

DHM/G/NCB/14-2078/79 Response to Clarification

3. Technical Specification (DHM/G/NCB/14-2078/79)	Question/Clarification	Clarification from DHM
S.N. 2) Front Node Server	How should the two head nodes be configured?	Base OS, Scheduler (SLURM), 1. SLURM Master 2. Database Node (SLURM Master Backup) 3. xCAT
S.N. 6) Monitor and keyboard for administrator access	5 monitors and keyboards are specified, what are they to be connected to? We suggest a single rack mounted Monitor-Keyboard-Mousepad connected to each computer by a suitable multi-port KVM switch.	Can be considered. Suggestions are noted.
S.N. 7) Cluster resource management and administration software pack with monitoring capabilities	Is this separate to the Batch System? Does this include a hardware monitoring system?	Yes, SLURM for Batch System There is a different system for cluster resource
1.3 Automated and computer assisted application and product generation	Please elaborate on what is required for this point. Are animations to a webserver etc. required and any associated training on this?	If needed, yes
2.1 Technical Specifications of Cluster Node		
Chassis; 1 U Rack Mountable	Please explain the choice to have 1U cases for the head and compute nodes specified. This will unnecessarily restrict the peripherals that can be added, or perhaps all the required components cannot be fitted into 1U cases at all. Forcing everything into 1U cases will make for a noisy machine with the need for small high-speed fans, and the risk that the machines will run unnecessarily hot. We recommend using cases not less than 2U high for all compute nodes, head nodes and the storage server	This Servers need to be 1U as it consumes less rack space, which we have very limited at the moment at DHM Datacenter
Memory; 32DIMM slots	There is simply not enough room in the specified 1U rack for 32DIMM slots.	Major 1U Servers today support 32 DIMM Slots
Hard Disk Drive; 2 x 480GB	Can we exceed the provided specification where necessary?	Higher size disc may be provided but the interface should be NVMe and should support all the mentioned OS.
Networking Features; InfiniBand HDR100	Can we exceed the provided specification where necessary?	Higher specifications can be provided
Power Supply; Minimum 2 x 500W	Can we exceed the provided specification where necessary?	Individual power supplies should not be higher than 500W as this will directly impact the power budget in DHM Datacenter.
2.2 Technical Specifications of Front Nodes		
Chassis; 1U Rack Mountable	Once again, we recommend using cases not less than 2U high for all compute nodes, head nodes and the storage server.	As per Specification

CPU	A lot of CPU power for the head node, largely wasted.	Limited cores for the head node rest for the compute node. Orchestration tools can define no. of processors from head and compute nodes.
Hard Disk Drive, 2 x 480GB	Can we exceed the provided specification where necessary?	Higher size disc may be provided but the interface should be NVMe and should support all the mentioned OS.
Networking Features	<p>There is no mention of a 10Gb/s Ethernet switch.</p> <p>We suggest changing one of the 1GB/s switched for a 10Gb/s model and adding 10Gb/s Ethernet to the compute nodes, then 10Gb/s NFS and provisioning can be used on them as well as 10GB/s for the various file protocols mentioned - including LSF, iSCSI, NFS etc.</p> <p>It is not clear to how these file systems etc. are expected to be used.</p>	Switch if needed for integration of vendor solution should be provided.
Power Supply; 2 x 500W	Can we exceed the provided specification where necessary?	Vendor Could propose higher Individual power supplies should not be higher than 500W as this will directly impact the power budget in DHM Datacenter.
2.3 Technical Specifications of Storage		
Processor	Can you elaborate on the reasoning between switching between Intel and AMD processors throughout the specification?	AMD processors are best suited for HPC workloads. As per specification
Storage Drives	SATA for large storage would strongly be suggested over SAS.	Disc interface Should be SAS 12G or higher.
LAN Ports	Requirement for Dual Port 10G Adaptors but no specification for 10G switch or 10G ports in the compute nodes?	Bidder can propose 10G Adaptors where ever necessary instead of 1G but should provide all the dependencies.
Supported Protocols	We suggest that HTTP and FTP are too insecure.	HTTP and FTP are required protocols
2.4 Technical Specification of Infiniband Switch		
Architecture; 40/100Gb	Can we exceed the provided specification where necessary?	Specifications with numerical values can be exceeded but should be better than the values published in specification.
Architecture	Please confirm the requirement of 4.76 Bpps.	Minimum requirement of DHM
Architecture	Please confirm the requirement of dual software images with clear isolation.	Dual and isolated images are required to maintain redundancy of images.
2.5 Technical Specifications of Management Switch		
48X 10/100/1000G Base-T ports	Please clarify the speeds required. We suggest 1000Gb/s speeds are unrealistic – are the speeds meant to be 1000Mb/s? With a maximum of 11 computers, 3 switches and 1 router in the rack, 48 ports	Minimum connectivity requirement.

