

# Frequently Asked Questions: Dell EMC PowerStore

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## Launch messaging summary

### 1) What is PowerStore? (1-minute value summary with messaging “pillars”)

PowerStore is a modern infrastructure platform designed for the data era and represents the culmination of Dell EMC’s Midrange.Next consolidation strategy. It provides our customers with

data-centric, intelligent, and adaptable infrastructure that supports both traditional and modern workloads. PowerStore makes this possible with:

- **Data-centric** design that optimizes system performance, scalability, and storage efficiency to support any workload without compromise.
- **Intelligent** automation through programmable infrastructure that simplifies management and optimizes system resources, while enabling proactive health analytics to easily monitor, analyze, and troubleshoot the environment.
- **Adaptable** architecture that enables speed and application mobility, offers flexible deployment models, and provides choice, predictability, and investment protection through flexible payment solutions and data-in-place upgrades.

## 2) What are the key PowerStore differentiators within each value category?

### **Data-centric**

- Single architecture to provide storage in multiple formats to applications (from physical and virtual LUNs to containers to traditional files) for the ultimate workload flexibility
- Performance-optimized design that scales up and out with end-to-end NVMe, delivering 7x more IOPS and 3x lower latency for real-world workloads compared to previous generations of Dell midrange storage
- Efficiency without compromise with always-on inline data reduction (4:1 data reduction guaranteed)

### **Intelligent**

- Programmable infrastructure that enables automation and DevOps by streamlining development environments and automating end-to-end workflows
- Built-in machine learning and automation to simplify appliance discovery and optimize system resources
- Proactive health analytics to provide smart monitoring for the environment to reduce risk and predict future needs.

### **Adaptable**

- Flexible architecture that enables virtualized hosting of user applications directly on the appliance (referred to as “AppsON”) as well as seamless integration into IT’s larger VMware ecosystem
- Flexible deployment models to modernize the core, edge, and cloud without disruption
- Choice, predictability, and investment protection through flexible payment solutions and data-in-place upgrades

## 3) What is PowerStore? (Summary with AppsON focus)

PowerStore is a revolutionary new storage architecture that combines the advantages of best-of-breed storage hardware with the ability to run virtualized workloads directly on the appliance via the new **AppsON** capability.

PowerStore includes a built-in VMware hypervisor, which allows it to provide multiple IT services *at the same time*:

- **Scalable storage capacity** for apps running on external hosts throughout the enterprise
- High-performance **VMware-based compute environment** for hosting local apps (AppsON)

With VMware as the underlying foundation, administrators can move workloads seamlessly between these services. PowerStore cluster management, combined with VMware tools including vMotion and storage vMotion, enables easy workload mobility in and out of PowerStore to other VMware targets.

Using a single storage instance, applications may be deployed on networked servers, hyperconverged infrastructure, or directly on the PowerStore appliance, then migrated transparently among any location – allowing application owners to quickly reassign workloads to the most effective environment based on current requirements and available resources.

#### 4) **In a nutshell, what customer and industry problems does PowerStore solve?**

Today's IT professionals are attempting to handle two simultaneous but conflicting pressures

- **Growing amount and diversity of data** – Data explosion from IoT and other sources presents huge opportunity for companies, but the complexity can be overwhelming. Increasingly diverse formats and data locations (edge to cloud) means most organizations find that no single infrastructure can address all their data requirement, so they deploy *multiple architectures*, creating siloes of IT resources that are managed and consumed independently.
- **New demands for operational simplicity** – At the same time, public cloud has raised the bar for business agility, and IT organizations are now expected to provide the same levels of operational and economic flexibility in their on-premise solutions.

PowerStore addresses both challenges with a scalable, unified design, unprecedented levels of automation and simplifying intelligence, and a mobile, flexible architecture that can **connect and mobilize current investments for a true hybrid cloud experience**.

PowerStore is a game-changing new platform that unlocks the power of data, regardless of its structure or location, helping you adapt and transform your IT without disrupting today's operations.

## Announcement and availability timeline

#### 5) **When was PowerStore announced?**

PowerStore was announced on May 5, 2020 and is now orderable in all regions.

## Social promotion (how to help)

### 6) Where can I find PowerStore launch videos, images and sample tweet text to post and forward to my customers?

All these resources are available on the [PowerStore SMAK](#) (*Social Media Activation Kit*) linked from the [PowerStore Inside Dell page](#). Check back frequently for updates that can help you introduce the new platform to existing and new accounts.

## Product positioning

### 7) What use cases/customer profiles is PowerStore designed for?

The primary “sweet spots” are:

- Traditional to modern databases and applications, block or block + general purpose file (unified)
- Tech refresh opportunities when existing platforms (XtremIO, high-end VNX, and SC Series) are no longer a fit.
- PowerStore appliances with AppsON enabled are also ideal candidates for infrastructure applications or data intensive workloads that have traditionally been deployed on three-tier architecture. Some examples include, but are not limited to, SQL Server 2019, Splunk, Hadoop, and MongoDB.

### 8) What does PowerStore mean for current Unity XT, SC Series and XtremIO products?

The Midrange.Next strategy represents the consolidation of Dell EMC’s midrange storage arrays. However, this will be a *long-term transition* with numerous onramps, allowing customers to migrate non-disruptively and at their own pace. They can also continue to purchase current product lines until they are ready to transition to PowerStore.

Again, no EOLs are being announced publicly, and it is expected that PowerStore will coexist with current Dell EMC midrange offerings in the portfolio for the foreseeable future. As PowerStore ramps in the market, Unity XT will be our lead midrange hybrid solution for the foreseeable future. SC and XtremIO will continue to support existing customers and we will provide seamless data migration to PowerStore if and when customers are ready to move.

### 9) How is PowerStore positioned alongside our other primary storage products?

In FY21, we will continue to lead with the power portfolio: PowerMax, PowerStore, PowerVault and VxFlex in the primary storage category, and PowerScale in the unstructured category.

PowerStore will play a critical role in our FY21 plan to go on offense and take share in the midrange storage space. Starting in Q2, sales should lead with PowerStore for all flash midrange opportunities that are priced ~\$50K ASP and above.

**10) Since PowerStore can run apps on board, how is it positioned compared to VxRail?**

PowerStore is complementary to VxRail – each has been architected and optimized to support different environments and different workloads.

VxRail is based on **standard servers and VMWare’s vSAN storage technologies**. It is ideal for general purpose, compute-intensive virtual workloads and provides full stack automation as well as simplified lifecycle management. VxRail also has onboard GPU processing for intensive AI/ML applications where the primary CPUs aren’t providing enough compute. VxRail is the leading general purpose HCI system in the market and will continue to be the lead HCI product in the portfolio.

PowerStore is based on **enterprise storage HW and an entirely new enterprise storage software stack** built with containers and microservices. It is ideal for infrastructure applications as well as data intensive apps. Infrastructure applications include but are not limited to anti-virus servers, data protection software, and monitoring software...essentially any applications needed to run the underlying storage infrastructure. Data intensive applications are those that are latency-sensitive or require an imbalance of compute and storage. (I.e., high capacity, high performance, and low latency storage requirements.) Since PowerStore is based on enterprise storage hardware, it can *simultaneously* provide enterprise block services (eg. Fibre Channel) and run applications on board. This can provide a greater degree of consolidation for existing infrastructure and operations.

As we’ve seen for years, 3-tier infrastructure remains the predominant architecture and is frequently being complemented by HCI. The combination of industry-leading VxRail and best-in-class PowerStore gives Dell Technologies the unmatched power of ‘&’ to address diverse data center needs.

**11) Which workloads are ideal for hosting locally on PowerStore with the new AppsON capability?**

In general, AppsON is ideal for two types of workloads: infrastructure apps and data intensive applications. “Infrastructure apps” include anything the infrastructure admin (eg. storage admin) needs to run their data center including anti-virus, data protection, monitoring software, etc. This enables the infrastructure team to simplify operations and have full control over their environments.

“Data-intensive” apps fall in two categories - those that are latency sensitive and those that require an imbalance of storage vs. compute. These include but aren’t limited to applications like Splunk, Spark/Flink and other edge IOT analytics applications that require a small footprint and to process and store vast amounts of data.

AppsON further benefits IT organizations by providing new flexibility while continuing to leverage existing infrastructure investments. It complements existing platforms, including HCI, by providing a landing zone for high capacity, high performance, storage-intensive workloads that require superior data efficiency and “always on” data reduction.

## 12) When should I lead with PowerStore?

Lead with PowerStore when the opportunity is for:

- All-Flash midrange storage priced ~\$50K (within the \$25K-\$250K price range) Tech refresh of existing platforms, especially XtremIO, high end VNX and SC Series
- Accounts where we can go on offense against competitors:
  - **Pure** – they have no differentiators vs. PowerStore
  - **HPE** – their fractured product line opens an opportunity
  - **NetApp** – change the conversation with a modern appliance designed for the data decade

Keep in mind there are situations where you should continue to lead with Unity XT, specifically when the opportunity is for:

- Hybrid solutions priced ~\$25K
- Customer environments where PowerStore is not a fit from a business or technical standpoint.
  - **Business** – the customer is considering purchasing Unity or is loyal to Unity; long qualification cycle of a new platform is not acceptable; they want lower hybrid price points
  - **Technical** – they require features or capabilities that are not available in the initial release, such synchronous replication, advanced file features, or Federal certifications

## 13) How does PowerStore performance compare to our current midrange storage products?

PowerStore offers a significant performance increase over current-generation products. The PowerStore announcement will feature a number of performance-related “hero” claims, including the following. Note geographic restrictions for use apply:

### Up to 7X more IOPs\*

\* Based on Dell analysis comparing PowerStore 9000 4x cluster to Unity XT 880 running 70/30 random read/write mix, 8K block size with compression and deduplication active, March 2020. Actual performance will vary. **Legal note: This is a Dell vs. Dell comparative claim; the following geo restrictions apply: The claim CANNOT be used in Costa Rica, Russia, South Africa, Ukraine, and Venezuela.**

### Up to 3X lower latency\*

\* Based on Dell analysis comparing PowerStore 9000 to Unity XT 880 at 300K IOPS, 8K random, 70/30 read/write mix, compression and deduplication active, March 2020. Actual performance will vary. **Legal note: This is a Dell vs. Dell comparative claim; the following geo restrictions apply: The claim CANNOT be used in Costa Rica, Russia, South Africa, Ukraine, and Venezuela.**

### Up to 4.5M IOPS\*

\* Based on Dell tests running cluster of four PowerStore 9000 models with 4K block size, 100% reads, with compression and deduplication active. March 2020. Actual performance will vary.

See [Claims section](#) for additional approved claims and stay tuned for additional competitive and application-specific test results to be published at launch or shortly after.

## Hardware details

PowerStore’s best-in-class hardware platform is focused on performance, reliability and modular flexibility. Designed from the ground up to leverage next-gen innovations such as end-to-end NVMe and Intel Optane Storage Class Memory (SCM), PowerStore delivers 7x more IOPs and 3x lower latency for real-world workloads compared to previous generations of Dell midrange storage – offering your customers all the performance and expansion headroom they need to ensure long-term value through multiple solution lifecycles.

PowerStore helps customers simplify and consolidate diverse infrastructures with high-performance multi-protocol network IO options and single-architecture support for block, file and VVols, transforming operations for both traditional and modern workloads.

### 14) What is the model lineup for PowerStore?

Each hardware configuration in the PowerStore lineup (listed in the table below) is available in either a “T model” or “X model” configuration.

Base hardware, Intel Xeon processors, memory, media support and SAN services such as deduplication and compression are identical between the two model categories. The difference is the software/OS configuration. The T models are for storage-only deployments, whereas the X models also enable application hosting with AppsON. **Additional detail on X and T model differences and use cases is available in the Software Details section. See [“X and T model comparison.”](#)**

	1000	3000	5000	7000	9000
Min/Max Drives	96	96	96	96	96
Base Enclosure	A 2U, 2 node enclosure with twenty five (25) 2.5" NVMe drive slots				
Expansion Enclosure	A 2U enclosure attached to a PowerStore base enclosure with twenty five 2.5" SAS drives slots				
Power Supplies	PowerStore appliances are powered by 2 power supplies (PS) per enclosure. Each power supply can provide power to the entire enclosure if the peer PS has been removed or is faulted.				
CPUs per Appliance	4 x Intel Xeon CPUs, 32 cores, 1.8GHz	4 x Intel Xeon CPUs, 48 cores, 2.1GHz	4 x Intel Xeon CPUs, 64 cores, 2.1GHz	4 x Intel Xeon CPUs, 80 cores, 2.4GHz	4 x Intel Xeon CPUs, 112 cores, 2.1GHz
Memory per Appliance	384 GB	768 GB	1,152 GB	1,536 GB	2,560 GB
Raw capacity per appliance*	0.898 PB	0.898 PB	0.898 PB	0.898 PB	0.898 PB

\* Note **effective** capacity is much higher, and up to four appliances may be deployed in a single PowerStore cluster.

### 15) Is hardware the exact same between PowerStore T model and X model appliances?

Yes, the hardware used for PowerStore T and PowerStore X models utilize the same enclosures. The only differences are as follows:

- PowerStore 3000X requires a 2200W power supply, while PowerStore 3000T can use either 1800W or 2200W options.



- In the Version 1 release, Ethernet IO Modules are only available on PowerStore T models, not X models. (However, iSCSI connectivity is still available for PowerStore X models through the embedded mezzanine card.)

**16) Can I upgrade/increase the memory on a PowerStore model?**

No, the memory is fixed for each model in V1. However, the Anytime Upgrade program offers non-disruptive upgrades to higher-model nodes (controllers) with greater amounts of memory. See [Future-Proof & Anytime Upgrade section](#).

**17) Is the PowerStore backend a true active-active architecture?**

Yes, PowerStore provides an active/active backend to ensure both nodes within an appliance are working for the customer at the same time and provide the best performance possible. This means that there is no volume ownership at the node level and there is no latency impact because of volume trespassing or failover from one node to the other.

Both controllers serve workload. The front-end presentation is ALUA. This is unlike some of our competitors who use one of the controllers for standby purposes only – which results in sub-optimal performance.

Scale UP and Scale OUT

**18) Can I add to the initial appliance capacity?**

Yes, each PowerStore appliance can expand to 898 TB of raw capacity.

**19) Do all PowerStore appliance models support the same expansion enclosures?**

Yes. The only expansion enclosure supported in V1 is a 25-bay 2.5” SAS enclosure.

**20) Does PowerStore support any of our existing expansion enclosures (Unity, SC, etc.)**

No. Only the PowerStore model enclosure is supported.

**21) What is the max number of Expansion Enclosures PowerStore supports?**

A max of three (3) PowerStore expansion enclosures can be attached to each PowerStore base enclosure for a total of 898 TB raw capacity per appliance.

**22) Does PowerStore support federation like SC Series?**

Yes, PowerStore clustering is similar to SC federation, but includes an embedded Cluster Manager and an AI/ML engine to help automate and simplify management. Within a cluster, volumes are still “owned” by individual appliances, but the cluster is otherwise managed as a single entity, with seamless migration and load balancing between appliances.

PowerStore has been designed with midrange use cases and economics in mind, and our intelligent scale out model (with independent scale of compute or storage, automation, and intelligent data placement) is “federation done right.” Other products in the Dell portfolio scale up and out differently. Unlike our competitors, we offer customers choice based on their requirements and workloads.

### **23) Why do we not share volumes across the appliances in the cluster?**

PowerStore has been designed with midrange use cases and economics in mind, and our intelligent scale out model (with independent scale of compute or storage, automation, and intelligent data placement) is “federation done right.”

Within a PowerStore cluster, volumes are still “owned” by individual appliances, but the cluster is otherwise managed as a single entity, with seamless migration and load balancing between appliances.

Sharing volumes across appliances requires dedicated low latency networking hardware and software. Technologies like Infiniband and RDMA are great for low latency cross-cluster data fetches and distribution, but they also cost more to implement and maintain over time. Plus, there are other trade-offs as well which are not ideal for midrange deployments. For instance, HP Nimble’s “virtual volumes” method of spanning multiple appliances makes it difficult to add or remove individual appliances, or to deploy heterogeneous appliance models within a cluster.

PowerStore keeps volumes within the bounds of a single appliance to guarantee the highest levels of performance and lowest latency without requiring appliance-wide striping and incurring penalties due to backplane traffic. From a user perspective however, everything is managed as a single pool of storage by the built in AI/ML engine.

Other products in the Dell portfolio scale up and out differently. For customers that require multi-controller scale and global distribution of data, we have PowerMax and XtremIO. Unlike our competitors, we offer customers choice based on their requirements and workloads.

### **24) How many PowerStore appliances can be deployed in a single cluster?**

Up to four (4) PowerStore appliances can be added to a single cluster, for a total of eight (8) active-active nodes and 3.6 PB raw capacity. See [Intelligence / Automation](#) section for more advantages related to clustering.

### **25) Can I move Expansion Enclosures from one PowerStore cluster to another?**

No, Expansion Enclosures cannot be moved between appliances and they cannot be moved between clusters. However, *appliances* can be moved from one PowerStore cluster to another.

### **26) Can I mix PowerStore models in the same cluster?**

Clusters are only supported for PowerStore T models in V1. Different PowerStore T models (3000, 7000, 9000, etc.) can be mixed in the same cluster however, a PowerStore X model cannot be added.

**27) Is direct-attach supported?**

Yes, hosts may be directly attached to PowerStore via Fibre Channel.

**28) How are PowerStore appliances connected for a scaleout configuration (cluster)?**

Top-of-rack switches are required to connect appliances together for cluster management and volume placement/balancing.

Note PowerStore can validate switch settings for some Dell switches. See PowerStore Support Matrix for a list of all supported switches.

## Hardware-based DDR

**29) What is the advantage of handling data reduction in hardware?**

Hardware acceleration using Intel QuickAssist Technology (Lewisburg chip) enables more consistent storage efficiency by allowing PowerStore's advanced inline compression to remain **"always on"** without compromising performance or other services. Inline deduplication is also "always on." *Unlike competing solutions, PowerStore enables maximum cost savings at all time, with no management interaction or decisions required.*

The hardware offload capability integrated into each PowerStore appliance provides 40 Gbps of total throughput, thereby conserving main CPU cycles for storage I/O tasks. With PowerStore, organizations will average 4:1 data reduction across ALL workloads, without compromising performance and services – though 20:1 or more is achievable depending on the data type.

