



DELL POWERSTORE T STORAGE FAMILY

The ground-breaking Dell PowerStore achieves new levels of operational simplicity and agility, utilizing a container-based architecture, advanced storage technologies, and intelligent automation to unlock the power of your data. Based on a scale-out architecture and hardware-accelerated advanced data reduction, PowerStore is designed to deliver enhanced resource utilization and performance that keeps pace with application and system growth. PowerStore T models provide organizations with all the benefits of an enterprise unified storage platform for block, file and vVol data, while enabling flexible growth with the intelligent scale-up AND scale-out capability of appliance clusters. Utilizing the proven capabilities of VMware ESXi, PowerStore X models with AppsON provide the unique ability to host data-intensive and storage applications directly on the PowerStore system with a storage-based virtualization environment, with the flexibility of seamless movement of applications between the storage system and external VMware servers.

Architecture

Based on a versatile scale-up and out platform utilizing Intel® Xeon® Scalable processors and today's most advanced storage technologies, including end-to-end NVMe Flash, dual-ported Intel® Optane™ SSDs, NVMe-oF and always-on data reduction, PowerStore uses powerful analytics, automation and active resource balancing to optimize performance and eliminate management overhead. Each appliance utilizes dual active-active storage nodes and a container-based software architecture to provide maximum adaptability.

PER APPLIANCE	500	1200	3200	5200	9200
Max Drives	97	93	93	93	93
NVRAM per Appliance	N/A	2	2	4	4
Base Enclosure	A 2U, 2-node enclosure with twenty-five 2.5" NVMe drive slots				
Expansion Enclosure	A 2U enclosure attached to a PowerStore base enclosure with twenty-four 2.5" NVMe drives slots (3 max per appliance)				
Power Supplies	PowerStore appliances are powered by 2 redundant power supplies (PS) per enclosure.				
Data Resiliency	Dynamic Resiliency Engine (DRE)				
Max Mezzanine cards*	2	2	2	2	2
Max IO Modules**	4	4	4	4	4
Backend Expansion Connectivity	4 25GbE Ports	4 Embedded 100GbE QSFP Ports			
Max front-end Ports (all types)	24	24	24	24	24
Max 16/32Gb FC Ports	16	16	16	16	16

PER APPLIANCE	500	1200	3200	5200	9200
Max 10 Gbase-T/iSCSI Ports per Appliance	16	24	24	24	24
Max 10/25 GbE/iSCSI Ports per Appliance	24****	24	24	24	24
Max 100 GbE/iSCSI Ports per Appliance	N/A	4	4	4	4
Max Raw Capacity***	1,490 TB	1,430 TB	1,430 TB	1,430 TB	1,430 TB
	1,355 TiB	1,300 TiB	1,300 TiB	1,300 TiB	1,300 TiB

* One Mezzanine card per node, mirrored.
** Two IO Modules per node, mirrored.
*** Value shown is vendor raw base capacity. TB is base-10 decimal (1000x1000x1000x1000). TiB is base-2 binary (1024x1024x1024x1024). For true appliance useable capacity data refer to Power Sizer. Maximum raw capacity may vary based on drive sizes available at time of purchase. Maximum logical capacity supported per appliance is 8 exabytes (EB).
**** 4 Onboard ports by default

Appliance System Limits

PER APPLIANCE	500	1200	3200	5200	9200
Max Initiators	1,000	2,000	2,000	2,000	2,000
Max Block Volumes/Clones (FC/iSCSI)	1,000	3,000	4,000	6,000	16,000
Max Block Volumes/Clones (NVMe-oF) *	1,000	2,000	2,000	2,000	2,000
Max Volumes per Volume Group	75	75	75	75	75
Max Volume Groups	125	125	125	125	125
Max Volume Size	256 TB	256 TB	256 TB	256 TB	256 TB
Max Snapshots (Block)	50,000	100,000	100,000	100,000	100,000
Max User File Systems**	500	500	500	500	500
Max NAS Servers **	50	50	50	50	50
Max File System Size **	256 TB	256 TB	256 TB	256 TB	256 TB
Max vVol Storage Containers	50	50	50	50	50
Max vVols	5,700	10,600	11,600	13,600	16,000
OS Support	See the Dell Simple Support Matrix on delltechnologies.com				
	* Limits to be updated by future Service Pack release ** Available for PowerStore T models only				

Cluster System Limits

Features			
Max. Appliances	4	Max. Initiators	2,000
Max. Front End Ports	96	Max. Initiators in an Initiator Group	1,024
Max. iSCSI sessions	2,048	Max Volumes and vVols	32,000
Maximum number of drives & maximum raw capacity of a PowerStore cluster will depend on the appliance level limits mentioned above.			