	on the management switch seems excessive.	
1x USB-C console port,1xOOBM PORT,1xUSB TYPE A,Should support Bluetooth dongle for mobile application	Proprietary specification and require to relax for participation,	Minimum connectivity requirement.
At least 4 uplink ports should be provided that supports 10G/25G and upgradable to 50G without any hardware change	50G is currently unavailable and would also exceed the total bandwidth of the switch specified (48 x 1G).	Minimum connectivity requirement.
10G Gbps latency: 1.46 uses or better	Please elaborate on the meaning of this specification.	Please read this as 1.46 Microsecond or better
Should support stacking of at least 10 switches up to a distance of 10KM	Please elaborate on the meaning of this specification. What is the purpose of the stacking? Where should we measure the 200Gb/s bandwidth in this stack?	Stacking support is mandatory requirement
Processor - Quad Core @ 1.8 Ghz or better	This clause is restricting to bid, hence request to remove this clause.	Minimum Processor requirement
RAM: 8GB DDR4 or better	This clause is restricting to bid, hence request to remove this clause.	Minimum Memory requirement
Flash: 32GB eMMC or better	This clause is restricting to bid, hence request to remove this clause.	Minimum Flash requirement
System Switching capacity: 880 Gbps or better	This clause is restricting to bid, hence request to remove this clause.	Minimum required Switching capacity for line rate performance
System Throughput: 650 Mpps or higher	This clause is restricting to bid, hence request to remove this clause.	Minimum System Throughput required
Stacking bandwidth of 200 Gbps or better	This clause is restricting to bid, hence request to remove this clause.	Minimum Stacking bandwidth required
The proposed vendor should be in Leader quadrant in wired and Wireless LAN Access Infrastructure of Gartner Magic Quadrant	This clause is restricting to bid, hence request to remove this clause.	The proposed vendor should be Listed in Wired and Wireless LAN Access Infrastructure of Gartner Magic Quadrant
2.7 Cluster resource management and administration software pack with monitoring capabilities		
xCAT for Node Provisioning	xCAT is a fine provisioning tool, but we would suggest the continued use of WareWulf, as it is already in use on the existing NWP cluster at DHM (with which staff will already have some familiarity). This would mean that there is not a further learning curve required for the staff at DHM to understand how to operate xCAT.	Functionality wise, compute node discovery and auto-configuration, firmware-updates are best in xCAT with more management functionality. However, since both are open source, Warewulf can be considered. Also, to note that the developer community of xCAT is more active than Warewulf community.
Lustre File System (LFS) for storage	How does DHM envision using LFS?	Keeping in mind of the parallel NETCDF, for better I/O and Stripe Count.
2.8 HPC software pack with scientific libraries		
GNU-compilers for C, C++ and Fortran	We strongly suggest considering the 'Portland' group compilers for much improved throughput in NWP applications.	Portland Group Compilers are expensive, and more vendor locked systems will mean more license cost to DHM. It must be