**30) Is deduplication granularity at the appliance or cluster level?**

Deduplication is performed at the node level in the initial PowerStore release. However, it also occurs *across* volumes, unlike Unity, which optimizes at the volume level. PowerStore also uses a finer level of granularity than Unity and has a larger dedupe cache.

PowerStore is designed for midrange architectural/deployment models where dedupe is NOT performed at the cluster level.

## Media support

**31) What media types does PowerStore support?**

The PowerStore appliance can be configured with either Flash drives or Storage Class Memory (SCM). The first 21 Flash drives reside in the NVMe base enclosure. Once the base enclosure is full SAS Flash drives are available for expansion in the 25x2.5 SAS expansion chassis. Flash drives and SCM cannot be configured in the same appliance.

**32) Why do we have SAS drives (vs. NVMe) in the expansion enclosures? Doesn't that impact performance?**

For customers needing to scale beyond the 1PBe mark in a single appliance, SAS-based expansion is available. This solution provides no performance degradation and also maintains ease of use and simplicity of management with Dynamic RAID and a single storage pool.

PowerStore customers do also have the option to add more NVMe SSDs or even SCM devices by scaling out the cluster, which has the added benefit of increasing overall processing power for the system.

Finally, NVMe in the expansion enclosures is slated for a near-term future release, and will be delivered as a non-disruptive firmware upgrade. See NVMe-oF support section.

**33) Is PowerStore using SCM as actual persistent storage, or just cache?**

Unlike some competitors, who use SCM for caching only, PowerStore can use SCM for a persistent high-performance storage option (data and metadata).

**34) What drive capacities does PowerStore support?**

NVMe Flash drives are available in 1.92TB, 3.84TB, 7.68TB & 15.36TB. SAS Flash drives are available in 1.92TB, 3.84TB & 7.68TB. Note that unlike NVMe, SAS Flash does not support a 15.36TB capacity point. SCM drives are available in 375GB or 750GB capacities

**35) Can different drive sizes be mixed in the same base or expansion enclosure?**

Yes.

**36) Do the base and expansion enclosures support the same drives?**

Only NVMe Flash or SCM can be configured in the base enclosure. Only SAS Flash can be configured in the expansion enclosure, and only after the base enclosure is filled with 21 NVMe flash drives.

**37) When will PowerStore support NVMe-over fabric (NVMe-oF)?**

The initial PowerStore release gives customers a huge immediate performance advantage via NVMe drive support inside the base appliance. A near-term future release will provide a non-disruptive firmware upgrade to enable NVMe-oF on your existing PowerStore appliance, as well as well as the ability to add new NVMe expansion enclosures. Also see [NVMe-oF support section](#).

**38) What are NVRAM drives and why are they need?**

The 8GB NVRAM devices are used for write-caching. There will be 2-4 cards auto-configured depending on Appliance model ordered. But we will proactively reserve 4 slots for NVRAM drives on all platforms.

**39) Does PowerStore support 3.5” drives in either the base or expansion enclosure?**

No – PowerStore does not support a 3.5” enclosure and can therefore only be configured with 2.5” drives.

**40) Can you add HDDs to a Dell EMC PowerStore system?**

No, hybrid configurations are not supported at this time.

**41) Does PowerStore use system drives? If so, what type are supported?**

No – Unlike Unity & Unity XT the first 4 drives in the base enclosure are no different than any other drive in the enclosure. The concept of ‘system drive’ or ‘system pack’ does not exist with PowerStore. Instead PowerStore uses 2 imbedded mSATA drives for base OE, primary boot, log files & recovery image.

**42) What is Low Line power, and does PowerStore support it?**

Low Line power means the supplied voltage is between 100-120V. All PowerStore appliances requires 200-240V to be powered on. If a datacenter requires the use of 100-120V, a step-up transformer is required to step up the supplied voltage from 100-120V to the support 200-240V.

**43) Is DC/NEBS power supported?**

No, DC/NEBS is not on the roadmap at this time. However the currently offered Dell EMC Unity Series based DC powered systems, which are available in Unity Hybrid and All-Flash models, will continue to be sold. For customers requiring DC power, they can continue to purchase the Unity 300/350F, 400/450F, 500/550F and 600/650F systems. There is no plan to support DC power variants on the new Unity XT system hardware.

Network connectivity

**44) What I/O protocols are supported?**

The following capabilities are the same for X model and T models.

Connectivity Options		
Type	Description	Details
Mezzanine card / IO Module*	4-Port 10Gbase-T Module (File & Block)	4-port 10Gbase-T Ethernet IP/iSCSI module with copper connection to Ethernet switch
Mezzanine card / IO Module*	4-Port 25 Gb/s Optical Module (File & Block)	4-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	4-Port 32 Gb/s Fibre Channel Module (Block only)	4-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

Model	1000	3000	5000	7000	9000
Max Mezzanine cards per Appliance*	2	2	2	2	2
Max IO Modules per Appliance**	4	4	4	4	4
Max front end Ports per Appliance (all types)	24	24	24	24	24
Max FC Ports per Appliance	16	16	16	16	16
10 Gbase-T/iSCSI Max Total Ports per Appliance	24	24	24	24	24
10/25 GbE/iSCSI Max Total Ports per Appliance	24	24	24	24	24

#### 45) Does PowerStore have greater networking requirements than previous storage arrays?

PowerStore networking requirements are similar to most other storage arrays. There are three basic switch/network types that may be required for PowerStore:

- Management Network:** *This is similar to the requirement for Unity and other arrays.* Customers typically already have a management network within their datacenter and we can plug directly into that network. If a customer does not have a management network, then a basic network switch can be easily purchased and deployed for the management network.
- Data Network:** The data network provides the customers with host level access to PowerStore using connectivity protocols like NFS, SMB, and iSCSI. **Note the same data network is also used for the PowerStore cluster connectivity and data mobility.** The customer often already has this type of IP network (10Gb / 25Gb) and PowerStore can simply connect. If the customer does not have this connectivity today these switches can be sold and bundled with a PowerStore appliance.
- Fibre Channel:** Customers with Fibre Channel requirements typically already have their network in place, and we simply plug in. *Note a customer who is 100% Fibre Channel will need to purchase IP switches to link multiple PowerStore appliances in clusters (see Data Network).*

Again, these requirements, where applicable, are not that different from other arrays.

#### 46) What is a “4-port module”?

A 4-port module is a mezzanine-style card that is located in the embedded module. Unlike an IO module which can be added/removed with the node still in the base enclosure, the node must be removed to add/remove a 4-port module.

This module is required in V1 and used for management services along with front-end connectivity. The available options include a 4x 10GbaseT and a 4x 25GbE Optical option that supports either 10GbE or 25GbE depending on the SFP or TwinAx cable used in each port.

**47) Does the 4-port module have a Fibre Channel option?**

Not in V1.

**48) Does PowerStore have plans for a 100GbE IO module?**

Not in V1 but it is being considered for a future release.

**49) Does the 32Gb FC IO module support lower speeds?**

Yes. The 32Gb FC IO module can support either 16Gb or 32Gb SFPs. Each SFP is capable of 3 speeds. For example, the 32Gb SFP support 32/16/8 Gbps and the 16Gb SFP support 16/8/4 Gbps.

**50) Does the 25GbE iSCSI IO module support lower speeds?**

Yes. The 25GbE iSCSI IO module can support either 1GbE, 10GbE, or 25GbE. The speed of the port is dependent on which SFP or TwinAx cable is inserted and it will not negotiate to lower speeds. For example, a 25GbE SFP only runs at 25 Gbps and if lower speeds are required, a new SFP should be used. Also, all 4 ports could be running different speeds if desired (i.e. 3 ports at 10GbE and 1 port at 25GbE).

**51) Can an IO module be swapped with another type after initial configuration?**

Not in V1.

## [NVMe-oF support](#)

**52) Does PowerStore support NVMe-oF (NVMe-over-Fabric)?**

PowerStore helps prepare your data center for end-to-end NVMe with our “NVMe-oF-ready” storage architecture.

The initial PowerStore release gives you a huge immediate performance advantage via NVMe drive support inside the base array. A near-term future release will provide a non-disruptive firmware upgrade to enable NVMe-oF on your *existing* PowerStore appliance, as well as in the expansion enclosure. Both Fibre Channel and TCP/IP networks will be supported.

**53) Why not offer NVMe-oF now?**

The technology is evolving, and the majority of our customers will need to make significant investments elsewhere in their environments to fully utilize NVMe-oF. We have successfully deployed NVMe-oF in our high-end PowerMax products and will introduce it for PowerStore to meet customer needs as the technology becomes more affordable. The unique modularity of our container-based software architecture will make the capability easy to enable in the product.



## Software details

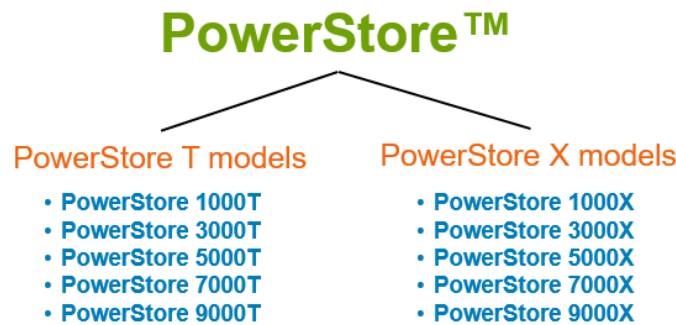
### 54) Are PowerStore software capabilities sold/licensed separately, or is pricing all-inclusive?

PowerStore software model is all-inclusive. There are no separate or a la carte feature licenses.

### X and T model comparison

### 55) What are the main differences between the X and T models?

Each hardware configuration in the PowerStore lineup (see previous question) is available in either a “T model” or “X model” configuration. Base hardware, processors, memory, media support and SAN services such as deduplication/compression are identical between the two categories.



The difference is the software/OS configuration. X models and T models represent the two main deployment modes for PowerStore, as shown below.

#### ***PowerStore T Models - Scalable Storage Consolidation***

PowerStore 1000T through 9000T models provide organizations with all the benefits of a 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. In addition, automated management of resources across the cluster results in superior storage utilization and simplified administration. PowerStore enables application storage for VMware Cloud Foundation (VCF) with both block and file protocols, supporting needs for portability across today’s hybrid cloud environments.

#### ***PowerStore X Models - Infrastructure Consolidation with AppsON***

PowerStore 1000X through 9000X models take storage platforms in a bold new direction, combining the fundamental benefits of enterprise shared storage with the capabilities of an on-board hypervisor. Integrating the PowerStore’s container-based software architecture with VMware ESXi provides unmatched operational and management integration between storage and the virtualized compute environment. For data centers this results in a seamless migration capability for applications which can be deployed on external VMware servers or directly on PowerStore with AppsON as requirements dictate, while simultaneously supporting their bare-metal server and legacy applications. For a variety of edge, ROBO, IoT and tactical environments, the option to collapse the hardware stack with PowerStore X, while maintaining



the full functionality of a scalable storage platform, provides organizations with new infrastructure consolidation options.

T models		X models		
Deployment mode	Standard Deployment <i>Storage only</i>	Hypervisor Deployment <i>Storage + local apps (AppsON)</i>		
Operating environment	<b>PowerStore OS:</b> <b>Docker containers deployed on bare metal</b> ( <i>microservices design enhances security, serviceability, integration</i> )	<b>PowerStore OS:</b> <b>Containerized OS runs in a VM on on-board ESX VMware hypervisor</b> ( <i>same microservices design advantages</i> )		
Management (primary)	<ul style="list-style-type: none"> <li>✓ PowerStore Manager</li> <li>✓ CloudIQ</li> <li>✓ 3rd-party management and orchestration frameworks</li> </ul>	<ul style="list-style-type: none"> <li>✓ Standard VMware tools (vSphere, etc.)</li> <li>✓ PowerStore Manager</li> <li>✓ CloudIQ</li> <li>✓ 3rd-party management and orchestration frameworks</li> </ul>		
Services	Inline data reduction (hardware-assisted), QoS, Mapped RAID, health engine, local and remote protection, thin provisioning, D@RE, etc.			
Data types supported*	Unified deployment (standard config)	Block optimized (optional config)	-----	
	<ul style="list-style-type: none"> <li>✓ SAN (block)</li> <li>✓ NAS (File)</li> <li>✓ vVols</li> </ul>	<ul style="list-style-type: none"> <li>✓ SAN (block)</li> <li>✓ vVols</li> </ul>	<ul style="list-style-type: none"> <li>✓ SAN (block)</li> <li>✓ vVols</li> <li>✓ VMs / applications</li> </ul>	
Scale-up	2.8PB effective capacity** per appliance (898TB raw)	2.8PB effective capacity** per appliance (898TB raw)	2.8PB effective capacity** per appliance (898TB raw)	
Scale-out	Cluster up to 4 appliances ( <i>NAS on master appliance only</i> )	Cluster up to 4 appliances	Single appliance in first release, clustering coming in follow-up release.	

\* Note within the T model deployment, there are separate Unified and Block Optimized modes.  
 \*\* Effective capacity assumes 4:1 average data reduction. Actual results will vary.

**56) Can customers change between PowerStore T and X model configurations after purchase?**

No, PowerStore T models may not be changed to X models after purchase, and PowerStore X models may not be changed to T models.

**57) Can customers change between PowerStore T model Unified and Block-optimized deployments after purchase?**

This conversion is not supported in V1.

**58) Within the X model and T model categories, are the software capabilities the same? (i.e., do 1000T, 3000T, 5000T, 7000T and 9000T have the same features?)**

Yes, all models within either X model or T model categories have the same software features. 1000, 3000, 5000, 7000 and 9000 differences are mostly related to performance and capacity.

## Container architecture

### 59) Why have we used containers to build the PowerStore architecture?

PowerStore's software architecture, known as PowerStoreOS, improves performance, fault tolerance and security by isolating individual OS components as microservices.

Containers enable our Engineering teams to modularize the PowerStore software stack into distinct logical entities. System resources like CPU cores and memory are assigned at the Container level which guarantees service levels for each container within PowerStore. This, in turn helps provide predictability and consistency in performance for the product

The modularity of containers also enables feature portability, standardization and rapid time-to-market for new capabilities. In addition to new modules developed specifically for PowerStore, proven applications and features from Dell EMC's portfolio of cross-platform solutions, including AppSync, SRM and Data Protection Suite, can be integrated directly into the PowerStore operating environment in future releases.

*Note the entire containerized PowerStoreOS can be deployed directly on the appliance, or within a VM on PowerStore's built-in VMware hypervisor (X models only), providing yet another layer of isolation, intelligence and abstraction. [See AppsON section.](#)*

### 60) Which PowerStore capabilities are deployed as containerized microservices?

Everything within PowerStoreOS is container based. The above isolation and portability advantages benefit key aspects of the OS such as Serviceability, Management, Data Path and NAS. Services encompassed range from QoS to cluster management, security, SupportAssist, data reduction and more.

### 61) Can customers deploy their own containers on PowerStore?

In the short term, no. However, PowerStore does provide persistent storage services for container orchestration environments such as Kubernetes via its industry-standard CSI plugin.

## AppsON

### 62) What is AppsON?

On PowerStore X models, the entire containerized PowerStoreOS (see above) runs within a VM on PowerStore's built-in VMware hypervisor. Customers can also access this hypervisor to deploy their own applications *directly on the appliance* – using the same VMware tools and

methods they use with external hosts. No external host is required for workloads running on AppsON, and since the storage is co-located with the host, network latency is eliminated.

See previous [Positioning section](#) for more AppsON overview information, including workload discussion and positioning with our current HCI portfolio.

### 63) **Can PowerStore X models serve storage to local *and* external VMs?**

Yes. PowerStore X has a dual personality that can simultaneously run VMs on its internal nodes, while simultaneously functioning as a traditional storage array for external hosts attached via FC or iSCSI.

This dual nature creates unprecedented flexibility and mobility as administrators can use standard VMware tools to move workloads seamlessly on and off the appliance.

Using a single storage instance, applications may be deployed on networked servers, hyperconverged infrastructure, or directly on the PowerStore appliance, and migrated transparently among any of these locations, allowing IT and application owners to quickly deploy and reassign workloads to the most effective environment based on current requirements and available resources

## VMware integration

### 64) **How is VMware licensed on PowerStore X models?**

The on-board ESXi is included, but customers also need an existing vCenter in their environment in order to install PowerStore X model appliances. PowerStore X models require Enterprise Plus version of vSphere. These can be purchased from Dell ordering system or customers can choose to use their own vSphere licenses.

### 65) **What happens to user VMs in the case of single node failure?**

VMware HA is turned on by default; if a node fails and resources are available on another node, user VMs will be restarted on the remaining nodes.

### 66) **Can a PowerStore appliance be added to an existing ESXi cluster?**

No, in the initial release, PowerStore always creates a new ESX cluster when a PowerStore X appliance is initiated. However, PowerStore does support bringing existing hosts into the newly formed cluster via RPQ.

### 67) **How do you upgrade the embedded ESXi on PowerStore X models?**

The goal of PowerStore is to make any upgrade as simple as possible. In V1, the user will upgrade vSphere using standard VMware interface. Future PowerStore firmware versions will provide a single package that can upgrade PowerStore's software, firmware and VMware components all from the PowerStore management interface.

Customers should only download vSphere releases from the Dell EMC website. Customers are NOT allowed to upgrade to any available release of vSphere on PowerStore X models, as versions must first be validated and approved by Dell. We are committed to supporting maintenance, update, security, and patch releases of vSphere within 30 to 45 days of their release.

**68) Can PowerStore X models run VMFS-based VMs?**

In V1, only VVol-based VMs can run directly on PowerStore. However, PowerStore X models can serve storage to VMFS-based VMs running on external ESX servers.

**69) What are the benefits of VVols over VMFS?**

Virtual Volumes radically simplify storage management for both vSphere and storage admins by providing VM-granular storage that can easily be managed. Rather than having many VMs get storage from a single pool with common characteristics such as VMFS, vVols give each VM their own storage that can be managed independently, with each vVol having its own array specific capabilities exposed via VMware SPBM.

