum

9	Dell	5.2.2.1 Technical Specifications	25	Transfer rate under Compression mode (TB/Hour)	Transfer rate under Compression mode (TB/Hour) - 10.8	Please clarify if this is required for single drive or all drives	Please clarify if this is required for single drive or all drives	Required for all drives
10	Dell	5.2.2.1 Technical Specifications	25	100TB with minimum Cartridges Quantity	100TB with minimum Cartridges Quantity - 60	As LTO 8 is required and maximum capacity of each Drive is 12TB , request you to clarify on required capacity . Kindly remove 60 count as this will give 720TB.Request DGR to amend this point so proper solution can be offered capacity.	As LTO 8 is required and maximum capacity of each Drive is 12TB, request you to clarify on required capacity . Kindly remove 60 count as this will give 720TB.Request DGR to amend this point so proper solution can be offered capacity.	Backup size currently required is 100 TB. But minimum of 60 cartridges are required from day 1.
11	Dell	5.2.2.1 Technical Specifications	25	Maximum Capacity of Each Drive under Compression (TB)	Maximum Capacity of Each Drive under Compression (TB) - 12 TB	It should be 30TB, Please clarify	It should be 30TB, Please clarify	Maximum Capacity of Each Drive - 12TB. The Same disk under Compression should be 2.5 times of 12 TB i.e 30 TB.
12	Dell	5.2.2.2 Technical Specifications	33	Platform supported for Bare Metal recovery	Platform supported for Bare Metal recovery - Windows OS, Linux OS, UNIX OS, HP- UX	As per the attached corrigendum, we need clarity on the count of non-windows server (from day 1) to meet the below Bare Metal Recovery requirements.	As per the attached corrigendum, we need clarity on the count of non-windows server (from day 1) to meet the below Bare Metal Recovery requirements.	Platform support required is already mentioned. Exact count may vary in future.

13	CCS/ HP	5.2.1 Technical Specifications	21	Automated Storage tearing feature across the populated drives types (in case of multiple drive system)	Automated Storage tearing feature across the populated drives types (in case of multiple drive system) - Yes	Automated Storage tearing feature across the populated drives types (in case of multiple drive system) - No	CCS :-All Enterprise Storage OEMs have moved their product line towards all Flash drives only due to higher performance, lesser price difference between SSD and other SAS/NLSAS mechanical drives and hence we doesn’t support Tiering in our latest generation enterprise storage products. Also tiering has inherent drawback where once the data is tiered to lower performance drives, it requires multiple hits or reads for data to become candidate for moving to faster tier (this can take 4 hrs to 24 hrs until data is moved to faster tier) till such time data is served from the slower drives,which means applications will starve for performance. Tiering was relevant in those days when entire data use to live on lower performing drives (SAS/NLSAS) and by just adding small quantities of SSD (because drive capacities were small and cost was prohibitively high) as performance tier and application could get performance acceleration, data was living on slow performing drives anyways hence a small acceleration would be considered as handful gain because cost of SSD Drives at that time prevented systems to be built for entire capacity on SSD's. However today it is not only the cost of SSD's have become at par very large capacity drives are also available, SSD's also provide 100's of Time more performance, Host systems or the application servers have become more powerful, bringing Tiering only deteriorates the user experience. Hence present day OEM's are deprecating the use of Tiering in the architecture. In present day Flash/SSD Drive capacities have increased and per TB SSD cost has come down drastically, so it is expected	As per Tender Document

14	CCS	5.2.1Technical Specifications	21	Automated Storage tearing feature across the populated drives types (in case of multiple drive system)	Automated Storage tearing feature across the populated drives types (in case of multiple drive system) - Yes	Automated Storage tearing feature across the populated drives types (in case of multiple drive system) - No	Same As Above	As per Tender Document
15	HP	5.2.1Technical Specifications	21	Power Consumtion	The equipment supplied must be compliant with the racks installed in State Data Centre which are of size 600mm X 1000 mm and 4.5 KVA power capacity.	The current RFP specifications completely ignored the aspect of **Higher power consumption and Rack space** requirements in Data Centre while using mechanical drives in storage instead of All Flash/All NVMe which will definitely add cost while calculating total cost of ownership.	The current RFP specifications completely ignored the aspect of **Higher power consumption and Rack space** requirements in Data Centre while using mechanical drives in storage instead of All Flash/All NVMe which will definitely add cost while calculating total cost of ownership.	As per Tender Document

16	IBM	5.2.1Technical Specifications	21	Protocols supported by the storage system from the day one	Protocols supported by the storage system from the day one - iSCSI, FC, NFS & SMB	New generation application demands S3, Swift and HDFS protocols.Current RFP is missing to provide cloud (S3 and Swift) like infra from storage point of view to 50 departments of Punjab Government and 3 crore people of Punjab. Leadership always expect AI base reports (HDFS) from existing available data to take decision on right time or proactively. Whereas RFP is missing with storage solution to provide complete pipe for data workflow (Ingest -> Organize -> Analyze -> Inference)	New generation application demands S3, Swift and HDFS protocols.Current RFP is missing to provide cloud (S3 and Swift) like infra from storage point of view to 50 departments of Punjab Government and 3 crore people of Punjab. Leadership always expect AI base reports (HDFS) from existing available data to take decision on right time or proactively. Whereas RFP is missing with storage solution to provide complete pipe for data workflow (Ingest -> Organize -> Analyze -> Inference)	As per Tender Document

17	IBM/ SISL	5.2.2.2 Backup application specifications	27	Additional features of Backup Server/Appliance	Additional features of Backup Server/Appliance – Bidder to provide physical backup server along with required operating system and any other software and hardware, if proposed backup solution requires separate physical server. Backup Server should have Active-Active HA configuration as under:- Rack space (U) - 4U Max CPU - 16 core x 2 Socket or higher RAM - 512 GB HDD - 1.8 TB or Higher x 2 (SSD) Raid -1 supported HBA cards as required Fully loaded SFP Dual power supply Indian type Power cable	**IBM** :-Total RAM ask is of 512 GB. We assume this is per server. We request you to consider 512 GB across servers or total 512 GB, as Backup Servers don't have low latency requirements like primary Storage and often are able to cater with limited memory for the said requirements. **SISL** :- Please give clarity on given clause. Do we need to have Backup Server Hardware, Operating System and Backup Software of Same OEM.	**IBM** :-Total RAM ask is of 512 GB. We assume this is per server. We request you to consider 512 GB across servers or total 512 GB, as Backup Servers don't have low latency requirements like primary Storage and often are able to cater with limited memory for the said requirements. **SISL** :- Please note all components are not related and Server Vendors, Operating System OEM's and Backup Software OEM's all are not same. This Feature is only possible if department ask for Purpose Build Appliance based Backup Device.	Covered in previous RTQ