		understood that the open-source compilers fulfil the current requirement of DHM.
2.10 Operating System for Front node and Cluster node		
CentOS 8.3	We strongly suggest the use of a stable downstream build from RedHat Enterprise Linux. CentOS has been changed to an upstream development build and is no longer recommended. Rocky Linux is a stable downstream build and is strongly recommended (Rocky is what CentOS used to be).	Surely, it's a better idea to opt for other OS which can be easily done.
2.11 Specifications for an Operational Localized and High-Resolution Numerical Weather Prediction system:		
Message Passing Interface (MPI) and Open Multi-Processing (OpenMP)	We strongly encourage to only use MPI when running WRF otherwise WRF becomes very unstable and is prone to slowing down the model or crashing the system. OpenMP code is considered very old.	Yes, MPI shows better performances as the cluster scales. An area of research can be done with the performance of OpenMP and MPI if both are compiled and installed separately. Doesn't harm having two separately.
Configuration Requirements	Current 9km domain is 455 X 356 and 3 km domain is 544 x 421.	Based on vertical information. Time user requires to get it done is also important to look into.
ASCII-based point forecasts	WRF can do this by default, and we can include, however are we expected to train DHM staff on this?	In case DHM requires, yes. NetCDF file readability is already available. 2-4 grid points should not be an issue with ASCII-based.
WRF-CHEM	We can have WRF-CHEM compiled with KPP available, however WRF CHEM requires complicated CHEM source data which is currently not available in Nepal. Therefore, we can include WRF-CHEM but will not be able to run it.	It is important for DHM also to do research activities on HKH region and just not in Nepal. Also, lots of scholar publications are available online where the research is performed using WRF-Chem. Also, it's better to have WRF-Chem installed for training sessions. 3-4 people run WRF-Chem in Nepal.
Other		
1. Rack	No rack specified. Are we supplying a rack or is DHM supplying a rack? We would prefer to install into our own dedicated rack. We recommend using cases not less than 2U high for all compute nodes, head nodes and the storage server	Rack space will be provided by DHM
2. Power Requirements	What are the power requirements? This system needs a fair bit of power to run and would also require a UPS. IS DHM going to supply this?	DHM datacentre facility
3. Cooling	Air conditioning is required to cool the system. Is DHM going to supply this?	DHM datacentre facility
4. Router	No router was specified. E.g., for VPNs, managing network control, security etc.	DHM datacentre facility

	We strongly suggest that we supply a suitable MikroTik CCR as we have done previously.	
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2.1 Technical specification of Cluster Node:				
Particulars	Details Specification	Changes	Remarks	DHM Comments
Memory Protection	Advanced ECC with multi-bit error protection, Online spare, mirrored memory and fast fault tolerance	AMD system does not support online spare and mirrored memory, hence remove it. Advanced ECC with multi-bit error protection, Online spare, mirrored memory and fast fault tolerance		Advanced ECC with multi-bit error protection, and fast fault tolerance
HDD Bays	Minimum 8 SFF Bays. The drive carrier should have intuitive icon based display along with "DO NOT REMOVE" caution indicator that gets activated automatically in order to avoid data loss/downtime due to wrong drive removal.	Please change it to -> Minimum 8 SFF Bays. The drive carrier should have intuitive icon based display along with "DO NOT REMOVE/ Illuminate LED light " caution indicator that gets activated automatically in order to avoid data loss/downtime due to wrong drive removal.	LED lights provide the path to change the failed Hard disk drive	This is a required feature as it prevents accidental disc removal.
Interfaces	Serial - 1, Micro SD slot - 1, USB 3.0 support With Up to 5 total: 1 front, 2 rear, 2 internal (secure)	Micro SD slot is obsolete technology. Now USB slots come with internal slots. Please change it to -> , Serial - 1, Micro SD slot -1 , USB 3 1 front, 3 rear, 1 internal		Micro SD card support is mandatory feature, Alternately USB SD Dongle can be provided
	Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser	3DES is old and obsolete, AES is compliant and better security. Please change it to -> Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser		These are required security features
Cloud Enabled Monitoring and Analytics	Cloud Enabled Monitoring and analytics engine shall have capability to provide following: a. Providing Firmware upgrade and patch upgrade recommendations proactively. b. Providing power and support entitlement status. c. Recommendations to eliminate performance bottlenecks and critical events, based on Analytics engine having capability of proactive recommendation for arresting the issues / problems.	Same features as above, but preferred to do (power and bios upgrade) onsite rather than on Cloud for better security of the system. Request to remove the Cloud enabled monitoring and Analytics completely	We have seen in the past certain automation process creating problem in the HPC system. Recent news of Kyoto university Japan has faced a 77TB data deletion. https://thehack.technology/supercomputer-files-deleted-kyoto-university-hpe/	As per the published specifications
2.2 Technical Specification of Front Node				