**70) Is NSX supported for tenant networking?**

NSX-V is supported. NSX-T is not supported in V1, but we can consider supporting it via RPQ

**71) What kind of management integration does the PowerStore Manager have with VMware?**

PowerStore has several integrations with VMware:

- **Managed Snapshots:** For vVol based VMs, the ability to take VMware aware snapshots using PowerStore efficient snapshots which are visible both in the Trident manager and in vCenter for restoration. These can be taken both from vCenter and/or the Trident UI. This includes both manual snapshots, and snapshots created via an assigned Protection Policy to a virtual machine
- **SPBM:** In V1, PowerStore exposes its QoS capabilities to VMware Storage Policy Based Management for vVol VMs
- **End-to-End Performance Metrics:** For vVol VMs, ability to view end-to-end VM performance metrics which include compute performance and storage performance

**72) Is NFS supported?**

NFS-based datastores are not supported with Trident in V1.

**73) Can vVol VMs be replicated?**

In V1, vVol-based VMs can be replicated using RP4VM.

**74) What are the pre-requisites for using vVols?**

To use vVols, the PowerStore VASA provider must be registered in vCenter. For PowerStore X models, the VASA provider registration happens automatically as part of the cluster create during initial configuration, while for PowerStore T models the VASA provider must be registered manually from within vCenter.

**75) What happens to user VMs in the case of single node failure?**

VMware HA is turned on by default on a best effort basis. If a node fails and resources are available on another node, user VMs will be restarted on the remaining nodes.

Intelligence / Automation

**76) What aspects of PowerStore are intelligent / automated?**

***Built-in Machine Learning*** – eliminates dozens of time-consuming tasks and decision points, reducing administrative costs up to 99% vs. traditional environments. Labor-intensive processes like data placement, migrations, load balancing and performance issue resolution are automated by PowerStore’s onboard ML engine, ensuring workloads are always optimized.

***Programmable architecture*** – PowerStore integrates seamlessly with VMware and a broad ecosystem of leading DevOps and open management frameworks. Two-way VMware intelligence is built into the core architecture, and powerful plug-ins for CSI, Kubernetes, Ansible, and vRealize Orchestration (vRO) automate workflow processes across a broad range of deployment scenarios.

***Proactive health analytics*** – CloudIQ provides state-of-the-art predictive analytics, anomaly detection, proactive monitoring and a convenient health score dashboard to help you identify and avoid potential risks before they impact your environment.

**77) What criteria does the ML engine consider when deciding where to place the volumes?**

PowerStore uses analytics to determine where to allocate resources during initial storage provisioning to consistently meet user storage and compute requirements. It also evaluates current storage space *and* usage trends to provide migration recommendations as needed to alleviate capacity concerns within the cluster.

A future release will add the ability to factor in system performance trends as well.

**78) Does PowerStore’s ML (Machine Learning) engine automatically move volumes between appliances in a clustered configuration?**

No, and that is by design, based on customer feedback. PowerStore’s ML engine takes the vast majority of effort out of the migration process through automation and proactive data placement recommendations but leaves the final decision and migration timing to the customer.

## Management

### **79) What is PowerStore Manager and what value does it provide my Dell EMC customers?**

PowerStore Manager is the HTML5 Web UI App that provides Storage provisioning, management, monitoring and performance tracking for all PowerStore appliance models and clusters.

### **80) What performance monitoring does PowerStore Manager provide?**

PowerStore provides performance monitoring across cluster, appliances, hardware and resource objects in both block and file settings, presenting a unified view of the storage environment.

### **81) Where do we report data reduction savings and efficiencies within PowerStore Manager?**

Overall efficiency, plus detailed data reduction ratios and savings statistics for the PowerStore cluster can be found on the capacity tab within the main dashboard.

### **82) Is there a dashboard view of my overall cluster to quickly check performance, capacity and alerts?**

Yes, the dashboard gives users a quick view into the cluster resource object inventory, a customized watchlist, system alerts, cluster capacity with data reduction savings, “top consumers” and historical usage, along with a performance view of the cluster for IOPS, bandwidth and latency.

### **83) How do I upgrade my PowerStore software?**

This can be done easily through the Settings area within the PowerStore Manager. The latest version can be uploaded and installed with recent activities tracked as well.

### **84) Does PowerStore Manager provide a list of audit logs showing user activity on the cluster?**

Yes, within the Settings area, a user can view the audit logs which provide a historical view of all user activity on the PowerStore cluster including things like the user, timestamp, action, resource, type and status.

### **85) How do users access/enable CloudIQ?**

Once customers set up their PowerStore and the Secure Remote Services connection (Secure Remote Services for Heritage EMC products, and SupportAssist for Heritage Dell products) between their system and Dell EMC, everything is ready to go. Users simply go to <http://CloudIQ.dell EMC.com> and supply their Dell EMC ProSupport or ProSupport Plus credentials and we'll take it from there.

*One small caveat: we authenticate users based on Dell EMC Install Base data, so each CloudIQ user needs to be associated with the systems he or she wants to see in CloudIQ.*

**86) What are the main advantages of CloudIQ?**

CloudIQ provides monitoring of PowerStore Clusters in addition to systems across the Dell EMC portfolio including: Isilon, PowerMax, Dell EMC Unity XT, XtremIO, SC Series, PowerVault, VxBlock and Connectrix switches, in a single pane of glass, unified view. CloudIQ enables customers to see the health of their systems and proactively take action to remediate to avoid downtime, DU and capacity issues. The Performance analytics monitoring tools pinpoint performance impacts and anomalies so that customers can triage more quickly and more efficiently, down to the resource object level. With capacity forecasting customers can plan for short-term and long-term capacity and business needs.

**87) Will CloudIQ provide a centralized monitoring for PowerStore clusters?**

Yes, CloudIQ will monitor PowerStore Clusters for Capacity, Performance, Alerts, Healthchecks and Version status.

**88) What APIs are supported by PowerStore?**

PowerStore supports RESTful API for orchestrated automation of provisioning, monitoring and reporting.

QoS

**89) What QoS features are available in V1?**

V1 includes support for shared-based QoS for Block, VVols, and VMs.

**90) What is share-based QoS?**

Share-based QoS allows the customer to set High/Medium/Low priority to different workloads. This ensures that all storage resources will get their required CPU processing times on a normal basis, but in the case of high CPU utilization, relative priorities (chosen by the customer) are automatically enabled.

**91) What QoS features will be included in future releases of the Dell EMC PowerStore Family?**

In future releases, we will build on QoS by adding support for hard limits, QoS for file resources, and additional features like bursting.



## Block data protection

### 92) What types of data protection exist in PowerStore?

PowerStore protection includes:

- Local Protection – Manual and scheduled snapshots
- Remote Protection – Asynchronous replication
- Backups – PowerStore is integrated with Avamar, Networker and PowerProtect for backing up the data

### 93) Does PowerStore support RecoverPoint?

No. PowerStore does not support RecoverPoint appliance for block. However, RecoverPoint for Virtual Machines (RP4VM) is supported, both sync and async replication.

### 94) Is VEEAM supported?

PowerStore will added to the VEEAM support matrix within 30 days of RTS.

### 95) How do I configure local protection for my volume in PowerStore?

In order to configure local protection (snapshots) in PowerStore, a protection policy with at least one snapshot rule should be assigned to the volume.

### 96) How can I create a consistent snapshot for multiple volumes?

In order to create a consistent snapshot for multiple volumes, add the volumes to a volume-group, check the “Apply write-order consistency to protect all volume group members” checkbox and create a snapshot or assign a protection policy to the volume-group.

### 97) How many snapshots are supported per volume in PowerStore?

PowerStore support 256 snapshots per volume

### 98) Does PowerStore support block replication?

Block replication is supported. PowerStore provides an Asynchronous replication solution for high-performance low-latency environments. PowerStore uses snapshot shipping mechanism to replicate block volumes. The replication method is very efficient replicating changes only and uses write folding to replicate only the latest change per block.

The solution includes:

- Planned and Unplanned Failover with immediate RTO
- Simple management & configuration
- Fully integrated with EMC and VMware Ecosystems
- Support the full scale and performance of PowerStore



**99) What is the minimum RPO for PowerStore block replication?**

PowerStore block replication support RPO as low as 5 minutes. In order to meet the RPO the system triggers a cycle every  $\frac{1}{2}$  of the RPO time, thus in case of 5 minutes RPO a cycle will be initiated every 2  $\frac{1}{2}$  minutes.

**100) Does PowerStore replicate over FC or IP?**

PowerStore supports replication over IP using iSCSI protocol.

**101) How is asynchronous replication configured in PowerStore?**

Defining protection for a storage object (e.g. volume or volume-group) in PowerStore is very simple. Customers assign a protection policy with replication rule to the storage object and PowerStore will automatically define and operate the replication.

The replication rule defines the refresh time of the latest copy on the target, according to the RPO. In order to keep multiple point-in-time copies at the target, it will require to add snapshot rules to the protection policy. When a snapshot rule is added to a protection policy PowerStore will create the snapshot at the source system and will replicate the snapshots to the remote system. The snapshots on both sides are managed by PowerStore automatically according to the retention settings of the snapshot rule.

**102) Does PowerStore support replication between PowerStore T models and PowerStore X models, and between clusters with different sizes?**

Yes. PowerStore replication is supported between PowerStore T and X models, and the source and remote systems may differ in the type and size.

**103) What management options exist for the Asynchronous replication?**

The replication is supported via PowerStore GUI, CLI and REST API.

**104) Is a full-sync required after failover?**

No, full-sync is not required after performing failover, PowerStore will replicate just the differences between the sites.

**105) Does the replication support online volume resizing?**

Yes, online volume resizing (expand only) is supported

## Security

106) **Does PowerStore support data-at-rest encryption (D@RE)?**

Yes, PowerStore supports Encryption through the use of Self Encrypting Drives (SEDs). All drives shipped with PowerStore appliances are SEDs which ensures that the encryption of user data is being handled inline and any data which is stored on the persistent storage media is always encrypted. This also avoids adding any performance impact because of encryption since it is handled in the hardware and offloaded from the nodes within the PowerStore appliance.

107) **Does PowerStore have its own local key manager for encryption?**

Yes, encryption keys are managed internally by PowerStore and do not require any external 3<sup>rd</sup>-party key manager.

108) **Is PowerStore data-at-rest encryption FIPS 140-2 validated?**

PowerStore uses FIPS 140-2 Level 2 validated SED drives for primary storage (NVMe SSD, NVMe SCM & SAS SSD). The NVRAM caching device is encrypted but not FIPS 140-2 validated at this time.

109) **Is there a price premium for encryption on PowerStore?**

No. Encryption capability is included with PowerStore. There is no license cost, and all drives supported by PowerStore are SEDs (Self Encrypting Drives).

110) **Is there a performance impact to using encryption with PowerStore?**

No. There is no performance impact because of encryption since it is handled at the hardware layer in the SEDs.

## Dynamic Resiliency Engine (DRE)

111) **How do we protect data on Dell EMC PowerStore?**

PowerStore sets a new standard in advanced data protection and availability with the introduction of our innovative PowerStore Dynamic Resiliency Engine (DRE).

112) **What is PowerStore Dynamic Resiliency Engine (DRE)?**

Dell EMC PowerStore Dynamic Resiliency Engine is patented technology designed to achieve enterprise-class availability while delivering extremely high levels of efficiency and cost savings.

Unlike traditional RAID, which was designed for HDDs and relies on physical drive groups, PowerStore DRE was built from the ground up for NVMe media, and is 100% software-based.

PowerStore leverages NVMe’s performance characteristics along with advanced virtualization methods to improve overall reliability, while minimizing management effort. More granular, virtualized and distributed than traditional architectures, PowerStore DRE is *redefining RAID protection* for the data era.

113) **What are the key benefits of DRE?**

***Enterprise Class Availability***

- *Minimizes rebuild times* to reduce exposure to risk.
- *Protects system against multiple drive failures* (see below)

***Intelligent Infrastructure***

- *Automatically assimilates drives*, no manual intervention required.
- *Automatically restores protection in the event of a drive failure*. DRE protects against multiple drive failures by dynamically transferring unused user capacity to replenish sparing.
- *Intelligently prioritizes workload performance*. Machine learning algorithms automatically adjust rebuild rate if a drive fails, prioritizing host IO based on real-world traffic patterns

***Flexible Configurations***

- *Lowers TCO with ability to expand storage one drive at a time*. Starting with a minimum of 6 drives, customers can expand PowerStore non-disruptively by adding single drives or multiple drives, based on need, up to a maximum of 96 drives per appliance.
- *Lowers TCO with ability to mix and match drive sizes*. Automatically accommodates drives with different capacities, based on need a current availability.

114) **What are the main enabling technologies of DRE?**

Although configuration and management of DRE is ***automated and completely transparent to the user***, DRE integrates multiple advanced technologies “under the covers” to deliver enterprise-class availability and efficiency. Examples include:

***DRE Virtualized Segments***

DRE begins with proprietary algorithms that partition every physical drive into small virtualized segments. These granular “chunks” provide the flexible framework for other aspects of DRE, such as Redundancy Extents, Distributed Sparing and Resiliency Sets.

***DRE Redundancy Extents***

Redundancy extents are software-based “parity domains,” built dynamically from virtualized segments across multiple drives. Within each extent, parity and redundancy are calculated and maintained similarly to a traditional RAID set. But unlike RAID sets, redundancy extents are *not* tied to a specific group of physical drives.

New extents are automatically created from virtualized segments on whatever drives are available as the data is being written. Extents do not need to be contiguous and the component

segments can be spread across the entire array, with each drive typically participating in multiple extents.

While redundancy extents offer the same or higher levels of protection as traditional RAID sets, they are much more flexible and economical. Their virtualized, distributed geometry allows you to add drives to PowerStore one at a time – *no need to add an entire RAID group each time you expand!* They also give you the freedom to mix-and-match drives of different capacities, minimizing TCO in both cases by helping you target the precise configuration your business needs.

### ***DRE Distributed Sparing***

In traditional sparing schemes, dedicated spare drives are required for a given number of data drives. These dedicated spares sit idle until needed and do not contribute to overall array performance. With PowerStore DRE, the same ratio of data-to-spare capacity is maintained, but the spare capacity is spread in small chunks across ALL drives. Every drive therefore remains available for live data, and every drive contributes to IO performance, with none standing idle.

In the case of a failure, rebuilds are much faster, since more drives are now involved. Instead of rewriting to a single spare, rebuilds are written to multiple drives. Plus, with PowerStore DRE, only the missing segments on the failed drive that contain actual data are rebuilt, further accelerating the process! It's extremely efficient – and ultimately, *faster rebuilds reduce your exposure to risk*, increasing the availability of your data.

### ***DRE Resiliency Sets***

Resiliency sets are fault protection domains that are also created automatically as you add drives to PowerStore. Each domain is protected by distributed sparing capacity equal to the largest drive size within the set.

Resiliency sets contain a maximum of 25 drives. When drives are added to the appliance, DRE creates new sets automatically as needed, splitting and rebalancing existing sets without user intervention. For example, if an appliance has 25 drives and the user adds a single drive, DRE will automatically create a second resiliency set and distribute the 26 drives across the two resiliency sets.

Resiliency sets are independent from redundancy extents (software-based parity domains), and each resiliency set will typically include multiple redundancy extents. ***Volumes can span resiliency sets***, which also increases availability and protection.

Even taken on their own, resiliency sets protect against multiple drive failures in an appliance, because the system will tolerate even *simultaneous* failures as long as they occur in different sets. But the real DRE advantage comes from intelligently combining all these capabilities for even greater protection and efficiency. (See next.)

## 115) **What happens in case of failure of a PowerStore drive?**

Today's SSDs are extremely reliable. However, in the unlikely event of a drive failure, parity is checked within each affected redundancy extent and any inconsistent stripes are rebuilt (actual data only) to the reserved distributed spare space within the resiliency set.

DRE's distributed sparing not only protects data from drive failures, it also *resets itself after a failure*, repurposing unused user capacity to quickly replenish optimal sparing capacity without user intervention. The array is automatically returned to its original level of protection, drastically reducing the probability of data loss due to multiple drives failing within the same resiliency set.

Even within a single resiliency set therefore, the system can tolerate multiple failures in succession, since the automated and VERY FAST rebuild/replenish process will restore the original protection *before the failed drive is even replaced*. (Compare this to traditional RAID, where data access remains, but full protection is not restored until the failed drive is manually replaced.)

116) **Which aspects of DRE do I need to configure manually?**

None of them. Simply insert drives into the appliance slot. All of the linked advantages described above are provided dynamically as you grow, with zero administrative effort. No configuration is required for

- Initial drives
- Expansion drives
- Replacements for failed drives

Drives are automatically assimilated into redundancy extents, distributed sparing and resiliency sets. The PowerStore system adjusts as needed, creating and rebalancing stripes across all drives. DRE is simply a more intelligent, flexible and low-cost way to maintain enterprise-class availability.

117) **Where can I find more information on Dynamic Resiliency Engine (DRE)?**

Both these resources contain additional detail and may be forwarded to customers.

- Whitepaper: "[Dell EMC PowerStore: Clustering and High Availability](#)"
- August 2020 blog: "[Dell EMC PowerStore: Dynamic Resiliency Engine \(DRE\)](#)"

118) **Why do we have RAID 5 only, and not RAID 6 protection?**

PowerStore DRE offers dynamic protection while maximizing overall efficiency and usable capacity. In version 1, the technology is based on single parity. This gives customers strong fault protection while fully leveraging their drive investment based on the excellent MTBF of modern SSDs – which rarely get replaced.

Some AFAs designed around older HDD architectures implement multi-parity protection as a default. Built from the ground for the latest storage media, the initial release of PowerStore avoids the overhead of dual-parity.

*For customers who nevertheless have a dual parity requirement checkbox, a "Dual Parity DRE" option will be released in the first half of CY2021. However, even after this option is available, it's important to note most customers' needs will be met with single parity, and the advantages of DRE should continue to be positioned as one of the many unique value offerings of*

PowerStore. Dual Parity DRE, if deployed, will also provide all the protection, automation and efficiency advantages described above and will therefore be superior to traditional RAID 6.

119) **What is the spare drive requirement in for PowerStore?**

One drive worth of spare space is reserved for every 25 drives. Spare space is reserved across all the drives in an resiliency set.

120) **How do we calculate spare space for PowerStore?**

The spare capacity is equal to that of the largest drive within a resiliency set. One drive worth of space is reserved per set, which can have anywhere from 6 to 25 drives.

121) **Are pools supported in PowerStore?**

The entire appliance is a single large pool. There is no need to configure a pool in PowerStore. The drives are automatically consumed, and the capacity is available for the customers to provision their storage resources.