Connectivity

Connectivity options via Mezzanine cards and IO modules for file, for NFS/SMB connectivity, and block storage for FC and iSCSI host connectivity (see above table for number of modules supported per node).

Connectivity Options		
Type	Description	Details
Mezzanine card / IO Module *	Two-Port 10 Gb/s Optical Module (Block)	Two port 10GbE IP/iSCSI module. Uses SFP+ optical connection or active/passive twinax copper connection to Ethernet switch
Mezzanine card / IO Module **	Four-Port 10GBASE-T Module (File & Block)	Four port 10GBASE-T Ethernet IP/iSCSI module with copper connection to Ethernet switch
Mezzanine card / IO Module ***	Four-Port 25 Gb/s Optical Module (File & Block)	Four port IP/iSCSI module with choice of 25GbE or 10GbE. Uses SFP+ optical connection or active/passive twinax copper connection to Ethernet switch
IO Module	Four-Port 32 Gb/s Fibre Channel Module (Block only)	Four port FC module with choice of 16Gb/s or 32Gb/s connectivity. Uses multimode optical SFP and OM2/OM3/OM4 cabling to connect directly to host HBA or FC switch
IO Module ****	Four-Port 10GBASE-T Module	Four port 10GBASE-T Ethernet IP/iSCSI module with copper connection to Ethernet switch
IO Module ****	Four-Port 25 Gb/s Optical Module	Four port IP/iSCSI module with choice of 25GbE or 10GbE. Uses SFP+ optical connection or active/passive twinax copper connection to Ethernet switch
IO Module **/****	Two-Port 100 Gb/s Optical Module	Two port IP/iSCSI module with QSFP optical or active/passive copper connection to Ethernet switch
* Only available for PowerStore 500 ** Not available for PowerStore 500 *** Ports 2 and 3 on the 4-Port Mezzanine card on 500T are reserved for backend connectivity **** IO module type only available for PowerStore T models		

Back-end (Drive) Connectivity

Each node connects to one side of each of two redundant pairs of GbE ports, providing continuous drive access to hosts in the event of a node or port fault.

Disk Expansion Enclosure (ENS24)	
24 X 2.5" NVMe Drive Enclosure	
Drive Types Supported	NVMe SSD
Controller Interface	100 GbE QSFP

Supported Media					
Drive Type	Interface	Raw base-10 Capacity *	Raw base-2 Capacity **	Base Enclosure	Expansion Enclosure
NVMe TLC SSD	PCIe	1.92 TB	1.7466 TiB	✓	✓
NVMe TLC SSD	PCIe	3.84 TB	3.4931 TiB	✓	✓
NVMe TLC SSD	PCIe	7.68 TB	6.9863 TiB	✓	✓
NVMe TLC SSD	PCIe	15.36 TB	13.9707 TiB	✓	✓
NVMe Optane SCM SSD	PCIe	750 GB	698.6 GiB	✓	
* Base-10 vendor raw TB (bytes X (1000 x 1000 x 1000 x 1000))			All drives are 512 bytes/sector.		
** Base-2 vendor raw TiB (bytes X (1024 x 1024 x 1024 x 1024))			All drives are FIPS 140-2 Level 2 validated TCG SED		

OE Protocols and Software Facilities

Support is provided for a wide variety of protocols and advanced features available via various software suites, plug-ins, drivers and packs.