Particulars	Details Specification	Changes	Remarks	DHM Comments
Memory Protection	Advanced ECC with multi-bit error protection, Online spare, mirrored memory and fast fault tolerance	AMD system does not support online spare and mirrored memory, hence remove it. Advanced ECC with multi-bit error protection, Online spare, mirrored memory and fast fault tolerance		Advanced ECC with multi-bit error protection, and fast fault tolerance
HDD Bays	Minimum 8 SFF Bays. The drive carrier should have intuitive icon based display along with "DO NOT REMOVE" caution indicator that gets activated automatically in order to avoid data loss/downtime due to wrong drive removal.	Please change it to -> Minimum 8 SFF Bays. The drive carrier should have intuitive icon based display along with "DO NOT REMOVE/ Illuminate LED light " caution indicator that gets activated automatically in order to avoid data loss/downtime due to wrong drive removal.	LED lights provide the path to change the failed Hard disk drive	This is a required feature as it prevents accidental disc removal.
Interfaces	Serial - 1, Micro SD slot - 1, USB 3.0 support With Up to 5 total: 1 front, 2 rear, 2 internal (secure)	Micro SD slot is obsolete technology. Now USB slots come with internal slots. Please change it to -> , Serial - 1, Micro SD slot -1 , USB 3 1 front, 3 rear, 1 internal		Micro SD card support is mandatory feature, Alternately USB SD Dongle can be provided
System Security	Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser	3DES is old and obsolete, AES is compliant and better security. Please change it to -> Advanced Encryption Standard (AES) and Triple Data Encryption Standard (3DES) on browser		3DES is required feature
Cloud Enabled Monitoring and Analytics	Cloud Enabled Monitoring and analytics engine shall have capability to provide following: a. Providing Firmware upgrade and patch upgrade recommendations proactively. b. Providing power and support entitlement status. c. Recommendations to eliminate performance bottlenecks and critical events, based on Analytics engine having capability of proactive recommendation for arresting the issues / problems.	Same features as above, but preferred to do (power and bios upgrade) onsite rather than on Cloud for better security of the system. Request to remove the Cloud enabled monitoring and Analytics completely	We have seen in the past certain automation process creating problem in the HPC system. Recent news of Kyoto university Japan has faced a 77TB data deletion. https://thehack.technology/supercomputer-files-deleted-kyoto-university-hpe/	Bidder can propose On-Prem Analytics engine complying to all the mentioned requirements.

2.3 Technical Specification of Storage

Particulars	Details Specification	Changes	Remarks	DHM Remarks
LAN Ports	At least 4 x Gigabit RJ-45 Ethernet port, Dual port 10G Adaptors	Please include 100G communication port for fast data transfer in the cluster.	Storage should be connected to 100G network for better data transfer and same should be connected with all the nodes.	Storage will be connected via 10G Adaptors, bidder can propose the connectivity interface higher than 10G but should include all the required interfaces and optics required for server and Storage.
Operating System	Microsoft Windows Server IoT 2019 Standard Edition or better. The OS should come installed on mirrored SSD drives.	Microsoft Windows Storage server 2019 or better. The OS should come installed on mirrored SSD drives.		Windows Server 2019 IoT Standard Edition will be required as it has large number of features required in DHM.