Besides, in a multi appliance cluster the capacity from all the appliances within the cluster is presented to the user and PowerStore takes care of placement of storage resources intelligently across the appliances within the cluster.

## Cloud integrations

122) **What cloud / hybrid cloud integrations are possible with PowerStore?**

PowerStore delivers a seamless hybrid cloud experience. Leveraging Dell Technologies Cloud Validated Designs, PowerStore provides an ideal landing zone for data intensive workloads on VMware Cloud Foundation (VCF). PowerStore is also supported with Dell EMC Cloud Storage Services, which directly connects PowerStore to the users' cloud(s) of choice, as a managed service. Cloud Storage Services can provide DRaaS to VMware Cloud on Amazon Web Services (AWS) with full operational consistency using VMware.

Hybrid clouds help organizations avoid vendor lock-in by keeping data independent of the cloud, so they don't have to worry about high egress charges, migration risks, or time required to move data. Extending the data center to the cloud using enterprise-class storage empowers users to innovate in the cloud and easily scale cloud environments to hundreds of thousands of IOPS to support high-performance workloads, while reducing risk and maintaining complete control of data.

123) **Does PowerStore support other managed services models?**

Yes, in addition to Dell EMC Cloud Storage Services, PowerStore provides Cloud Data Services through Faction, a managed service provider that offers scalable, resilient cloud-attached storage with flexible multi-cloud access. Cloud Data Services provides agile, multi-cloud support

allowing you to leverage multiple clouds and easily and quickly switch clouds based on applications' needs to maximize business outcomes.

124) **Will CTA (Cloud Tiering Appliance) support PowerStore?**

No. We are planning to include this functionality (both block snapshot shipping and file tiering) as a built-in feature in a future release, rather than an external appliance. PowerStore's modular container-based microservices architecture will allow us to roll out the capability quickly and non-disruptively.

125) **Does PowerStore offer a virtual instance (like VSA) for replication into the cloud?**

Not in V1. PowerStore's unique VMware-based architecture already provides many of the mobility/flexibility advantages customers would be seeking with a virtual instance. If a specific VSA version is required, position Unity XT in the near term.

## DevOps integrations

126) **What is the fastest and easiest way to understand this DevOps/ Containers/ Programmable Infrastructure stuff?**

Watch this [video](#).

127) **What integrations does PowerStore have for a modern DevOps and IT Operations Automation?**

PowerStore has the following integrations:

- vRealize Orchestrator (vRO) plugin for PowerStore
- Ansible plugin for PowerStore
- Container Storage Interface (CSI) Plugin for PowerStore

### vRealize Orchestrator Plugin

128) **What is the value of vRO plugin for PowerStore**

VMware vRealize Orchestrator (vRO) is an IT process automation tool that enables automated management and operational tasks across both VMware and third-party applications. With vRO IT admins can create automation routines for elaborate workflows using a simple drag and drop approach. The workflows can span different pieces of infrastructure and scale to very large task volume.

The vRO plugin for PowerStore brings an extensive range of storage functionality in the form of programmable blocks that can be dropped into a workflow's process map. Functionality includes:

- Storage Provisioning



- Scheduled and on-demand snapshots
- Access to various storage objects specific to the array
- VMware integrated storage operations

The various tasks under the above categories form the basic building blocks that can be combined with compute and networking tasks to form an end-to-end operation that is easy to read, maintain and extend.

**129) How does the vRO Plugin for PowerStore help integrate platforms like vRealize Automation (vRA) and ServiceNow?**

VMware vRealize Automation (vRA) takes automation to the next level by providing a self-serve catalog (anything-as-a-service) of workflow automation recipes covering the entire IT Operations ecosystem (including Service Delivery and Infrastructure Management) across multiple cloud environments and accelerated DevOps processes. Workflows that are automated in vRO can be seamlessly offered as “self-serve” catalog items for application owners.

VMware vRealize Automation Suite also has tight integration with ServiceNow ITSM platform to extend and connect workflows developed on either platform. There is a vRA plugin that exposes vRA catalog items in ServiceNow and a ServiceNow plugin that exposes ServiceNow routines as building blocks in vRealize Orchestrator to build automation sequences.

[Ansible Plugin](#)

**130) What is Ansible?**

Ansible is a rapidly growing automation and configuration management platform now automating a very wide variety of IT Operations from infrastructure management to DevOps processes to Cloud operations.

Ansible Playbooks provide an easy way to specify the various tasks to be run and configuration end states to be met in an easy-to-read key-value-format YAML file. This approach has led to the now widely-known paradigm of “Infrastructure as Code” or as Gartner calls it, “Programmable Infrastructure.” With the growing popularity of Ansible, a large number of modules have been contributed that cover a wide variety of infrastructure management and application deployment. This makes Ansible a great choice to rapidly build end-end automation routines.

**131) What is the value of Ansible Modules for PowerStore?**

Ansible Plugin for PowerStore helps customers improve the efficiency, flexibility and agility with which they run their datacenter. Gone are the days when automation meant specialized programming skills like Perl, Python or hard to use shell scripting. With Ansible Modules for PowerStore, we are doing the heavy lifting of coding Ansible interactions with PowerStore by developing modules that expose the storage functionality to Ansible engine. IT Operations users simply need to specify the storage management actions to be performed in a simple key-value pair format in a YAML file.



The YAML file defines the desired state/configuration of the infrastructure. The PowerStore Ansible plugin verifies if the desired state is reached and executes the actions only if the desired state is not reached. This intelligent management avoids inadvertent execution of actions, eliminating the resulting drift in infrastructure configuration. This approach makes it easy to maintain consistent, scalable operations over the entire IT infrastructure stack.

## Containers and Kubernetes

### 132) **What is CSI and how is it related to Kubernetes?**

Until recently, there was no easy or consistent way to provision persistent (block) storage for workloads running as containers (typically on Kubernetes). The introduction of the Container Storage Interface (CSI) standard made it much easier to develop storage plugins for a given storage platform. The CSI Plugin for a particular storage platform comes with the required hooks to expose the data services like snapshot and replication of storage volumes that are provisioned to containerized applications. CSI plugins are developed independently of the container orchestration platforms release cycle.

### 133) **What is the value of CSI Plugin for PowerStore?**

Software applications are rapidly moving to microservices-based architectures that are deployed using Containers. Database workloads are also shifting to a container deployment model and therefore require access to persistent storage.

*With the CSI Plugin, customers can now run containerized workloads on PowerStore without the need to move test and dev to public cloud platforms. This means greater workload consolidation and ROI for on-premise datacenter infrastructure.*

### 134) **How does the CSI Plugin for PowerStore work?**

Consider a simple eCommerce application example: Database services are required to store and retrieve information from records like product catalog, pricing database, customer information etc. Depending on the design, this may require multiple database workloads, both relational databases (Oracle and SQL Server) as well as NoSQL databases (like MongoDB, Cassandra, etc).

In a Kubernetes environment, these database services are deployed as individual PODs (similar to the concept of a VM in virtualized environment). To provision storage to these services, logical volumes called **Persistent Volumes** are required. PowerStore's CSI Plugin presents backend LUNs of the required size and performance characteristics (defined in a **Storage Class**) and maps them to the Persistent Volumes.

### 135) **Does the CSI Plugin for PowerStore support Containerized Workloads running on OpenShift or VMware's Pivotal Kubernetes Service (PKS)?**

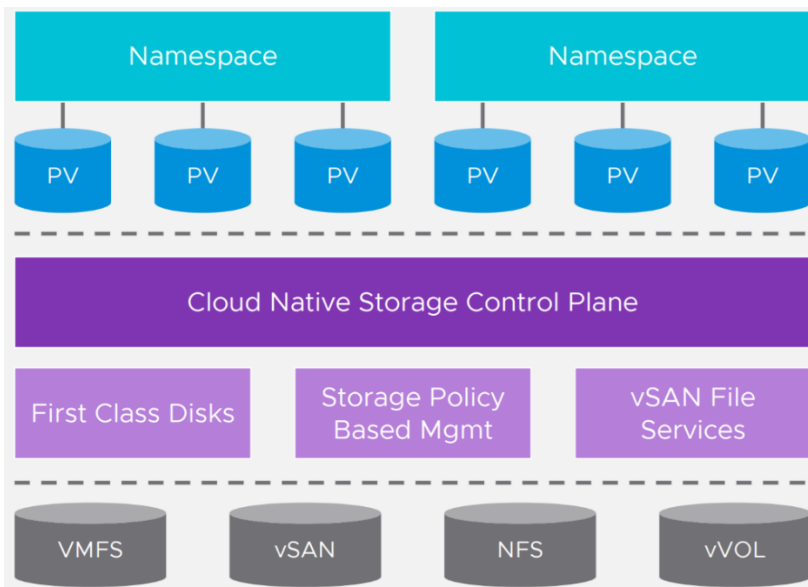
Currently CSI Plugin for PowerStore has been tested with (vanilla) Kubernetes 1.14. We are in the process of validating all our CSI plugins with RedHat OpenShift. Please stay tuned for the

announcements. We have no plans to validate CSI plugins with any other platform in the near future.

**136) What is the key difference when it comes to storage interface for Kubernetes (vanilla, OpenShift, Rancher, PKS etc.) and Kubernetes with vSphere (Project Pacific)? Is the CSI plugin redundant for vSphere with Kubernetes?**

For vanilla Kubernetes or Kubernetes with a management platform like OpenShift, stateful applications that need to store data use Persistent Volumes (PVs) and Persistent Volume Claims (PVCs) that map to the volumes and LUNs of a storage platform through storage classes that use the Container Storage Interface (CSI) plugin provided by the storage vendor (we provide these plugins for PowerMax, PowerStore, Unity, Isilon, XtremIO as well VxFlex). Today our CSI plugins work with vanilla Kubernetes and very soon we will be qualifying our plugins for OpenShift. Most recently we validated PowerMax CSI plugin with Google’s Anthos platform which uses Google Kubernetes Engine.

vSphere with Kubernetes (Project Pacific) uses Cloud Native Storage (CNS) interface, which is a VMware extension of the CSI interface, that provides storage classes that can map PVs PVCs to one of VMware VMFS datastore, NFS datastores, vVols and vSAN volumes. In this model customers need not worry about individual CSI plugins of the different storage vendors but only need to make sure storage is provisioned and available in VMware vCenter/vSphere.



VMware’s Cloud Native Storage Interface

**137) Where can I get more information on Containers, DevOps and Automation platform integrations for Dell EMC Storage?**

There is a dedicated [Knowledge Center page](#) that has links to all the key pieces of pre-sales collateral like the master deck for the area, white papers, solution briefs etc. to help you position these new age capabilities with Dell EMC storage portfolio.

For customers there is an [external page of delltechnologies.com](#) that aggregates all of the content and links to GitHub and other repositories where they can download the plugins free of cost.

There is also a YouTube playlist that has a great explainer video as well as short videos.

## PowerStore Support for the Integrated Offerings

### 138) What revisions of AppSync, PowerPath, Storage Resource Manager (SRM) and VPLEX will support PowerStore?

With the PowerStore RTS, the following revisions will support PowerStore:

- AppSync 4.1
- PowerPath Windows 6.5, Virtual Edition (VE) 7.0 and Linux 7.1
- VPLEX 6.2.0.2 Patch
- **Note:** SRM support will be post RTS

## Other integrations and applications

### 139) The PowerStore announcement included a video showing our Streaming Data Platform (SDP) running via on PowerStore using AppsON. Is this platform available today?

See <https://youtu.be/BTh1gkf0kQQ> for the video.

To help showcase the unique AppsON capability of PowerStore, the SDP team installed a future roadmap, edge-centric version of SDP on PowerStore and achieved what was shown in the video. The video's reference to streaming "Edge SDP" data to the core "Data Center SDP" software is accomplished via a Flink application that pulls data from edge streams and publishes to core Pravega streams, ensuring the same in-order guarantees across systems.

This configuration of SDP is **not currently available for sale** but is being actively tested with limited customers/partners to refine for an upcoming release. Other edge HW options will also be supported for customers to leverage with SDP.

If you have a customer with a similar use-case need, please contact Product Management to share the details of their needs with the potential for early beta access.

***In addition, while SDP offers an easy turn key solution for the real time processing of streaming data, PowerStore's AppsON capability allows customers to run any streaming data solution (such as Apache Flink) as Virtual Machines on the platform***

## Metro Replication for Continuous Availability

### 140) Does PowerStore have an embedded block-based solution for metro synchronous replication that provides continuous availability?

Currently, we are leveraging industry-leading Dell EMC VPLEX metro technology for synchronous replication, continuous availability and workload mobility. In a PowerStore context, this is referred to as “PowerStore metro node.” (See questions below.)

Customers who need a hardware-accelerated metro solution for PowerStore have a strong option today – but *native* metro capability will also be added to PowerStore in a future release.

### Metro node (PowerStore VPLEX offering)

### 141) I’ve been hearing the term “PowerStore metro node.” What does this mean?

PowerStore metro node is a co-sell solution that allows customers to combine the power of VPLEX technology and PowerStore to enable synchronous replication and true active-active transparent fail-over between PowerStore sites across metro-area distances. Metro node brings another dimension to the scale out capability of PowerStore, delivering additional compute resources, as well as increased data mobility – without impacting performance or underlying array data services.

### 142) What is the PowerStore + metro node offering?

The PowerStore + metro node offering is an aggressively-priced VPLEX co-sell when sold with PowerStore within DSA/Gii. It enables simplified ordering to address price points that require continuous availability (Active/Active) between sites as part of a simplified solution, and is comprised of a VPLEX VS6 with metro frame-based licenses.

The offer includes all PowerStore T and X model configurations and VPLEX VS6 single-engine metro configurations with VPLEX frame-based (entire array) licenses, and is accessible within the PowerStore guided journey solution structure. After configuration of a PowerStore appliance, the addition and configuration of a metro node (VPLEX) is available.

***Note the pricing offering only applies for VPLEX appliance + PowerStore solutions sold together on the same sales order.*** There are no specially-priced VPLEX software-only solutions, upgrades, engine expansions, 2 or 4-engine clusters, or Generational Upgrades (GENUs). These will be handled in subsequent releases. For additional questions and special pricing info, work through your regional CoC specialist.

### 143) Has VPLEX been re-branded?

VPLEX has not been re-branded. The new “metro node” term found in PowerStore sales collateral refers to the functionality and benefits of VPLEX. This terminology streamlines PowerStore messaging, and also helps stop “pocket vetoes” around an external solution. PowerStore + metro node provides an industry-leading active/active synchronous metro replication solution for customers who require continuous availability.

"Metro node" terminology will be used exclusively in PowerStore sales collateral such as customer presentations – but expect to occasionally see "VPLEX" terminology as well (particularly in slide notes) to provide clarity around the underlying technology. Again, VPLEX itself is *not* being rebranded, and the new terminology is currently for use in PowerStore contexts only. Once Voyager comes out, metro node will also be used with Unity XT.

To further integrate metro node into the products, in the near future we will offer the metro node solution with PowerStore or Unity XT bezels, depending on which path the solution is ordered from

**144) Is the PowerStore + metro node solution available in all sales regions?**

The offering will be available initially in all Dell Sales Application (DSA) and Gii regions. The offering will *not* be available in DOMS regions (Federal, Canada, and LATAM) and Brazil in the first release.

If you are in a DOMS region or Brazil, contact your regional CoC representative. You can sell VPLEX capacity-based licenses with PowerStore.

**145) Quality has been the hallmark for storage engineering the past few years, is the same true for VPLEX engineering?**

Yes! Over the past few years the engineering team has made quality their mantra. As a result, we have provided many enhancements to VPLEX making it even more robust and reliable such as:

- We're now delivering greater than six 9's availability
- Improved metro WAN communication and tolerance
- Improved target code stability
- Reduced management complexity with an HTML5 GUI
- Plus, we now have 64TB virtual volume support
- With 400 million run hours and greater than 12,000 installations
- Great than 50% of the Fortune 500 companies use VPLEX

**Note:** Please see the Pure and NetApp competitive tables below to see how we win against the competition.

**146) In the past, some midrange storage customers have complained that VPLEX adds complexity. How do we successfully position metro node (VPLEX)?**

VPLEX is the industry's only active/active metro replication solution to deliver zero Recovery Time Objective (RTO) and Recovery Point Objective (RPO) as well as instant site failover with VPLEX Witness. In addition, unlike solutions from Pure and NetApp, VPLEX uses no array or host cycles thereby maintaining the full performance of the PowerStore or any other Dell EMC array. Please see further detail in the competitive Pure and NetApp tables below.

**147) In the past, some midrange storage customers have complained that VPLEX adds too much cost to the overall storage solution. Is there special pricing available for metro node?**

To address the perception of the added cost of our industry-leading, high value Metro active/active Continuous Availability solution, please contact your local CoC Field Marketing Managers (FMMs) for information about special pricing.

148) **What VPLEX and PowerStore co-sell configurations will be in DSA and are there any known limitations?**

Please use the table below:

Item	Scope
<b>Hardware</b>	VS6, single and dual engine, Metro IP with Fibre Channel
<b>Software</b>	Local and Metro Frame
<b>VPLEX Co-sell</b>	Storage M&R
<b>Supported Arrays</b>	PowerStore T, X and Unity XT
<b>Upgrades</b>	None allowed at this time
<b>Regions Supported</b>	All DSA/Gii countries

149) **How can we win against Pure ActiveCluster with metro node as our solution for metro synchronous replication?**

Please refer to this table which highlights how you can win against Pure.

Feature	Metro Node (VPLEX)	Pure ActiveCluster
<b>Zero RPO/RTO</b>	<b>YES</b> Metro node offers zero RTO/RPO with synchronous replication. Makes certain failure conditions unnoticeable.	<b>NO</b> Remote side remains down until volume resync completes, unless hosts are cross-connected to arrays.
<b>Non-disruptive addition of consistency groups</b>	<b>YES</b> Metro node supports consistency group add/delete operations without disruption. Provides operational flexibility with zero downtime.	<b>NO</b> Cannot add or remove volumes to consistency groups without breaking replication.
<b>Supports 3<sup>rd</sup> site witness</b>	<b>YES</b> Witness in 3 <sup>rd</sup> fault domain increases HA robustness, distinguishing WAN vs. array or site failure to avoid split-brain.	<b>NO</b> 3 <sup>rd</sup> Site is basically a quorum. Primitive implementation, less effective in determining WAN vs. site failure.
<b>No additional overhead on the arrays</b>	<b>YES</b> Metro node replication is built-in to the VPLEX appliance without any array overhead. Increases Read performance in some cases and handles Write-through cache.	<b>NO</b> Replication consumes 20-30% of array resources. May result in loss of sync and/or larger array to handle replication.
<b>Adapts and grows with the business</b>	<b>YES</b> Manages multiple arrays and array types with rich ecosystem integration support matrix.	<b>NO</b> ActiveCluster replication is array-array and limited only to Pure FlashArray

150) **How can we win against NetApp MetroCluster with metro node (VPLEX) as our solution for metro synchronous replication?**

Please refer to this table which highlights how you can win against NetApp.