Protocols and Facilities Supported		
Access-based Enumeration (ABE) for SMB protocol	Lock Manager (NLM) v1, v2, v3, and v4	REST API: Open API that uses HTTP requests to provide management
Address Resolution Protocol (ARP)	Management & Data Ports IPv4 or IPv6	RSVD v1 for Microsoft Hyper-V (SMB3)
Block Protocols: iSCSI, Fibre Channel (FCP SCSI-3), NVMe/FC, NVMe/TCP, vVols	NAS Servers Multi-protocol for UNIX and SMB clients (Microsoft, Apple, Samba)	Simple Home Directory access for SMB protocol
DFS Distributed File System (Microsoft) as Standalone Root Server	Network Data Management Protocol (NDMP) v1-v4, 3-way	Simple Mail Transfer Protocol (SMTP)
Direct Host Attach for Fibre Channel	Network Information Service (NIS) Client	Simple Network Management Protocol v2c & v3 (SNMP) Trap support
Dynamic Access Control (DAC) with claims support	Network Status Monitor (NSM)	Virtual LAN (IEEE 802.1q)
Internet Control Message Protocol (ICMP)	Network Time Protocol (NTP) Client	VMware Virtual Volumes (vVols) 2.0
Kerberos Authentication	NFS v3/v4 Secure Support	vStorage APIs for Array Integration (VAAI)
LDAP (Lightweight Directory Access Protocol)	NT LAN Manager (NTLM)	vStorage APIs for Storage Awareness (VASA)
Key Management Interoperability Protocol (KMIP) compliant external key manager for D@RE		

Security & Compliance
Common Criteria (in process)
Data at Rest Encryption (D@RE) in PowerStore utilizes FIPS 140-2 Level 2 validated Self-Encrypting Drives (SEDs) by respective drive vendors for primary storage (NVMe SSD and NVMe SCM SSD). The NVRAM caching device is encrypted and FIPS 140-2 Level 2 validated.
(KMIP) compliant external key manager for D@RE
FIPS 140-2 Level 2 validated
IPv6 certification
Native SHA2 certificate
Restriction of Hazardous Substances (RoHS) compliance
TLS 1.2 support by default, TLS 1.1 and older are disabled by default. TLS 1.1 can be optionally enabled.

Service and Support

World-Class Dell Technologies Services	
Deployment Services	Dell ProDeploy Enterprise Suite Dell Migration Services Dell Residency Services
Support Services	Dell ProSupport Enterprise Suite Anytime Upgrades Dell Optimize for Storage
Services & Support Technologies	MyService360 SupportAssist Enterprise

Software

All Inclusive Base Software	<p>Management Software:</p> <ul style="list-style-type: none"> • PowerStore Manager • CloudIQ: Cloud-based storage analytics • Thin Provisioning • Dynamic Resiliency Engine (DRE) – Single & Dual parity • Data Reduction: Zero Detect/Deduplication/Compression • Proactive Assist: Configure remote support, online chat, open a service request, etc. • Quality of Service (Block and vVols) <p>Protocols: PowerStore T Models</p> <ul style="list-style-type: none"> • Block • vVols • File <p>Protocols: PowerStore X Models</p> <ul style="list-style-type: none"> • Block • vVols <p>Local Protection:</p> <ul style="list-style-type: none"> • SED Based Encryption with self-managed and external key management • Local Point-In-Time Copies (Snapshots and Thin Clones) • AppSync Basicile Level Retention (FLR) • Dell EMC Common Event Enabler; AntiVirus Agent (CEPA) <p>Remote Protection:</p> <ul style="list-style-type: none"> • Native Asynchronous Block Replication • Native Asynchronous vVol Replication • Native Metro Volume Synchronous Block Replication • Native Asynchronous File Replication <p>Migration:</p> <ul style="list-style-type: none"> • Native Block migration from Dell EMC Unity, VNX, SC Series, PS Series • Native File Migration from Dell EMC VNX
Interface Protocols	<p>Block: FC, NVMe/FC, iSCSI, NVMe/TCP and VMware Virtual Volumes (vVols) 2.0</p> <p>File: NFSv3, NFSv4, NFSv4.1; CIFS (SMB 1), SMB 2, SMB 3.0, SMB 3.02, and SMB 3.1.1; FTP and SFTP</p>
Optional Solutions	<p>AppSync Advanced</p> <p>Connectrix SAN</p> <p>Data Protection Suite: Backup, Archive and Collaboration Software</p> <p>Dell EMC RP4VM</p> <p>PowerPath Migration Enabler</p> <p>PowerPath Multipathing</p> <p>PowerStore metro node (block synchronous metro Active/Active, zero RPO/RTO)</p> <p>VPLEX</p>
<p>Note: For more details on software licensing, please contact your sales representative</p>	

Virtualization and Container Solutions

PowerStore offers support for a wide variety of protocol and advanced features available via various software suites and packs including but not limited to:

- Dell EMC Virtual Storage Integrator (VSI) for VMware vSphere™: For provisioning, management, and cloning
- OpenStack Cinder Driver: For provisioning and managing block volumes within an OpenStack environment
- VMware Site Recovery Manager (SRM) Integration: Managing failover and failback making disaster recovery rapid and reliable
- Virtualization API Integration: VMware: VAAI and VASA.
- vRO Plugin for PowerStore
- Container Storage Interface (CSI) Plugin for PowerStore
- Ansible Module for PowerStore

Electrical Specifications

All power figures shown represent a worst-case product configuration with max normal values operating in an ambient temperature environment of 40°C.