2.4 Technical Specification of InfiniBand Switch

Particulars	Details Specification	Changes	Remarks	DHM Remarks
		Switch configuration is of 100Gig switch while ask for Infiniband switch, request for change of specification to accommodate Infiniband switch which has very low latency and improve application performance.		Bidder can provide the switch which has less than or equal to the stated latency.
	32-port-40/100-Gb-QSFP28: Minimum 16 Licensed-Active-Ports	40 port 200Gb QSFP56 ports with minimum 16 licensed active ports		Bidder can propose higher capacity ports
	1-port Console/Serial with cable, 1-port USB, and 1-port OOB-1Gb-Ethernet-Management	1-port RS232 Console/Serial with cable, 1-port USB, and 1-port OOB 1Gb Ethernet Management		Mentioned interfaces will be required.
Architecture	Dual redundant AC Hotswap power supplies (Minimum Gold efficiency)	Dual redundant AC Hotswap power supplies (Minimum Gold efficiency)		Dual Hot Swappable Power Supplies will be required.
	Quad-redundant-hotswap-fans	Hot Swappable fan unit		Minimum 4 redundant hot swap fans will be required
	Minimum 8GB System Memory (RAM); and Minimum 32GB Flash/SSD			Minimum Memory and Flash requirement
	Minimum 16MB system-buffer			16MB System Buffer or bettwe
	Minimum 500ns-latency	Minimum 130ns latency		Switch should have latency of 500ns or better
	6.4 Tbps switching capacity	16 Tbps switching capacity		6.4Tbps or higher switching capacity
	4-76 Bpps	Compliant with IBTA 1.21 and 1.3		4.76 Bpps or higher
	forwarding/processing capacity	9 virtual lanes; 8 data + 1 management		Mandatory features, required in DHM
	Minimum 256K system forwarding entries table in aggregate of MAC table, Routing Table, and ACL. Should be flexible to share as per different workload deployment requirements.	256 to 4Kbyte MTU		Mandatory features, required in DHM

	IPv6 ready with dual-stack IPv4 and IPv6 protocol operation readiness from day-1	Adaptive Routing		Mandatory features, required in DHM	
	Dual-software-images-with-clear-isolation	Congestion control		Mandatory features, required in DHM	
	Container deployment ready switch for deploying container-based management and/or analytic applications	Port Mirroring		Mandatory features, required in DHM	
		4X48K entry linear forwarding database		Mandatory features, required in DHM	
		Industry Standard CLI		Mandatory features, required in DHM	
		Management over IPv6		Mandatory features, required in DHM	
		Management IP		Mandatory features, required in DHM	
		SNMP v1, v2, v3		Mandatory features, required in DHM	
		WebUI		Mandatory features, required in DHM	
Quality-of	QoS classification, QoS	Remove the clause		Mandatory features, required in DHM	
Service (QoS)	Rewrite, Queuing & Scheduling, RED/WRED, ECN, ACL, PFC	Remove the clause		Mandatory features, required in DHM	
	802.3x-flow-control, 802.1Qbb, 802.1Qaz	Remove the clause		Mandatory features, required in DHM	
	DCBx, Application-TLV, 802.1ab	Remove the clause		Mandatory features, required in DHM	
	RoCE/AVARP-ready-from-day-1	Remove the clause		Mandatory features, required in DHM	
	Cut-through-as-well-as-store-and-forward-performance-architecture	Remove the clause		Mandatory features, required in DHM	
Data Center-Features	Modular switch QoS	Remove the clause		Mandatory features, required in DHM	
	Jumbo frames sizes of up to 9K bytes	Remove the clause		Mandatory features, required in DHM	
	VXLAN ready from day-1, VXLAN-EVPN	Remove the clause		Mandatory features, required in DHM	
	VXLAN-Hardware-VTEP	Remove the clause		Mandatory features, required in DHM	
	VMware-NSX-integration-up-to-1000-VNEs	Remove the clause		Mandatory features, required in DHM	
	Openstack-integration-ready	Remove the clause		Mandatory features, required in DHM	
	Virtual routing and forwarding functions (VRFs); up to 64-VRF-instances	Remove the clause		Mandatory features, required in DHM	
	OpenFlow 1.3 or equivalent with support for at least 3 SDN controllers; Should support hybrid mode IEEE 1588-PTP	Remove the clause		Mandatory features, required in DHM	
	Automatic fabric configuration using tools such as Ansible, SaltStack, ZTP and Puppet (or equivalent)	Remove the clause		Mandatory features, required in DHM	
	Switching-Features	802.1Q-VLAN, Voice	Remove the clause		Mandatory features, required in DHM
VLAN, QinQ, Concurrent-4K-VLANs		Remove the clause		Mandatory features, required in DHM	
RSTP, MSTP, RPVST		Remove the clause		Mandatory features, required in DHM	
BPDU Filter & Guard, Loop Guard, Root Guard		Remove the clause		Mandatory features, required in DHM	
VRRP, LAG, MLAG		Remove the clause		Mandatory features, required in DHM	
LACP, Multi-active Gateway (MAGP)		Remove the clause		Mandatory features, required in DHM	
Interface & port isolation, LLDP		Remove the clause		Mandatory features, required in DHM	
IGMP v3, IGMP		Remove the clause		Mandatory features, required in DHM	
snooping, PIM-SM and PIM-SSM		Remove the clause		Mandatory features, required in DHM	
Static Route, OSPF, BGP, BFD, ECMP (64-way)		Remove the clause		Mandatory features, required in DHM	
Management		Multiple configuration files to be stored to a flash/SSD storage, ZTP	Remove the clause		Mandatory features, required in DHM
		sFlow (RFC 3176) Equivalent, JSON, CLI, WEB, GUI, SSH	Remove the clause		Mandatory features, required in DHM
	Telnet, SNMPv3, NTP, Sntp, FTP, TFTP, SCP, Port mirroring (SPAN & RSPAN), BER	Remove the clause		Mandatory features, required in DHM	
	monitoring, Root Cause Analysis, Telemetry, Real Time queue depth histograms & thresholds	Remove the clause		Mandatory features, required in DHM	
	At least 16x 100G QSFP28 optics for connectivity to servers	Remove the clause		Mandatory features, required in DHM	
		Remove the clause		Mandatory features, required in DHM	
Transceivers	3-Year Parts, 3-Year Labor, and 3-Year Onsite				
Warranty & Support	support with next business day response				
Manufacture Authorization	Manufacturer Authorization letter should be provided from OEM				