Feature	Metro node (VPLEX)	NetApp MetroCluster
<b>Zero RPO/RTO</b>	<b>YES</b> Metro node offers zero RTO/RPO with synchronous replication.	<b>NO</b> Cannot meet zero RTO/RPO – up to 120 second failover delay.
<b>Active/Active Metro</b>	<b>YES</b> Metro node distributed virtual volumes enable host access to both sites, providing optimized data access from both sides for increased performance	<b>NO</b> A LUN is accessible only on the primary side of the link, hosts local to the target side incur a latency penalty as reads must traverse the link multiple times
<b>Multi-Platform Support</b>	<b>YES</b> Metro node enables replication between different arrays (e.g. cheaper target array) and between non Dell EMC platforms	<b>NO</b> Only supports NetApp arrays and they must be the same model and ONTAP version
<b>Immediate access on failback</b>	<b>YES</b> Metro node provides immediate failback without requiring primary site volume resync to complete.	<b>NO</b> Primary site must complete a volume resync with the secondary site before failback
<b>Volume/LUN-level granularity</b>	<b>YES</b> Metro node allows the replication of specific LUNs for application level granularity, significantly reducing TCO and improving flexibility by giving customers the choice of which workloads to replicate	<b>NO</b> The entire NetApp storage pool must be replicated regardless of the workload
<b>No host software required</b>	<b>YES</b> Metro node is self-contained and does not require any software be deployed on the hosts or a host reboot	<b>NO</b> NetApp must deploy the Host Utility Kit SW on each host manually and some operating systems will require a reboot

## Future-Proof

151) **What components of Future-Proof apply to PowerStore?**

- **3-year Satisfaction Guarantee** – The product will do what we say it will do.
- **Refresh & Recycle** – Your hardware will keep its value, from purchase through upgrade.
- **Predictable Support Pricing** – Clear and predictable prepaid and renewal support pricing.



- **Storage Data Reduction Guarantee** – The best storage data reduction for your workload.
- **Never-Worry Data Migrations** – It's simple to move to the next generation.
- **All-Inclusive Software** – You get a functional, useable system with a single purchase.
- **4:1 DDR Guarantee** – No assessment required, no performance compromise
- **Flexible Consumption** – Flexible On-Demand payment options for IT infrastructure.
- **Anytime Upgrades** – Keep your infrastructure modern, end fork-lift migration (see below)

152) **How is PowerStore able to support such a high Data Reduction Guarantee?**

PowerStore offers a 4:1 average rate guaranteed across customer applications. Although rates for individual applications may vary, the 4:1 guarantee demonstrates Dell's confidence in the extremely efficient PowerStore architecture, which includes hardware-accelerated data reduction powered by Intel QuickAssist Technology.

Hardware acceleration enables more consistent storage efficiency by allowing PowerStore's advanced inline compression to remain **"always on,"** without compromising performance or other services. Inline deduplication is also "always on." *Unlike competing solutions, PowerStore enables maximum cost savings at all time, across all workloads, with no management interaction or decisions required.*

[Anytime Upgrade program](#)

Also see full [Anytime Upgrade program FAQ](#).

153) **What is Anytime Upgrade?**

Anytime Upgrade is the industry's most flexible controller upgrade program\*, exclusively available with PowerStore. Part of the overall [Future-Proof Program](#), Anytime Upgrade is designed to expand and enhance PowerStore capacity and performance as business needs change over time.

By enrolling in the program when they purchase their appliance, PowerStore customers become eligible to either

- *Upgrade the controllers in their appliance* to "Next Gen" or "Next Gen + Higher Model" versions, OR
- *Scale-out their PowerStore cluster* with a discount credit on a second appliance.

The new program allows PowerStore infrastructure to be modernized without forklift upgrades, downtime, or application impact. Anytime Upgrade effectively *ends* the cycle of traditional

platform migration, simplifying planning by ensuring customers always have access to the latest technology at a predictable cost.

Note Anytime Upgrade is an *optional* offer available only at point of sale when the PowerStore appliance is originally purchased. To qualify for Anytime Upgrades, customers must purchase a ProSupport or ProSupport Plus 3, 4 or 5-year contract. Anytime Upgrade coverage is good for the duration of the selected ProSupport contract.

\* Based on Dell analysis, April 2020 using publicly available data to compare the highest available program/subscription offers for controller upgrades. Upgrade available after 180 days. Requires purchase of minimum 3-year ProSupport or ProSupport Plus contract to qualify.

**Up to 54% savings<sup>1</sup>**  
 compared to post-sale purchase

- +** NO new purchase order
- +** LOWER admin costs
- +** EXTENDS useful life
- +** LONGER depreciation

*Respond to unforeseen change*

Enroll at point of sale → Redeem anytime in contract<sup>2</sup>

Next Gen or Next Gen + Higher Model upgrade | Scale-out credit

Renewal decision (after upgrade)

1 – Example savings estimated based on PowerStore 7000 model and AU Standard option. Actual savings will vary based on PowerStore model and upgrade option selected. 2 – Eligible for upgrade 180 days after invoice. No need to wait up to 3 years!

3 © Copyright 2020 Dell Inc. **Dell Technologies**

154) **What are the Anytime Upgrade program options?**

With Anytime Upgrade, customers may choose between Standard and Select offers.

- Both offers let them non-disruptively upgrade the nodes on their existing appliance to **Next Gen** versions, while preserving their current media investments.
- Anytime Upgrade Select (our premium offering) adds the ability to upgrade nodes to a **Higher Model** (still Next Gen) or to **Scale-out** their cluster with a second appliance. *Note Select customer will receive Next Gen AND Higher Model benefit at the same time.*

The following descriptions detail which redemption benefits are provided with each offer.

**STANDARD offer**

- a) **Next Gen upgrade:** Once a next-generation product has been released, upgrade the nodes in your appliance to the latest generation equivalent hardware. Includes Deployment services.
  - Example: (Gen 1) 1000 model convert to (Gen 2) 1000-level model

**SELECT offer (greatest flexibility)**

Select customers have multiple redemption options:

- a) **Next Gen + Higher Model upgrade:** Once a next-generation product has been released, Select customers can upgrade their nodes to the next generation AND one model higher. Includes Deployment services.
  - Example: (Gen 1) 1000 model convert to (Gen 2) 3000-level model
- b) **Scale-Out upgrade:** This benefit provides a credit towards a 2<sup>nd</sup> PowerStore appliance equivalent to the value of your current nodes. *The second appliance can be either the current generation or next-generation if available – just has to be within the same numerical sequence.*


Example: (Gen 1) 3000 appliance + second (Gen 1 or Gen 2) 3000 appliance

### Anytime Upgrade Program Options

Two offers keep you continuously modern, on your own terms

**Standard**


Upgrade nodes



**Next Gen upgrade**


**Select: Total Flexibility and Choice**

Upgrade nodes



**Next Gen + Higher Model**

...or add a new appliance



**or Scale-out**

Note the above PowerStore model scenarios are examples only. Anytime Upgrades are available for all models. See T&Cs for details. Upgrade eligibility begins 180 days after invoice. Anytime Upgrade Program availability may vary by country and segment. For details, contact your sales representative.

155) **Can a customer choose a next-generation product when redeeming a Scale-out upgrade?**

Yes. Customers may apply their Scale-out credit to a next-gen equivalent model if available. Customer may NOT apply their Scale-out credit to a higher model product.

156) **Can Select customers upgrade to Higher Model within the *current* generation, without moving to Next Gen?**

No. Higher Model upgrades (Select offer only) are always Next Gen as well.

The “Next Gen + Higher Model” upgrade will not be available for redemption until we release our next-generation model. *However, even after the next-generation release*, although both current and new generations may be available to purchase for a limited time, the Anytime Upgrade Higher Model redemption benefit will always include a move to the newest generation.

Most customers will welcome this, since the new generation will undoubtedly have more advanced capabilities. However, a small subset of customers may wish to remain on the current generation due to product familiarity or because of a tightly-controlled qualification. Therefore, you should take care not to misrepresent the benefit, ensuring that customers who anticipate moving to a Higher Model are aware of the Next Gen stipulation when purchasing Anytime Upgrade Select.

157) **Can PowerStore 9000 customers choose the “Next Gen + Higher Model” redemption option in Select?**

No. Higher Model upgrades are not available for the PowerStore 9000. 9000 customers with the Select program option may choose either a Next-Gen-only (same model level) or Scale-out redemption.

158) **When can a customer purchase Anytime Upgrades?**

Customers can only purchase Anytime Upgrades at point-of-sale with a PowerStore appliance. Anytime Upgrades will not be available as an after point-of-sale (APOS) purchase.

159) **Are all Anytime Upgrade options available today?**

Both Standard and Select offers of Anytime Upgrade may be *purchased* today. However, customers’ ability to *redeem* their upgrade varies by option.

- **Scale-out upgrade** – Redemption available now\*
- **Next-Gen upgrade** – Redemption available once a next-generation PowerStore product has been released\*
- **Next-Gen + Higher Model upgrade** – Redemption available once a next-generation PowerStore product has been released\*

\* *Note: In each case, customers must wait 180 days after invoice to redeem their upgrade.*

160) **Why do customers care about data-in-place upgrades?**

Data-in-place upgrades not only allow customers to modernize their infrastructure without interrupting workloads – they also enable them to *preserve much of their original investment*, including storage media and expansion enclosures. This is particularly important for customers with a significant investment in NVMe or SCM flash technology.

161) **Are services included in the Anytime Upgrade offers?**

***Anytime Upgrade requires the purchase of a 3, 4 or 5-year ProSupport or ProSupport Plus contract on the PowerStore appliance.*** Anytime Upgrade coverage automatically matches the duration of the selected ProSupport contract.

***Anytime Upgrade includes deployment services for the new node when the customer executes their Next Gen or Next Gen + Higher Model program upgrade.*** The new node is

immediately covered by the existing ProSupport contract.

For the Scale-out option, purchase of ProDeploy or ProDeploy Plus is required to install the new clustered appliance. Support on the new appliance is also available.

162) **Is Anytime Upgrade available in all countries?**

No, at launch Anytime Upgrades will not be available in all countries. Over time, the goal is to roll out Anytime Upgrades to additional countries.

- a) Anytime Upgrade is currently **restricted to countries using DSA/Gii sales** tools only.
- b) Over time, DOMs countries like Canada and LATAM will be added to the Anytime Upgrade program. Until then, they are not eligible.
- c) Countries or segments not covered at RTS may also have their own legalities, tax laws, accounting practices or trade compliance requirements that require additional research.
- d) Countries must first offer ProSupport and ProDeploy to be eligible to participate in the Anytime Upgrade program.
- e) Anytime Upgrades country sell to list can be found [here](#)

163) **Is the Anytime Upgrade program available on other Dell Technologies platforms?**

No, for now Anytime Upgrade is available for PowerStore only.

164) **Is sales compensated for selling Anytime Upgrade?**

Yes, if in your sales role you are compensated for selling ProSupport. For more information, contact your manager.

165) **Have there been any program changes since Anytime Upgrade was first announced?**

Yes. Although the basic structure of the program has remained the same since our May 2020 launch, we have tuned some details to respond to Sales feedback and improve customer value.

Recent changes (October 2020) include

- **Program pricing now “fixed” across capacity range** – Anytime Upgrade price is no longer tied to capacity, making the offer more attractive for larger customers
- **Flexible support options** – Customers may now purchase Anytime Upgrade with any ProSupport version (not just ProSupport Plus), making the offer more attractive to cost-sensitive customers.
- **“Next Gen + Higher Model” redemption option for Select** – Select customers no longer have to choose between these two upgrades. They can get them both at the



same time! The new option “sweetens the deal” for Select, making our premium AU offer a more compelling upsell for any customer.

- **CloudIQ and SupportAssist no longer a hard requirement** – This enables support for “dark sites” or those with other policy restrictions

166) **How is Anytime Upgrade priced?**

Pricing for both Standard and Select Anytime Upgrade offers is tied to the PowerStore model selected. In other words, the cost of coverage varies, depending on whether the customer selects a 1000, 3000, 5000 model, etc.

**October 2020 update:** Pricing no longer varies by capacity, but is fixed throughout the solution range for each model. This change benefits customers with *larger configurations*, making Anytime Upgrade more attractive and affordable for them.

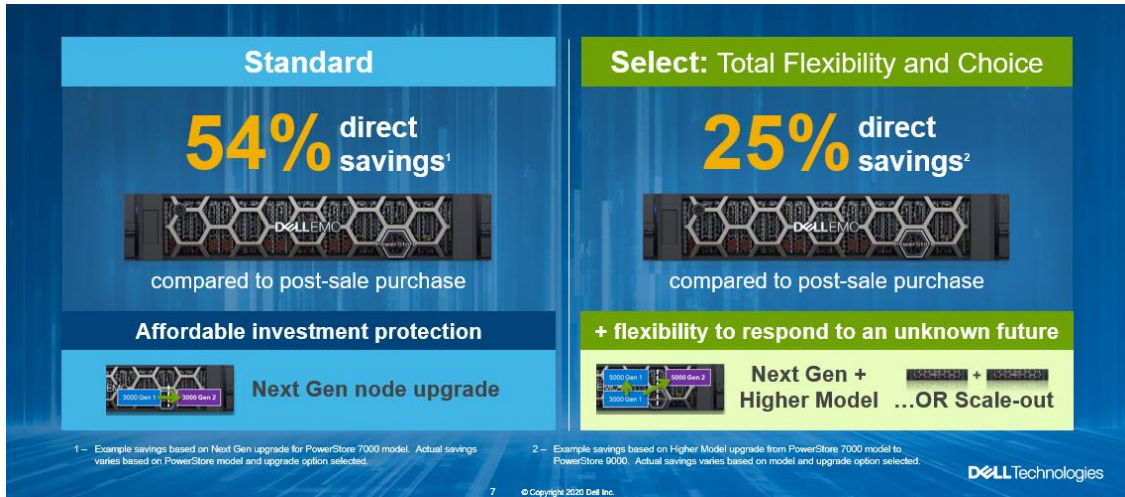
167) **How much will customers save with Anytime Upgrades compared to waiting to purchase their upgrade later?**

**October 2020 update:** Customers who enroll in Anytime Upgrade at time of purchase can save up to 54% on upgrades compared to waiting to buy later. Although the exact benefit varies by model and program offer, customers will *always* save money, no matter which offer or redemption option they choose. Sell with confidence!

The economic benefits of Anytime Upgrades fall into three categories

1. **Direct cost savings on the upgrade itself** – This is the actual price difference between upgrading with Anytime Upgrade vs. waiting to purchase an upgrade later. Savings varies by PowerStore model, Anytime Upgrade offer and upgrade redemption selected – but again, the ROI is now positive for all models and configurations. (See 7000 example below.)
2. **Lower TCO**
  - Reduced administrative costs via
    - Predictable budgeting
    - No separate purchase order for hardware or installation services
  - Extends life of product, longer depreciation cycles
3. **Value of enabling quicker response to new business opportunities**
  - Flexibility to boost performance and/or capacity with minimal effort or lead time increases long-term ROI on PowerStore purchase

Direct cost savings example: PowerStore 7000 model



*Direct savings are somewhat lower with Select, due to the higher program cost – but the additional flexibility of Higher Model or Scale-out upgrade options PLUS the ability to wait to decide what type of upgrade will be most beneficial has real business value for customers.*

*Note both examples assume next-generation product is priced same as current generation. Benefit to customer will be even greater if next-generation model is priced at a premium.*

168) **How does Anytime Upgrade compare with competitive upgrade programs like Pure’s Evergreen or HPE’s Timeless Storage?**

Prior to Anytime Upgrade, Dell did not have an offering to compete. Now with Anytime Upgrade, we have closed the gap, exceeding competitors with even *more* flexibility.

The three main differentiators vs. other upgrade programs in the market are:

- Flexible upgrade options – goes beyond simply a next-gen controller swap.
- Upgrades can be done anytime in contract, as opposed to waiting three years or more.
- No renewal is required when an upgrade is performed.

See per-competitor comparisons below.



# Anytime Upgrade vs. Competition

✓ Strength  
▬ Partial Credit  
✗ Weakness

	<b>DELL Technologies</b> Anytime Upgrade	<b>PURE STORAGE</b> Evergreen Gold	<b>Hewlett Packard Enterprise</b> Technology Refresh Program Primera   Nimble		<b>NetApp</b> Next Credit	<b>HUAWEI</b> Ever New Device
<b>Flexibility</b>	Standard: Next Generation ✓ Select: Next Generation, and/or Higher Model OR Scale-out	Free Every Three: Next Gen Upgrade Flex: full trade-in credit, must buy add'l capacity	✗ Next Gen	✗ Next Gen	Fixed credit amount can be used toward any NetApp products	✗ Next Generation upgrades for Controllers & DAEs
<b>Timing</b>	✓ Anytime in Contract *after 180 days	Free Every Three: Cannot upgrade before end of 3-yr contract Upgrade Flex: Upgrade before 3rd year and/or to a higher model – resets Free Every Three timing	✗ Cannot upgrade before end of 3 year contract	✗ Cannot upgrade before end of year 1	✗ Cannot upgrade before the end of 3 year contract	✗ Controllers: Cannot upgrade before end of year 3 ✗ DAEs: Cannot upgrade before end of year 5
<b>Renewal</b>	✓ No Renewal Required	Free Every Three: Must renew for an add'l 3 years to "unlock" upgrade Upgrade Flex: +3 years & must purchase additional capacity	✓ No Renewal Required	✓ No Renewal Required	✗ Must renew for an additional 3 years to "unlock" upgrade	Information unavailable
<b>Capacity Consolidation</b>	Refresh & Recycle program offers trade in credits for old HW	✓ Up to 25% trade in credit towards newer media	✗ Unavailable	Trade-in credits towards media refresh Must subscribe for 6+ years	✗ Unavailable	Refresh & Recycle program for HW

Competitive Data as of October 2020  
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## Migration from existing Dell EMC platforms

### 169) What capabilities exist to help customer migrate to PowerStore?

PowerStore offers more ways to migrate than ever, including new native tools that let you automate entire migrations directly from the PowerStore Manager wizard. Current Unity, SC Series, PS Series or VNX customers can complete a non-disruptive array-to-array transfer in as few as seven clicks. Hosts are remapped transparently, and completely offloaded, keeping workload performance high throughout the process.