The enclosure power numbers provided may increase when operating in a higher ambient temperature environment.

PowerStore Base System Enclosures					
	500	1200	3200	5200	9200
	25x2.5" drives, four IO modules	21x2.5" drives, 2xNVRAM modules four IO modules	21x2.5" drives, 2xNVRAM modules four IO modules	21x2.5" drives, 4xNVRAM modules four IO modules	21x2.5" drives, 4xNVRAM modules four IO modules
Power					
AC Line Voltage	100-240 VAC ± 10%, single phase, 47 to 63 Hz (500T) 200-240 VAC ± 10%, single phase, 47 to 63 Hz (1200-9200)				
AC Line Current (operating maximum)	10.6 A max at 100V 5.3 A max at 200V	8.1 A max at 200V	8.1 A max at 200V	9.0 A max at 200V	10.4 A max at 200V
Power Consumption (operating maximum)	1061 VA (1040 W) max at 200V-240V	1629.6 VA (1597 W) max at 200V-240V (+/- 10%)	1629.6 VA (1597 W) max at 200V-240V (+/- 10%)	1792.9 VA (1757.96 W) max at 200V-240V (+/- 10%)	2088.8 VA (2047 W) max at 200V-240V (+/- 10%)
Power Factor	0.95 minimum at full load, @ 200 VAC				
Heat Dissipation (operating maximum)	3.74 x 10 ⁶ J/hr (3,549 Btu/hr) max 200VAC	5.74 x 10 ⁶ J/hr, (5,449 Btu/hr) max 200VAC	5.74 x 10 ⁶ J/hr, (5,995 Btu/hr) max 200VAC	6.32 x 10 ⁶ J/hr, (5,995 Btu/hr) max 200VAC	7.37 x 10 ⁶ J/hr, (6,985 Btu/hr) max 200VAC
In-rush Current	45 Apk "cold" per line cord, at any line voltage				
MaStartup Surge Current	120 Apk "hot" per line cord, at any line voltage				
AC Protection	20 A fuse on each power supply, single line				
AC Inlet Type	IEC320-C20 (100VAC) (500T Low line) EC320-C14 or IEC320-C20	IEC320-C14 or IEC320-C20	IEC320-C14 or IEC320-C20	IEC320-C14 or IEC320-C20	IEC320-C20
Ride-through Time	10 ms min				
Current Sharing	± 5 percent of full load, between power supplies				
	Note: Power consumption values for enclosures are based on fully populated enclosures (power supplies, drives and I/O modules).				
Weight and Dimensions					
Weight kgs/lbs	empty 30.38/66.97 full 37.4/82.4	empty 35.80/79 full 41.7/92	empty 35.80/79 full 41.7/92	empty 35.80/79 full 41.7/92	empty 35.80/79 full 41.7/92
Vertical size	2 NEMA units	2 NEMA units	2 NEMA units	2 NEMA units	2 NEMA units
Height cm/inches	8.72/3.43	8.72/3.43	8.72/3.43	8.72/3.43	8.72/3.43
Width cm/inches	44.72/17.61	44.72/17.61	44.72/17.61	44.72/17.61	44.72/17.61
Depth cm/inches	79.55/31.32	79.55/31.32	79.55/31.32	79.55/31.32	79.55/31.32
	* PowerStore 500T supports running native low line power (100-120VAC +/-10)				