2.5 Technical Specification of Management Switch

		Please change the switch specification to make it open specification, right now specification is proprietary and does not allow other bidder to bid.		Mandatory features, required in DHM
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Particulars - Detailed Specification	Changes	Remarks	
1x USB-C console port, 1xOOBM PORT, 1xUSB TYPE A, Should support Bluetooth dongle for mobile application	1x USB-C console port, 1xOOBM PORT, 1xUSB TYPE A, Should support Bluetooth dongle for mobile application	Proprietary specification and require to relax for participation,	1x USB-C console port, 1xOOBM PORT, 1xUSB TYPE A
At least 4 uplink ports should be provided that supports 10G/25G and upgradable to 50G without any hardware change	At least 4 uplink ports should be provided that supports 10G/25G and upgradable to 50G without any hardware change	This switch is internal to HPC and will not be communicating with other network. There is no requirement of 25G or 50G of speed on this switch.	At least 4 uplink ports should be provided that supports 10G/25G and upgradable to 50G without any hardware change
RAM: 8GB DDR4 or better	RAM: 2GB DDR4 or better		Mandatory features, required in DHM
Flash: 32GB eMMC or better	Flash: 8GB eMMC or better		Mandatory features, required in DHM
Packet Buffer: 8MB or better	Packet Buffer: 8MB or better		Mandatory features, required in DHM
System Switching capacity: 880 Gbps or better	System Switching capacity: 128 Gbps or better		Mandatory features, required in DHM
System Throughput : 650 Mpps or higher	System Throughput : 191 Mpps or higher		Mandatory features, required in DHM
10G Gbps latency: 1.46 uses or better	10G Gbps latency: 1.46 uses or better		Mandatory features, required in DHM
Should support stacking of at least 10 switches up to a distance of 10KM	Should support stacking of at least 10 switches up to a distance of 10KM		Mandatory features, required in DHM
Stacking bandwidth of 200 Gbps or better	Stacking bandwidth of 40 Gbps or better		Mandatory features, required in DHM
MAC Address table capacity: 32,000 or better	MAC Address table capacity: 96,000 or better		Mandatory features, required in DHM
Should support configuring individual ports as routed ports	Should support configuring individual ports as routed ports		Mandatory features, required in DHM
Should support IPv4 and IPv6 dual stack	Should support IPv4 and IPv6 dual stack		Mandatory features, required in DHM
Should support OSPF/OSPFv3 full stack	Should support OSPF/OSPFv3 full stack		Mandatory features, required in DHM
Should support IPv4/IPv6 static routing	Should support IPv4/IPv6 static routing		Mandatory features, required in DHM
Should support BGP/MP-BGP	Should support BGP/MP-BGP		Mandatory features, required in DHM
Should support PBR	Should support PBR		Mandatory features, required in DHM
Should support VxLAN	Should support VxLAN		Mandatory features, required in DHM
Should support EVPN	Should support EVPN		Mandatory features, required in DHM
Should support ECMP	Should support ECMP		Mandatory features, required in DHM
Should support TACACS+	Should support TACACS+		Mandatory features, required in DHM
Should support 802.1x, multi user authentication	Should support 802.1x, multi user authentication		Mandatory features, required in DHM
Should support MAC authentication	Should support MAC authentication		Mandatory features, required in DHM
Should support Radius Change of Authorization (CoA)	Should support Radius Change of Authorization (CoA)		Mandatory features, required in DHM
Should support Voice Vlan	Should support Voice Vlan		Mandatory features, required in DHM
Should support VRF	Should support VRF		Mandatory features, required in DHM
Support for storm protection against BUM with user defined thresholds	Support for storm protection against BUM with user defined thresholds		Mandatory features, required in DHM
Support for advance QoS, rate limiting, 802.1p	Support for advance QoS, rate limiting, 802.1p		Mandatory features, required in DHM
Support for Radius/TACACS+	Support for Radius/TACACS+		Mandatory features, required in DHM
Support for 802.1ab - LLDP	Support for 802.1ab - LLDP		Mandatory features, required in DHM
Support for sFlow/Netflow/Jflow	Support for sFlow/Netflow/Jflow		Mandatory features, required in DHM
Support for UDLD	Support for UDLD		Mandatory features, required in DHM
Support for SNMPv1/2/3	Support for SNMPv1/2/3		Mandatory features, required in DHM
Support for STP/RSTP/MSTP/RPVST+	Support for STP/RSTP/MSTP/RPVST+		Mandatory features, required in DHM
Support for DHCP Server	Support for DHCP Server		Mandatory features, required in DHM
Support for access control lists	Support for access control lists		Mandatory features, required in DHM