Besides the new native tools, customers have other migration options, from VPLEX and PowerPath/ME to host-based tools such as vMotion and Linux LVM, as well as guided migration offerings from Dell Technologies Global Services. Whatever storage platform they are running today, we can make sure they get to PowerStore quickly and smoothly – keeping their data fully secure along the way.

### 170) Do the new native PowerStore migration tools support file?

Not in PowerStore V1. However, other methods are available, including Dell Technologies Global Services file migration offerings in partnership with Datadobi

## Services

### Services overview

#### 171) **What services are available for Dell EMC PowerStore?**

The following service options give your customers choice and flexibility in how plan, deploy, support and optimize their systems. Services are designed to give customers the best experience possible, freeing their time to work on other priorities.

- Dell EMC ProDeploy Enterprise Suite
  - Dell EMC ProDeploy Plus (Defaulted in ordering system)
  - Dell EMC ProDeploy (Minimum requirement for multi-appliance cluster)
- Deployment Add-Ons
- Dell EMC ProDeploy Additional Deployment Time
- Dell EMC Migration services
  - Dell EMC Intelligent Data Mobility (IDM)
  - Dell EMC ProDeploy Migration Ad-on
  - Dell Technologies ProConsult Migration Services
- Dell EMC Residency Services
- Dell EMC Data Sanitization for Enterprise
- Dell EMC Data Destruction for Enterprise (available Nov 17, 2020)
- Dell EMC ProSupport Enterprise Suite
  - Dell EMC ProSupport Plus
  - Dell EMC ProSupport (Defaulted in ordering system)
- Dell EMC ProSupport One for Data Center (for large enterprise accounts)
- Dell EMC Anytime Upgrade
- Dell EMC Optimize for Storage (Monthly or Quarterly reporting)
- Dell EMC Keep Your Hard Drive for Enterprise
- Dell EMC Onsite Diagnosis
- Dell EMC Keep Your Components (Fed Only)
- Dell EMC Onsite Diagnosis
- Dell EMC Post Standard Support
- Dell Technologies Education Services
- Dell Technologies Consulting Services
- Dell EMC Managed Services

### Deployment Services

#### 172) **What are the top features and benefits of our Dell EMC deployment options?**

[\*\*ProDeploy Enterprise Suite\*\*](#) helps customers get systems out of the box and into production fast and includes setup of connectivity software, which is integrated in the PowerStore appliance to ensure the best customer support experience and a faster connection with CloudIQ. Services offerings are:

- **ProDeploy Plus:** Deploy storage infrastructure up to 66% faster with ProDeploy Plus, which provides 24x7 onsite installation and configuration of both hardware and system

software with a commitment of delivering in-region and onsite resources for a personalized, high-touch experience. It also comes with Dell EMC training credits, 30-day post-deployment configuration assistance and deployment validation to address any immediate concerns during early production. (*ProDeploy Plus is the system default in ordering tools.*)

- **ProDeploy:** Offering a blended delivery model, ProDeploy includes onsite hardware installation and remote resources for system software configuration, ensuring accurate and timely delivery regardless of where the customer is located. (*For clustering multiple appliances, ProDeploy is the minimal requirement.*)
- *Custom deployments are also available.*

**Deployment Add-ons:** To ensure your new system is configured and production-ready, we offer specialized services to add scale or capabilities outside the standardized scope of ProDeploy or ProDeploy Plus – all orderable with simple add-on SKUs. Available at Point of Sale or later. See **PowerStore Service Brief** for detailed descriptions for all PowerStore deployment services, available on the [Services Offer Index \(SOI\)](#).

- **2 Host Addition:** Configuration, provisioning and validation of storage access of up to 2 Fibre Channel or iSCSI hosts, or a combination.
- **File Systems:** Configuration of up to 5 shares or exports, NAS server, file systems and validation.
- **Local Protection:** Design and configuration of up to 10 sessions of either snapshots or thin clones or both, for volumes and file systems.
- **Remote Replication:** Design & configuration of replication between 2 PowerStore appliances of up to 10 replication sessions for volumes and file systems, typically for disaster recovery.
- **Hardware Component:** Installation, design and configuration of additional hardware components, such as adding additional drives into an existing enclosure.
- **Expansion Enclosure:** Installation, design and configuration of an expansion enclosure.

### 173) **When are deployment services required for PowerStore?**

Deployment services are mandatory when clustering multiple PowerStore appliances (2 or more) with a minimum of ProDeploy and a recommendation of ProDeploy Plus.

#### **Accelerate PowerStore deals with limited-time, fee-waived ProDeploy Promotion\***

The limited-time fee-waived Dell EMC ProDeploy Promotion for PowerStore is being extended until we reach a cap of 450 worldwide orders or upon future notice. Continue to sell and position ProDeploy Plus as the best customer experience. This promotion is well positioned to give customers who would not otherwise purchase deployment services an opportunity to experience ProDeploy. If a customer decides to self-deploy, propose the ProDeploy Promotion as an attractive benefit. The promotion is only available at point-of-sale for the PowerStore base and expansion enclosures. The promotional SKUs will appear as options in global sales tools. View this sales and partner facing [FAQ](#) for details. Also reference the [PowerStore Ordering and eLicensing Guide](#).

**Dell Technologies sales and partners to attach (cut and paste) the legal disclaimer to quotes sent to customers. \***

\* LIMITED TIME PRODEPLOY PROMOTION LEGAL DISCLAIMER: ProDeploy for Enterprise Promotion for PowerStore is valid for the first 450 orders, available on a first-come-first-served basis. This promotion is available where PowerStore is sold. It is for direct customers and qualified Dell Technologies Partner Program Storage-Authorized Distributors and Solution Providers. Orders must be placed with Dell at point-of-sale by selecting the promotional SKU. Promotion does not include ProDeploy add-ons (such as 2-host adder, file, local protection and remote replication services), additional deployment time, migration services, residency services, other supplemental services, and ProDeploy Plus. Promotion does not apply to stock-and-sell orders, and cannot be combined with partner co-delivery. Promotion is subject to change, may not be combinable with all other promotional offers. Taxes, shipping, and other fees may apply. Dell reserves the right to cancel orders arising from pricing or other errors. ProDeploy availability and terms vary by region. See [dell.com/servicecontracts/global](http://dell.com/servicecontracts/global). Resellers and distributors are free to set their own resale prices; Dell is not responsible if a reseller or distributor chooses not to pass on the promotional discount.

**174) When not clustered, PowerStore is a customer installable product. What skills should the customer have to successfully deploy a PowerStore appliance?**

Customer deployment teams are often storage or systems administrators or engineers capable of setting up complex storage infrastructures and virtual environments. For PowerStore, the person planning the network side of the deployment will also need to understand networking concepts, including:

- VLAN Trunking & utilizing Native VLAN
- Spanning Tree Protocol Priority & Port Management
- Switch Interconnect via VLT (Dell Switches), VPC, VSS (Cisco), M-LAG
- Aggregating ports through the use of port channels/LACP
- Host performance Flow Control and Jumbo Frames

If a customer does not have this level of expertise, and wants to get up and running fast, we recommend ProDeploy or ProDeploy Plus to validate the setup and provide recommendations. For customers purchasing Dell switches, they will need to purchase ProDeploy for those switches in addition to ProDeploy for PowerStore. If they have their own switches or don't purchase ProDeploy for the Dell switches, they will be responsible for network configuration,

**175) What services are available for PowerStore hardware expansions and upgrades APOS?**

PowerStore Expansion Enclosures purchased APOS can be deployed onto an existing PowerStore appliance with either **ProDeploy or ProDeploy Plus for PowerStore Expansion Enclosure** services. Sell a quantity of one service for each Expansion Enclosure sold.

Individual drives purchased APOS in the PowerStore Upgrade chassis can be deployed into an existing PowerStore Base Enclosure or an existing Expansion Enclosure with either **ProDeploy or ProDeploy Plus for PowerStore Hardware Component** service. The base service covers up to 42 individual drives.

The following Add-On Services can be included to expand the deployment scope of any ProDeploy or ProDeploy Plus base offer:

- 2 Host Add-On (Note: no hosts are included in the Expansion Enclosure or Hardware Component base offers)
- File Add-On (5 filesystems)
- Local Protection Add-On (10 sessions for snaps and thin clones)

- Remote Replication Add-On (10 native replication sessions)
- Hardware Component Add-On (42 individual Drives)

*Note: All Add-on services are also available for purchase as base deployment offers in the non-tied chassis.*

## Data Migration Services

### 176) **What is Intelligent Data Mobility (IDM)?**

This service migrates block, file, or virtual data into a PowerStore storage system in a consistent and predictable manner. Data Migration Services are delivered using remote resources, and use a proven, standardized vendor-agnostic methodology. Recommend for those who want to:

- Move data efficiently, more securely and with minimal disruption
- Accelerate time to value on newly purchased equipment
- Leverage our expertise and industry-leading best practices of Dell EMC
- Looking to move 35 TB (15 hosts) or 30 VMs or more

**ProDeploy Migration Add-ons:** Data migration add-ons are available in conjunction with ProDeploy and ProDeploy Plus implementations. These add-ons are ideal for small amounts of data migration, starting at 1 TB (4 hosts).

**ProConsult Migration Services** from Dell Technologies Consulting accelerate migration of virtual machine workloads, *application content and databases* with our global delivery team allowing in-house resources to focus on higher-priority initiatives. ProConsult Migration services are fixed price SKUs that require no MSA and no SOW. They are designed for migrating from one target to one source and are available for the following service options:

### 177) **Why might customers need Data Migration Services in addition to the built-in native data migration tools with PowerStore?**

Customers with limited time or experience, or for those who need help with discovery, planning, and execution, can leverage data migration services to efficiently migrate their data with reduced risk, allowing internal teams to focus on other priorities. The built-in migration tools are limited to Dell EMC block migrations to PowerStore. Leverage Data Migration Services (IDM or ProDeploy Migration Add-ons) to ensure a fast, accurate experience when moving file or from 3rd party systems. When moving applications or workloads for complex environments, position ProConsult Migration Services.



Migration Options	File	Block	VM	Applications Office 365, SQL, VDI	Cloud Azure, AWS, Google	1TB+	35TB+	Dell to Dell	3 <sup>rd</sup> Party to Dell
Intelligent Data Mobility (IDM)	Y	Y	Y				Y	Y	Y
ProDeploy Migration Add-on*	Y	Y	Y			Y	Y	Y	Y
ProConsult Migration**			Y	Y	Y	Y	Y	Y	Y
PowerStore*** native tools		Y				Y	Y	Y	

\*Requires ProDeploy or ProDeploy Plus as a prerequisite.

\*\*Migration to non-VMware public clouds (e.g. EC2/S3 on AWS, Azure), non-VMware VDI (e.g. Microsoft, Citrix)

## Specialized & Supplemental Deployment Services

### 178) **What other deployment services are available for PowerStore?**

**Residency Services:** Ideal for **PowerStore** customers with a large Dell EMC infrastructure install base or complex environments, Residency Services provide a dedicated hands-on storage expert to fill resource gaps, manage day-to-day operations and help teams transition to new technologies. **Residency services can be purchased in one-month increments.** Use existing midrange Residency offers for PowerStore deals.

**Data Services:** When going through an asset refresh, retirement, resale or return, there are several options that provide added protection and can be purchased at Point of Sale or After Point of Sale as a stand-alone order:

- **Data Sanitization for Enterprise** helps customers safely and securely protect data from unauthorized access. It uses a software-based method of securely overwriting data to render it unrecoverable, utilizing proprietary techniques and industry tools aligned to NIST 800-88 Guidelines. Customers will receive a NIST compliant certificate upon completion of the service. Note: Data sanitization service requires systems to be fully operational and healthy.
- **Data Destruction for Enterprise** renders media and underlying data unusable and inaccessible through the process of physical shredding, disintegration, pulverizing, melting or incinerating, thus ensuring sensitive data won't fall into the wrong hands. This offer can be redeemed up to 4 Years after purchase if purchased simultaneously with Equipment that is the subject of the Services on the same Order Form, or 12 months if purchased separately from the Equipment.

## Support

### 179) What type of support services are available for PowerStore?

**ProSupport Enterprise Suite** resolves IT issues in less time and with less customer effort, often catching issues before they occur. Recommending a support service often depends on the complexity of your customer's environment and how they allocate their IT resources. Options include:

- **ProSupport Plus:** When you recommend our highest level of support, customers get all the features of ProSupport and a higher level of personalization and proactive features, including an assigned Service Account Manager (SAM) and priority access to specialized support experts.
- **ProSupport:** Ensures comprehensive 24x7 predictive support with automated issue detection and case creation. It's a single source for your customer's hardware and OS support.

Both ProSupport Plus and ProSupport can be purchased with either **next business day or 4-hour mission critical** response time for parts replacement. All ordering systems default to ProSupport with 4-hour mission critical, 3-year term, so remember to de-select and choose ProSupport Plus for those customers who want the best option. ProSupport and ProSupport Plus are part of Clear Price, which provides price guidance for future renewals of maintenance.

1 Answer:

**Keep Your Hard Drive for Enterprise (KYHD):** This supplementary support service enables the customer to retain possession of failed hard drives [standard, Solid-State Drives (SSD), Serial ATA (SATA), and Hard Disk Drives (HDDs), including PCIe and NVMe] while simultaneously getting the failed drive replaced. With KYHD, sensitive data never leaves the customer's control, ensuring added security as well as the ability to comply with data privacy regulations. KYHD can be purchased at Point of Sales (POS) or After Point of Sales (APOS) for assets that have a support contract.

**Keep Your Component** is designed for US Fed organizations to retain physical control over sensitive data, while preserving all the benefits of our Limited Warranty on failed hardware components. Keep Your Component is available at the time of system purchase or any time before your system experiences a hardware component failure while the system remains under Limited Warranty.

**Onsite Diagnosis:** This support offer is ideal for customers who do not have the time, expertise or staff to troubleshoot and diagnose technical issues. With Onsite Diagnosis, we will dispatch a highly skilled technician, even to satellite locations, unmanned sites and traveling team members. Our technician will work with Dell EMC tech support to troubleshoot and diagnose the issue and handle replacement part dispatch, if necessary. (Available with ProSupport of higher)

<https://www.dell.com/en-us/customer-services/product-warranty-and-service-descriptions.htm>

### 180) What are the terms of ProSupport and ProSupport Plus for PowerStore?

ProSupport or ProSupport Plus purchased at Point-of-Sale will be available for a duration of 12 months (minimum) i.e. 1 year to a maximum of 5 years on Base Enclosures (in the increments



of one year). For APOS/Renewals, the minimum is 12 months. For PowerStore T, monthly co-termining is allowed whereas for PowerStore X, it is always yearly.

For Support beyond 5 years, a budgetary quote can be requested where-in Support will initially be sold for 5 years at POS and support for additional 2 years can be sold at APOS/contract renewals.

**181) Is ProSupport One for Data Center available and when do I recommend it?**

Yes, ProSupport One for Data Center is available for PowerStore. The service provides a flexible support model customized for complex data centers with more than 1,000 assets. It's ideal for qualified large customers with high density of data center products. Sold direct, Federal, OEM and opportunistically through channel.

**182) Is remote connectivity required?**

Connectivity via SupportAssist for enterprise systems is highly recommended, especially when paired with ProSupport or ProSupport Plus. SupportAssist for enterprise systems is an automated, proactive and predictive technology that leverages adaptive AI and machine learning to automatically identify hardware faults, create a case, and initiate contact from Dell EMC to the customer – to help detect and prevent issues before they become problems.

For similar capabilities, a customer may choose to connect via Secure Remote Services 3.38 or higher, which will show their new PowerStore appliance and their legacy EMC devices.

**183) Where can I go online to track support issues, find documentation, access services analytics and more for my supported devices?**

**At [Dell.com/support](https://Dell.com/support)**

All customers who have purchased PowerStore can view their Customer Agreement ID and identify the sub-components of their solution. In addition, they can access the Product Support page for their system, open and monitor service requests and find documentation, among other support-related actions.

**[MyService360](https://MyService360) accessible at [Dell.com/support](https://Dell.com/support)\*:**

Customers currently using the MyService360 dashboard for designated data protection, storage and CI/HCI products will manage services health for PowerStore storage solutions alongside their existing products.

Customers who buy PowerStore solutions but do not have any of the designated data protection, storage and CI/HCI products currently supported in MyService360 in their portfolio will be able to access MyService360 to view and manage PowerStore. However, at this time, these customers cannot add, view or manage any other products, alongside PowerStore, in their MyService360 dashboard.

**Applicable to all customers:** PowerStore assets will not have all the same equivalent data points as other storage products. Specific fields where data is unavailable will be appropriately labeled in the MyService360 interface.

**MyService360** is personalized online dashboard that simplifies complex data sets for services and support into actionable intelligence. With 360-degree data visualizations and analytics for an entire data center to a single product, MyService360 helps IT stakeholders proactively assess and manage the service health of their Dell EMC environment. And we're enhancing the MyService360 experience to deliver even more value. For example, a new Heads-Up Display with KPIs tailored for Health & Risk, Install Base and Incident Management to help efficiently monitor and take action across thousands of systems.

[TechDirect.com](#) portal: Current users can manage technical support for PowerStore alongside the enterprise products that use TechDirect. However, with PowerStore they can only perform the following actions:

- **From online TechDirect dashboard:** Submit Technical Support requests
- **From their company helpdesk via TechDirect API integration:** Submit Technical Support requests and/or Check Warranty

They will not be able to view the Customer Agreement ID, identify sub-components or submit Self-Dispatch requests for PowerStore from TechDirect.

184) **What is the base product warranty?**

PowerStore comes with a 1-year limited [warranty](#) on hardware only.

185) **Do I need a support contract to access CloudIQ?**

To access all the features and functionality of CloudIQ, customers need a ProSupport or ProSupport Plus contract, or be under limited warranty. Without a valid support contract, CloudIQ will show your health score and model details, but not the underlying data and analytics.