Drive Expansion Enclosure

24 X 2.5" Drive Expansion Enclosure (ENS24)

Power

AC Line Voltage	100 to 240 VAC \pm 10%, single phase, 47 to 63 Hz
AC Line Current (operating maximum)	10.06 A max at 100 VAC 5.00 A max at 200 VAC
Power Consumption (operating maximum)	1016 VA (965 W) max at 100 VAC 1006 VA (956 W) max at 200 VAC
Power Factor	0.95 minimum at full load, @ 100V/200V
Heat Dissipation (operating maximum)	3.47 x 106 J/hr. (3,293 Btu/hr.) max at 100 VAC 3.44 x 106 J/hr. (3,262 Btu/hr.) max at 200 VAC
In-rush Current	82A max for 1/2 Line cycle per line cord at 200 VAC
Startup Surge Current	100 Apk Max for up to 125uSec
AC Protection	15 A fuse on each power supply, single line
AC Inlet Type	IEC320-C14 appliance coupler, per power zone
Ride-through Time	10 ms minimum
Current Sharing	\pm 5 percent of full load, between power supplies

Weight and Dimensions

Weight kg/lbs	Empty: 27.2 kg / 60lb Full: 33.5 kg / 74lb
Vertical size	2 NEMA units
Height cm/inches	8.89 cm / 3.5in
Width cm/inches	43.18 cm / 17in
Depth cm/inches	65.30 cm / 25.71in

Note: Power consumption values for Base Enclosure and Expansion Enclosures are based on fully populated enclosures (power supplies, drives and I/O modules).

Cabinets

Standard 42U Cabinet

Power Configuration	One, two, three, four, five, six power domains, each redundant
Power Inlet Count	Two, four, six, eight, ten, or twelve (two per domain)
Plug Types	NEMA L6-30P or IEC309-332 P6 or IP57 (Australia)
Input Power Capacity	1 Domain: 4,800 VA @ 200 VAC, 5,760 VA @ 240 VAC 2 Domain: 9,600 VA @ 200 VAC, 11,520 VA @ 240 VAC 3 Domain: 14,400 VA @ 200 VAC, 17,280 VA @ 240 VAC 4 Domain: 19,200 VA @ 200 VAC, 23,040 VA @ 240 VAC 5 Domain: 24,000 VA @ 200 VAC, 28,800 VA @ 240 VAC 6 Domain: 28,800 VA @ 200 VAC, 34,560 VA @ 240 VAC
AC Protection	20 A site circuit breakers on each power branch
42U Cabinet Dimensions	Height – 78.4 in (199.1 cm); Width - 23.6 in (60.0 cm); Depth - 39.3 in (99.8 cm); Weight Empty – 387 lb (176 kg)

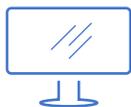
Operating Environment

	Description	Specification
Recommended Range Operation	The limits under which equipment will operate the most reliably while still achieving reasonably energy-efficient data center operation.	18°C to 27°C (64.4°F to 80.6°F) and 15°C (59°F) dew point
Continuous Allowable Range Operation	Data center economization techniques (e.g. free cooling) may be employed to improve overall data center efficiency. These techniques may cause equipment inlet conditions to fall outside the recommended range but still within the continuously allowable range. Equipment may be operated without any hourly limitations in this range.	5°C to 35°C (50°F to 95°F) at 20% to 80% relative humidity with 21°C (69.8°F) maximum dew point (maximum wet bulb temperature). De-rate maximum allowable dry bulb temperature at 1°C per 300m above 950m (1°F per 547 ft above 3117 ft).
Improbable Operation (Excursion Limited)	During certain times of the day or year, equipment inlet conditions may fall outside the continuously allowable range but still within the expanded improbable range. Equipment operation is limited to ≤ 10% of annual operating hours in this range.	35°C to 40°C (with no direct sunlight on the equipment) at -12°C minimum dew point and 8% to 85% relative humidity with 24°C maximum dew point (wet bulb temperature). Outside the continuously allowable range (10°C to 35°C), the system can operate down to 5°C or up to 40°C for a maximum of 10% of its annual operating hours. For temperatures between 35°C and 40°C (95°F to 104°F), de-rate maximum allowable dry bulb temperature by 1°C per 175m above 950m (1°F per 319 ft above 3117 ft).
Temperature Gradient		20°C / hour (36°F / hour)
Altitude	Max Operating	3,050m (10,000ft)

Statement of Compliance

Dell Information Technology Equipment is compliant with all currently applicable regulatory requirements for Electromagnetic Compatibility, Product Safety, and Environmental Regulations where placed on market.

Detailed regulatory information and verification of compliance is available at the Dell Regulatory Compliance website. http://dell.com/regulatory_compliance.



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