Support for Port Security	Support for Port Security			Mandatory features, required in DHM
Support for Port mirroring	Support for Port mirroring			Mandatory features, required in DHM
Support for Source port filtering	Support for Source port filtering			Mandatory features, required in DHM
Support for GVRP / MVRP	Support for GVRP / MVRP			Mandatory features, required in DHM
Support for dynamic ARP protection	Support for dynamic ARP protection			Mandatory features, required in DHM
Support for Telnet / SSHv2	Support for Telnet / SSHv2			Mandatory features, required in DHM
Integrated trusted platform module (TPM) for platform integrity	Integrated trusted platform module (TPM) for platform integrity			Mandatory features, required in DHM
TAA Compliance, FIPS 140-2 validated cryptography for protection of sensitive information	TAA Compliance, FIPS 140-2 validated cryptography for protection of sensitive information			Mandatory features, required in DHM
The proposed vendor should be in Leader quadrant in wired and Wireless LAN Access Infrastructure of Gartner Magic Quadrant	The proposed vendor should be in Leader quadrant in wired and Wireless LAN Access Infrastructure of Gartner Magic Quadrant	This clause is restricting to bid, hence request to remove this clause.		Vendors in the Leaders quadrant have the highest composite scores for their Completeness of Vision and Ability to Execute. A vendor in the Leaders quadrant has the market share, credibility, and marketing & sales capabilities needed to drive the acceptance of new technologies.
Qualification Criteria	Change Request			
The bidder must submit CV of Qualified personnel. The skilled personnel shall have BE in Electronics/Communications/ICT/Computer Engineering with working experience in HPC and Proficient in Numerical Weather Prediction WRF Installation/execution and should submit the documents to validate CV and Education Certificate, Copy of Citizenship or Passport and copy of training certificate on HPC/WRF.	The bidder/ OEM must submit CV of Qualified personnel. The skilled personnel shall have BE in Electronics/Communications/ICT/Computer Engineering with working experience in HPC and Proficient in Numerical Weather Prediction WRF Installation/execution and should submit the documents to validate CV and Education Certificate, Copy of Citizenship or Passport and copy of training certificate on HPC/WRF.			Minimum Qualification criteria of Installation Personnel.