186) **What is Optimize for Storage service and when is it recommended?**

Think of [Optimize for Storage](#) like a personal coach for time or resource-constrained customers who need in-depth analysis and strategic guidance to keep systems optimized and configured year-round. Customers will get a highly skilled storage expert (Technical Account Manager, TAM) who keeps a daily watch on system health, interprets complex data and delivers regularly scheduled deep-dive performance evaluations with personalized recommendations. Optimize for Storage is ideal for customers running critical workloads and can't afford the risk of data loss, downtime or business delays. The service supplements ProSupport or ProSupport Plus and requires [CloudIQ](#) activation. To request a Optimize demo and preview personalized analytics, view Optimize for Storage in Live Optics or email [Optimize\\_Questions@Dell.com](mailto:Optimize_Questions@Dell.com)

## Education Services

187) **What PowerStore training courses are available for purchase?**

We offer training to help customers develop the skills to modernize and simplify storage. Two offers are customer-specific. All four offers are available to partners:

**Offer 1: PowerStore Implementation and Administration**

- 5 days of classroom or virtual classroom instruction. Includes hands-on labs
- Prep for Implementation Engineer certification

**Offer 2: Comprised of two on-demand courses**

- (a) PowerStore Concepts, Features and Migration; Duration: 4 hours; and
- (b) PowerStore Implementation and Administration - On Demand; Duration: 17 hours.
- 21 hours of on demand instruction
- Prep for Implementation Engineer certification

Note: The on-demand course PowerStore Concepts, Features and Migration (course number ES101STG01736) is free (\$0) and has no SKU associated with it.

**Offer 3: PowerStore Installation and Maintenance (Partner-only)**

- 10 hours of on demand instruction
- Prep for Platform Engineer certification

**Offer 4: Midrange Storage Concepts, Features, and Design (Partner-only)**

- 33 hours of on demand instruction
- Prep for Technology Architect certification

Note: When ProDeploy Plus has been purchased a certain amount of TCs are part of that offer.

## Consulting Services

**188) When would I recommend Dell Technologies Consulting Services?**

For customers who want to leverage hybrid cloud capabilities as part of an overall multi-cloud strategy, Dell Technologies Consulting provides expert advice and services to define and execute strategies, including architectures for associated multi-cloud platforms, automation and service-based operations, cloud protection strategies, and profiling and migration of applications. [Dell Technologies ProConsult Advisory services](#) are a simple way to introduce clients to these consulting capabilities.

## Channel Partner

**189) Will partners have both resell and services deliver opportunities for PowerStore?**

Yes. Partners will have the opportunity to resell, co-deliver Dell Technologies Services (ProDeploy or ProDeploy Plus), or deliver their own services. In order to co-deliver or deliver their own services, partners authorized by Dell Technologies must complete the required competency training. Please visit the services section of the Dell Technologies partner portal for more information.

## Services Resources & Links

**190) Where can I get additional information about support and deployment services?**

Sales materials are posted on the **Sales Portal**:

- Access via the services tab on the [PowerStore Knowledge Center](#)
- Or access via the [Services for Storage Knowledge Center](#)

**Other Resource Links**

- PowerStore Ordering and Licensing Guide: <https://inside.dell.com/docs/DOC-443060>
- Services Ordering Tool & Offer Information: <https://inside.dell.com/docs/DOC-443560>
- Services Offering Index (SOI): <https://www.dell.com/resources/en-us/auth/soi.htm>
- PowerStore Services Country Availability: <https://inside.dell.com/docs/DOC-445595>
- Service Brief for ProDeploy and ProDeploy Plus for PowerStore:
  - [ProDeploy for PowerStore](#)
  - [ProDeploy Plus for PowerStore](#)

For a consolidated list of PowerStore Service Briefs outlining scope of service, see the backup slides in the [Services for PowerStore Training deck](#).

**Note:** When positioning Dell Technologies Services with PowerStore, your **Services Account Executive (SAE)** is your first line of contact.

## Claims / Proof points

### 191) What claims have approved for customer use?

The following claims have been approved in public-facing sales and marketing collateral. Note the explanatory disclaimers must be included if indicated. Geographic restrictions apply as indicated in the Legal Notes column.

#	External Claims / Disclaimer	Legal Notes
1	<b>Up to 7X more IOPs*</b> * Based on Dell analysis comparing PowerStore 9000 4x cluster to Unity XT 880 running 70/30 random read/write mix, 8K block size with compression and deduplication active, March 2020. Actual performance will vary.	AD #: G20000055 Dell vs. Dell comparative claim; the following geo restrictions apply: The claim CANNOT be used in Costa Rica, Russia, South Africa, Ukraine, and Venezuela.
2	<b>Up to 3X lower latency*</b> * Based on Dell analysis comparing PowerStore 9000 to Unity XT 880 at 300K IOPS, 8K random, 70/30 read/write mix, compression and deduplication active, March 2020. Actual performance will vary.	AD #: G20000055 Dell vs. Dell comparative claim; the following geo restrictions apply: The claim CANNOT be used in Costa Rica, Russia, South Africa, Ukraine, and Venezuela.
3	<b>Up to 4.5M IOPS*</b> * Based on Dell tests running cluster of four PowerStore 9000 models with 4K block size, 100% reads, with compression and deduplication active. March 2020. Actual performance will vary.	AD #: G20000055 Non-comparative claim

#	External Claims / Disclaimer	Legal Notes
4	<p><b>4:1 data reduction guaranteed*</b></p> <p>* 4:1 average rate guaranteed across customer applications. Rates for individual applications may vary. See Future-Proof Program terms and conditions for details.</p>	AD #: G20000055 Non-comparative claim
5	<p><b>PowerStore is designed for 99.9999% availability</b></p> <p>* Based on the Dell Technologies specification for Dell EMC PowerStore, April 2020. Actual system availability may vary.</p>	AD #: G20000055 Non-comparative claim. This claim should not be used in a competitive manner.
6	<p><b>Create vVols in seconds*</b></p> <p><i>Alt: "Zero to vVols in seconds"</i></p> <p>* Based on Dell analysis, March 2020. PowerStore's native vVol capability lets you create vVol-based VMs as soon as you initialize your appliance. VASA provider, storage container, datastore and protocol endpoints are all created and configured automatically. Actual results will vary.</p>	AD #: G20000055 Non-comparative claim
7	<p><b>Up to 99% less effort to rebalance volumes*</b></p> <p>* Based on Dell analysis of staff time required to maintain balanced PowerStore cluster vs. traditional multi-array deployment, March 2020. Factors in effort required to monitor, plan, define and execute volume migrations. Actual results will vary.</p>	AD #: G20000055 Dell vs. Dell comparative claim; the following geo restrictions apply: The claim CANNOT be used in Costa Rica, Russia, South Africa, Ukraine, and Venezuela.
8	<p><b>Migrate from existing platforms in 7 clicks*</b></p> <p>* Based on Dell analysis of minimum effort required to execute non-disruptive migration of volume group using PowerStore's built-in migration tools for Unity, SC Series, PS Series and VNX arrays, March 2020. Actual results will vary.</p>	AD #: G20000055 Non-comparative claim
9	<p><b>Designed for 99.9999% reliability*</b></p> <p>* Based on Bellcore component reliability modeling for common configurations of all PowerStore models.</p>	AD #: G20000055 Non-comparative claim
10	<p><b>The only purpose-built array with a built-in VMware ESXi hypervisor*</b></p> <p>* Based on Dell analysis of publicly available information on current solutions from mainstream storage vendors, April 2020.</p>	AD #: G20000055 Comparative claim: CANNOT be used in Chile, China, Colombia, Costa Rica, Guatemala, Hong Kong, Korea, Malaysia, Russia, South Africa, Taiwan, Ukraine, Venezuela and Vietnam.
11	<p><b>Run any application directly on PowerStore</b></p> <p>* PowerStore's AppsON feature provides access to PowerStore's on-board VMware hypervisor to run virtualized workloads with no need for an external host. Ideal for data-intensive apps requiring low latency or a storage-heavy imbalance of compute and storage.</p>	AD #: G20000055 Non-comparative claim

#	External Claims / Disclaimer	Legal Notes
12	<p><b>Migrate external apps to PowerStore in minutes*</b>  <b>Alt: Migrate external apps to PowerStore in 10 clicks</b>            * Based on Dell analysis of minimum effort required to migrate virtualized workloads onto PowerStore, using the optional AppsON feature, March 2020. Actual results will vary.</p>	AD #: G20000055 Non-comparative claim
13	<p><b>Use up to 70% less rack space*</b>            * Based on Dell analysis of PowerStore AppsON workload deployment vs. the same workload deployed on an external host. Actual results may vary based on configuration and workload.</p>	AD #: G20000055 Dell vs. Dell comparative claim; the following geo restrictions apply: The claim CANNOT be used in Costa Rica, Russia, South Africa, Ukraine, and Venezuela.
14	<p><b>Industry's most flexible controller upgrade program*</b>            * Based on Dell analysis, April 2020 using publicly available data to compare the highest available program/subscription offers for controller upgrades. Requires purchase of Anytime Upgrade Standard or Select option and minimum 3-year ProSupport or ProSupport Plus contract at point of sale to qualify. Upgrade eligibility begins 180 days after invoice.</p>	AD #: G20000055 Comparative claim: CANNOT be used in Chile, China, Colombia, Costa Rica, Guatemala, Hong Kong, Korea, Malaysia, Russia, South Africa, Taiwan, Ukraine, Venezuela and Vietnam.
15	<p><b>Reduce deployment timeframes from days to seconds*</b>            * Based on Dell analysis of effort required to deploy workloads with and without Ansible and vRO orchestration integrations, March 2020. Factors in effort required to monitor, plan, define and execute volume migrations. Actual results will vary.</p>	AD #: G20000055 Non-comparative claim
16	<p><b>Increase workload density up to 10X*</b>            * Based on Dell internal analysis of deployment with and without Kubernetes integration via PowerStore's CSI plugin, March 2020</p>	AD #: G20000055 Dell vs. Dell comparative claim; the following geo restrictions apply: The claim CANNOT be used in Costa Rica, Russia, South Africa, Ukraine, and Venezuela.
17	<p><b>Provision PowerStore directly from Kubernetes</b>            (no disclosure required)</p>	AD #: G20000055 Non-comparative product functionality statement
18	<p><b>Get faster storage performance with PowerStore. Up to 54% more IOPS than a leading competitor.*</b>            *Based on a Principled Technologies Report commissioned by Dell comparing PowerStore 9000 model vs. a leading competitor's array running 32KB random reads, March 2020. Actual results may vary. Full report: <a href="http://facts.pt/sqgbbpyp">http://facts.pt/sqgbbpyp</a>             Link to report when possible: <a href="http://facts.pt/sqgbbpyp">http://facts.pt/sqgbbpyp</a></p>	AD #: G20000055 <u>Geographic Restrictions</u> Dell v Unnamed Company based on 3rd party support: <b>DO NOT USE IN:</b> China, Colombia or Guatemala.



#	External Claims / Disclaimer	Legal Notes
19	<p><b>Cut storage wait times by up to 53% vs. a leading competitor and enable more work with PowerStore*</b></p> <p><b>Up to 53% lower latency compared to/than a leading competitor *</b>            *Based on a Principled Technologies Report commissioned by Dell comparing PowerStore 9000 model vs. a leading competitor’s array running 32KB random reads, March 2020. Actual results may vary. Full report: <a href="http://facts.pt/sqgbbpyp">http://facts.pt/sqgbbpyp</a></p> <p>Link to report when possible: <a href="http://facts.pt/sqgbbpyp">http://facts.pt/sqgbbpyp</a></p>	<p>AD #: G20000055  <u>Geographic Restrictions</u>            Dell v Unnamed            Company based on 3rd party support: <b>DO NOT USE IN:</b> China, Colombia or Guatemala.</p>
20	<p><b>Maximize storage efficiency by reducing data by up to 3X as much as a leading competitor *</b>            *Based on a Principled Technologies Report commissioned by Dell PowerStore 9000 model vs a leading competitor’s array running 32KB random reads, March 2020. Actual results may vary. Full report: <a href="http://facts.pt/sqgbbpyp">http://facts.pt/sqgbbpyp</a></p> <p>Link to report when possible: <a href="http://facts.pt/sqgbbpyp">http://facts.pt/sqgbbpyp</a></p>	<p>AD #: G20000055  <u>Geographic Restrictions</u>            Dell v Unnamed            Company based on 3rd party support: <b>DO NOT USE IN:</b> China, Colombia or Guatemala.</p>
21	<p><b>Get more work done with up to 125% greater bandwidth vs. a leading competitor *</b>            *Based on a Principled Technologies Report commissioned by Dell comparing PowerStore 9000 model vs. a leading competitor’s array running 256KB random reads, March 2020. Actual results may vary. Full report: <a href="http://facts.pt/sqgbbpyp">http://facts.pt/sqgbbpyp</a></p> <p>Link to report when possible: <a href="http://facts.pt/sqgbbpyp">http://facts.pt/sqgbbpyp</a></p>	<p>AD #: G20000055  <u>Geographic Restrictions</u>            Dell v Unnamed            Company based on 3rd party support: <b>DO NOT USE IN:</b> China, Colombia or Guatemala.</p>

**Note competitor name is redacted for claims 18 – 21 above due to EULA agreements, and may not be specified.**

See the Principled Technologies report, “[Enable greater data reduction, storage performance, and manageability with Dell EMC PowerStore storage arrays](#),” for additional competitive comparisons and claims. These additional competitive comparisons may also be shown customers, provided the relevant publicly-available report is referenced. (DO NOT USE IN: China, Colombia or Guatemala.)

### Related CloudIQ claims based on recent 3rd-party testing

**“Faster time to insight”**

- up to 10x faster to predict capacity approaching/almost full\*
- up to 16x faster to identify HA problems\*
- up to 50% fewer steps to identify anomalies in system performance\*
- up to 1.4x faster to identify a “noisy neighbor” LUN\*
- **up to 42x faster to find reclaimable storage\***

\*Based on an April 2020 Principled Technologies Report commissioned by Dell EMC, “[Dell EMC CloudIQ streamlined the user experience in five cloud-based storage preventive management tasks](#)”, compared to HPE InfoSight with an



HPE Primera array vs. CloudIQ with a Dell EMC Unity array. Actual results may vary. Full report: <http://facts.pt/m8a5u3v>

Link to full report when possible: <http://facts.pt/m8a5u3v>

AD #: G20000125. **Geographic Restrictions:** Dell v Named Company based on 3rd party support. Claim cannot be used in the following countries: **DO NOT USE IN:** Argentina, Brazil, China, El Salvador, Guatemala, Honduras, Indonesia, Morocco, Nicaragua, Philippines, Turkey, Venezuela and Vietnam

## Ordering / Sizing

### 192) What tools are used to order PowerStore?

PowerStore ordering tools offer the ability to quote and configure both PowerStore T & PowerStore X appliances through the regional sales tools below:

Region	Tool
US	OSC/DSA
Canada	OSC/Dell Star/DOMS
US Federal	OSC/Dell Star/DOMS
EMEA	OSC/Gii
APJ	OSC/Gii
LATAM	OSC/Dell Star/DOMS

The recommended path is to use the PowerStore Sizing Tool and import into OSC. Once the solution ID is generated, user can start quoting/ordering process in either DSA (US) or Gii (EMEA/APJC). Users can configure New Solution PowerStore appliances directly using guided journey (bypassing the PowerStore sizing tool) by selecting the offers in the product tree.

### 193) Who can sell and order PowerStore?

Similar to the Unity and other Dell EMC midrange products today, PowerStore will be transacted and sold through a combination of distributors, value added resellers, OEMs, direct sales force. As PowerStore is focused on delivering users with an application-centric experience, pre-sales tools will include Application Sizers.

Primary Sales & Pre-Sales	Primary sales team responsible for revenue number Commercial/Enterprise
Secondary Sales & Pre-Sales	MDC/GCN
Federal Government	Sales team supporting US Federal Gov:

Indirect Channel Sales	VARs, Channel partners
Distributors	business that acts as an intermediary between vendors and value-added resellers
OEMs	Original Equipment Manufacturers
Service Providers/MSP	Partners that deliver as a service hybrid, private, and public cloud EMC Powered solutions on- or off-premise
System Integrators/ System Outsourcers	Partners that resell products, services, and solutions; specific partner types include value add reseller (VAR), and direct marketing reseller (DMR)
Solution Provider	Influence or co-sell products, services, and support as part of a solution set
Tech Alliances	Partners that work with Dell EMC to deliver business solutions to our joint customers, mainly through consulting or services engagements
Vertical	Industry verticals (i.e. Healthcare, Oil & Gas, etc.)

194) **Which tool should be used to determine how many appliances and drives are needed to suit a customer’s storage needs?**

PowerStore Sizer

195) **What is PowerStore Sizer?**

Dell EMC PowerStore Sizer is a modern HTML5 based sizing tool. The smooth workflow makes it easy to use and best practices are built in. This one-stop design tool provides two primary ways to size and configure Dell EMC PowerStore systems. The System Advisor and the System Builder.

In order to identify the appropriate hardware configuration, the customer is expected to do their own workload sizing calculation taking into account present total requirement of different workloads and corresponding growth rate. The PowerStore Sizer is available from the Dell EMC Sales Enablement Center. Please note that the PowerStore Sizer has been built from the ground up and is specific to PowerStore configurations only.

[Link to the PowerStore sizer.](#)

196) **How does System Advisor work in PowerStore Sizer?**

The System Advisor allows users to input workload information or import it from Live Optics and makes sizing and configuration recommendations based on best practices. In Advisor you start with workloads to get configs

197) **How does Builder work in PowerStore Sizer?**

The System Builder allows for a more manual approach for custom or advanced configurations. In System builder you start with a config and can add workloads to see if they fit.

198) **Which tool should be used to determine a customer’s capacity and performance requirements of old array?**

Live Optics

199) **What tool should be used to configure PS network environment?**

Fabric Design Center

200) **Can we upload configurations from sizer to the ordering tools?**

Yes

201) **Can I size a clustered environment?**

Yes, the system builder path will allow for sizing a multi-appliance customer with all legal configurations. The System Advisor path will suggest multi-appliance configurations with homogenous models only, for example 3 PowerStore 5000 or 2 PowerStore 1000

202) **Can I size power and cooling information in PowerStore Sizer?**

Yes

## Additional Tools

The following tools will be ready at Launch

Tool	Description	Who uses?
<b>Trident Sizer (ready at RTS)</b>	Receives user input for performance and capacity variables to create PowerStore configurations to ensure we are selling customers the right configuration. Under sizing customers results in unhappy customers and over sizing results in uncompetitive sales proposals. <a href="https://powerstoresizer.emc.com">https://powerstoresizer.emc.com</a>	Pre-Sales and Partners
<b>Power Calculator</b>	Provides power and cooling of Trident, based on the exact sale configuration instead of the maximum power and cooling provided by product guide <a href="https://powercalculator.emc.com">Powercalculator.emc.com</a>	Pre-sales and Customers
<b>Quick Proposal Generator</b>	Generates proposal reports: TCO / ROI; comparison to other solution; challenges and outcomes; multiple languages <a href="https://salestools.isus.emc.com">https://salestools.isus.emc.com</a> <a href="https://presalestools.emc.com">https://presalestools.emc.com</a>	PreSales
<b>Fabric Design Center</b>	Helps pre-sales teams design a network fabric for Dell EMC infrastructure solutions to simplify and accelerate network attach <a href="https://fdc.emc.com">https://fdc.emc.com</a>	Pre-Sales

Tool	Description	Who uses?
<b>WebCST</b>	Tech Console with visuals for configuration, performance, utilization and logs <a href="https://tools.ph.dell.com/cst#/customer.index/product/sc/env/prod">https://tools.ph.dell.com/cst#/customer.index/product/sc/env/prod</a>	Support and Sales
<b>Solve</b>	Produces step by step instructional procedures for internal/external field resources including service partners and customers to guide each through service activities within customer environments, such as code upgrades, installations, FRU/CRU replacements <a href="https://SolveOnline.emc.com">https://SolveOnline.emc.com</a>	Internal field service and deploy, service partners and customers
<b>Network Validation Tool</b>	Validate if customer network meets installation requirements <a href="https://psapps.emc.com/central/solutions">https://psapps.emc.com/central/solutions</a>	Pre-Deploy
<b>PowerStore Designer</b>	Configuration tool to: examine existing configurations (extracted from config capture); create new Trident configurations <a href="https://psapps.emc.com/central/solutions">https://psapps.emc.com/central/solutions</a>	Solution Architects, SMEs reviewing designs/implementation, Implementation Specialists
<b>iTriage</b>	Web/REST-based Triage cloud service: support material extraction; dump analysis; system & trace log generation; system timeline; log analysis & search UI <a href="http://itriage.lss.emc.com">http://itriage.lss.emc.com</a> Dark sites: VMware image ova	Midrange Engineering and Services
<b>Firewall Rules Generator</b>	Spreadsheet listing customer configurable firewall rules Location: <a href="https://SolveOnline.emc.com">https://SolveOnline.emc.com</a> and within the security configuration guide.	Customers
<b>Atlas WWN</b>	Encodes port WWNs for storage arrays <a href="https://psapps.emc.com/central/solutions">https://psapps.emc.com/central/solutions</a>	Professional Services, Pre sales, Post sales
<b>INQ</b>	SCSI inquiry functionality for command-line troubleshooting; output can be used as input to array configuration collection triage tool <a href="ftp://ftp.emc.com/pub/symm3000/inquiry/v9.0.0.0/">ftp://ftp.emc.com/pub/symm3000/inquiry/v9.0.0.0/</a>	Customer-facing
<b>ELAB Advisor</b>	Users upload data collections into ELA for problem diagnosis, ELab Navigator interoperability assessment, target array migration readiness assessment, and for documenting their environments. ELA uses E-Lab Navigator's (ELN) Support Matrices to assess and qualify uploaded Host servers, Operating Systems, HBAs, Storage Arrays, and Software information <a href="https://psapps.emc.com/central/solutions">https://psapps.emc.com/central/solutions</a>	Customers, Employees (Delivery and Support group, some Presales) Partners
<b>EMC Grabs</b>	Purpose is to collect UNIX host-configuration data. Users can submit that information to DELL EMC support to speed time to resolution or upload it to Central Discovery and Remediation (ELA) for problem diagnosis, migration planning, interoperability assessment, and reporting <a href="https://psapps.emc.com/central/solutions">https://psapps.emc.com/central/solutions</a>	Customers, Employees, Delivery and Support group, some Presales, Partners
<b>Generic Log File Scrubber</b>	Scrubs sensitive information from log data <a href="https://psapps.emc.com/central/solutions">https://psapps.emc.com/central/solutions</a>	Post-Sales Support

Tool	Description	Who uses?
<b>EMC Reports</b>	Purpose is to collect Windows host-configuration data. Users can submit that information to DELL EMC support to speed time to resolution or upload it to Central Discovery and Remediation (ELA) for problem diagnosis, migration planning, interoperability assessment, and reporting <a href="https://psapps.emc.com/central/solutions">https://psapps.emc.com/central/solutions</a>	Customers, Employees (Delivery and Support group, some Presales) Partners

The following tools are anticipated to be available within 90 days of Launch.

Tool	Description	Who uses?
<b>Live Optics Assessment</b>	Automates the flow of the sales tasks creating a seamless integration with sizing and TCO/ROI tools. <a href="http://www.liveoptics.com">www.liveoptics.com</a>	Pre-Sales
<b>Systems Configurations Reporter</b>	Generates the Health Assessment of a VxBlock / VxRack System: raises flags on component health issues; warns against configuration mismatch; generates information on upgrade readiness Internal: ftp site; Partners: need a Flexera account	Post-sales

## Flexible Consumption Model

### 203) What is a Flexible Consumption Model, and can I offer it for PowerStore?

Yes, PowerStore is available via **Dell Technologies On Demand**. On Demand provides a range of options for customers to easily purchase and scale storage – as they grow it, as they consume it, or as a service. These flexible consumption models combine flexible payment solutions and value-added services to align spending with usage and optimize both financial and technological outcomes. In environments where capacity demands are cyclical or variable, usage-based consumption models deliver clear cost-savings and business advantages.

### 204) What is Flex on Demand?

Flex On Demand is a consumption-based as-a-service offering that delivers IT with the agility of cloud and performance of on-premises infrastructure. This committed product utility is a Dell Financial Services payment solution that includes a base capacity commitment with the option to use a buffer capacity at the same rate billed based on actual usage, offering customers the ability to use capacity on demand within the buffer. See [Flex on Demand FAQ](#) for more details.

### 205) How is Dell Technologies on Demand handled through Distribution from the operations and billing perspective?

There are 2 models for partners/distributors to participate in On Demand deals: referral and resell. In the referral model, distributors earn a 2% rebate on the FOD (Flex on Demand)

committed contract value and partners 7 – 10% on deals that are registered in SFDC and referred to DFS. Resell agreements are also possible for Titanium partners and distributors but are more complex and require risk acceptance.

Please see the [short partner presentation](#) and [Partner FAQ document](#) on Inside Dell for more info on FOD referral and resell.

## Licensing

### 206) **What licenses are *required* at the initial purchase?**

PowerStore Licenses are all inclusive of software, and they are automatically applied. And if the automated E-licensing fails, the customer can choose to do it manually

### 207) **Can I use my existing VMware licenses?**

Yes, customer can use their existing VMWare Enterprise Plus license

### 208) **What optional licenses may be applied to PowerStore?**

License is all inclusive for trident features noting purchasable except for VMware

### 209) **How many days of trial are offered?**

The trial license is for 30 days applied each of the appliances in the cluster

## Competitive position

### 210) **How is PowerStore positioned competitively?**

PowerStore is highly-differentiated from any other competitive solution. It is the only platform in the industry that provides

- Unified scale up/out architecture, optimized for performance, with support for NVMe / SCM in the persistent storage layer AND superior “always on” DRR
- Consolidation of infrastructure by co-locating 3<sup>rd</sup>-party apps (ANY VMware app) within the storage appliance with the industry’s first AppsON capability, bringing applications closer to the data.

### PowerStore vs Top Tier Competition

	DELL EMC PowerStore	PURE STORAGE FlashArray// X	NetApp AFF	Hewlett Packard Enterprise Primera	Nimble
⚡ Efficiency (4:1 DRR Guaranteed)	✓	↔	↔	↔	↔
↗ Performance (active / active)	✓	✗	✓	✓	✗
⚡ Persistent storage – NVMe / SCM	✓	↔	↔	↔	✗
🔗 Microservices based	✓	✗	✗	✓	✗
📄 Native application support (AppsOn)	✓	↔	✗	✗	✗
📈 Scale up / scale out	✓	✗	✓	✓	↔
📄 Next-gen unified	↔	✗	✓	✗	✗
☁ Cloud – tiering / VSA / Storage Services	↔	✓	✓	✗	✗
📊 Cloud-based analytics (CloudIQ)	✓	✓	✓	✓	✓
🔄 Sync / metro	✗	✓	✓	✓	✓
🛡 Future-Proof – Anytime Upgrades	✓	✓	↔	↔	↔

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### PowerStore vs Top Tier Competition

	DELL EMC PowerStore	IBM FlashSystem	HITACHI VSP	HUAWEI OceanStor Dorado v6
⚡ Efficiency (4:1 DRR Guaranteed)	✓	↔	↔	↔
↗ Performance (active / active)	✓	✓	✓	✓
⚡ Persistent storage – NVMe / SCM	✓	↔	↔	↔
🔗 Microservices based	✓	✗	✗	✓
📄 Native application support (AppsOn)	✓	✗	✗	✗
📈 Scale up / scale out	✓	↔	↔	✓
📄 Next-gen unified	↔	✗	✗	↔
☁ Cloud – tiering / VSA / Storage Services	↔	↔	↔	↔
📊 Cloud-based analytics (CloudIQ)	✓	✓	✓	✓
🔄 Sync / metro	✗	✓	✓	✓
🛡 Future-Proof – Anytime Upgrades	✓	↔	↔	↔

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3<sup>rd</sup> party test results comparing PowerStore to a leading competitor:

- Up to 53% more IOPS<sup>1</sup>
- 52% lower latency<sup>2</sup>
- 5X faster storage provisioning<sup>3</sup>
- 3X better data reduction<sup>4</sup>

1 – Based on a [Principled Technologies Report](#) commissioned by Dell comparing PowerStore 9000T vs. a leading competitor's array running 32KB random reads, April 2020. Actual results may vary.



2 – Based on a [Principled Technologies Report](#) commissioned by Dell comparing PowerStore 9000 model vs. a leading competitor's running 32KB random reads, April 2020. Actual results may vary.

3 – Based on a [Principled Technologies Report](#) commissioned by Dell PowerStore 9000T cluster vs. a leading competitor's cluster, April 2020. Actual results may vary.

4 – Based on a [Principled Technologies Report](#) commissioned by Dell PowerStore 9000 model vs. a leading competitor's array running 32KB random reads, April 2020. Actual results may vary.

Get additional PowerStore competitive information and battlecards from the [KLUE competitive website](#).

211) **Do any competitors offer a similar feature to AppsON? How about Purity Run?**

No, competitors can not come close to matching PowerStore's AppsON. Pure has a limited ability to host a few specific proprietary apps on their array, but they do not expose a hypervisor allowing users to deploy their own workloads. Since they don't support VMs, VMware or VMware-supported apps, Pure can't provide the profound flexibility, mobility and enterprise integration advantages of AppsON, which allows customers to use familiar VMware tools to move workloads transparently on and off the appliance.

With AppsON, using a single storage instance, applications may be deployed on networked servers, hyperconverged infrastructure, or directly on the PowerStore appliance, then migrated transparently among any of these locations, allowing application owners to quickly deploy and reassign workloads to the most effective environment based on current requirements and available resources.

Expect Pure to claim they can match AppsON – but any customers who actually need to use the feature will soon discover otherwise as they look into Pure's capabilities.

212) **In ADDITION to AppsON, how is PowerStore differentiated vs. “traditional arrays” from our standard storage competitors?**

Besides AppsON ([see above](#)) PowerStore advantages include

- **Next-gen storage tech** – All-NVMe architecture, Intel Optane SCM, unified block/file/vVols, “always on” hardware-accelerated inline data reduction.
- **Scales Up AND Out** – Intelligent clusters let you expand capacity and performance independently
- **Software-defined architecture** – Including container-based microservices design that enables feature portability, standardization and rapid time-to-market for future capabilities
- **Autonomous operation** – Intelligent data placement, automated migrations, machine learning (ML) engine optimizes resource utilization and load balancing
- **Programmable infrastructure** –Streamlines application development and automates storage workflows through integration with a broad ecosystem of leading DevOps and open management frameworks. Comprehensive VMware integration, CSI, Kubernetes, Ansible and vRealize Operations plugins.

- **Hybrid cloud enabler** – Integrate on-prem with cloud while maintaining operational consistency. VMware Cloud on AWS, VCF, Dell EMC Cloud Storage Services, Faction
- **Proactive health analytics** – CloudIQ gives you intel to take quick action and more efficiently manage storage environment. Reduce risk with predictive analytics, machine learning insights.
- **Future-Proof** – including 4:1 Data Reduction Guarantee, new **Anytime Upgrade** program keeps infrastructure modern without forklift migrations

213) **Where can I get more detailed competitive comparisons?**

Visit <https://app.klue.com> or email [DT.competitive@dell.com](mailto:DT.competitive@dell.com)

## Branding Questions

214) **What do PowerStore’s “X model” and “T model” designations stand for?**

These designations do *not* have a literal meaning.

215) **How should the “X model” and “T model” designations be used?**

The standalone brand, “PowerStore” (with no modifier), is preferred for the majority of platform references, in both marketing and technical documentation, implying the entire spectrum of capabilities for the overall platform.

The “X model” and “T model” groupings are *not* brands and should be used only when necessary to communicate “spec-level” differences between the hypervisor and non-hypervisor categories in user manuals, spec sheets, detailed portfolio lineup slides and similar documentation.

216) **Can I use the terms “X Series” and “T Series?”**

No. Whenever “X” and “T” are used, the word “model” or “models” must be included. Do not use the term “series” for this purpose, and do not pair X or T with PowerStore without adding “model.”

In other words

- **DO:** “PowerStore X models” or “X models”
- **Do NOT:** “PowerStoreX” or “PowerStore X” (without “models”)

217) **Can PowerStore models be referenced without the X or T?**

The X or T are part of the actual model number and therefore must be used for ordering or similar precise model references. However, when talking broadly about capabilities that pertain to both the X and T variants, it is permissible to say things like, “PowerStore 5000 models can expand to...”

## PowerStore Terminology Glossary

### 218) What unique/new terminology will we use to talk about PowerStore?

Since PowerStore represents an entirely new kind of infrastructure, some of the terms used may be unfamiliar to customers. Here are a few you should be aware of:

Term	Description	Unity or SC Equivalent Term
Base Enclosure	Initial PowerStore enclosure unit containing two nodes (Node A and Node B) and 25x NVMe drive slots.	UNITY: Disk Processor Enclosure (DPE)  SC: Base Unit or Storage Center
Node	Component within the base enclosure that contains processors and memory. Each appliance consists of 2 nodes.	UNITY: Storage Processor (SP)  SC: Controller
Expansion Enclosure	Optionally attached to base enclosure to provide additional storage capacity beyond the 25 NVMe drive slots in the base enclosure. Expansion enclosures do NOT include nodes.	Unity: Disk Array Enclosure (DAE)  SC: Same
Appliance	Overall solution consisting of a base enclosure and any attached expansion shelves. (Note even a single base enclosure without expansion enclosures can be called an appliance)	Array
Cluster	Single appliance or multiple connected appliances managed with PowerStore Manager. Clusters are expandable by adding more appliances.	Unity: N/A  SC: Federation (roughly)
Embedded Module	Module embedded on each node providing mgmt, host front-end connectivity, SAS expansion ports, & selectable 4-port and 2-port cards	N/A
4-Port Card	Card for each node that provides 4 ports for mgmt. and front-end ports. Selectable in 25GbE and 10GBase-T options.	Unity: Similar to CNA Ports  SC: Mezz card or IO ports
IO Module	Main IO personality module for PowerStore. Options are: <ul style="list-style-type: none"> <li>• Four-Port 32 Gb/s Fibre Channel Module (Block only)</li> <li>• Four-Port 10Gbase-T Module (File &amp; Block)</li> </ul>	

Term	Description	Unity or SC Equivalent Term
	<ul style="list-style-type: none"> <li>Four-Port 25 Gb/s Optical Module (File &amp; Block)</li> </ul>	
Onboard Ports	Each node contains 2x 1GbE onboard ports; one will be used for mgmt (Unified only) and the other as a service port	Embedded Ports
12Gb SAS Expansion Ports	Two ports on each node to allow for connection of optional expansion shelves. Utilizes a 'Loop-Back' cabling strategy	12Gb SAS IO Ports
Internal M.2 Boot Module	Two pluggable M.2 SATA drives located internal to each node used for boot / recovery. 1x 120GB & 1x 240GB module.	M.2 SSD
PowerStore T model	Storage-centric appliance type	N/A
PowerStore X model	Storage-and-application appliance centric type	N/A
Volume group	A volume group provides a single point of management for multiple storage resources that work together as a unit	N/A
PowerStore Manager	PowerStore management application. The software used to manage the cluster.	Unisphere
Controller VM	An internal system Virtual Machine used to run the operating environment. Used for PowerStore X models only.	N/A
Controller VM datastore	An internal system datastore mounted by PowerStore X model appliances. These are VMFS datastores containing the Operating Environment. Customers will not use these, but they will be exposed in vSphere.	N/A
Host	Addressable external node capable of sending and receiving data	host
Host group	Collection of hosts to mimic host cluster	N/A
NVMe-oF	Refers to "NVMe over Fabrics". NVMe-oF defines a common architecture that supports a range of storage networking fabrics for the NVMe block storage protocol over a storage networking fabric. Examples are NVMe-FC, NVMe-RoCEv2, and NVMe-TCP.	N/A
Storage container	Use storage container everywhere instead of VVol datastore.	VVol datastore
PowerStoreOS	The overall storage operating system for PowerStore. Encompasses multiple microservices deployed in Docker containers, either on "bare metal" PowerStore hardware (PowerStore T models) or in a VM running on the onboard ESXi hypervisor (PowerStore X models).	Unity: Unity OE SC: SCOS

## Objection Handling

The following table lists some of the most common sales objections you can expect, and how to respond.

Objection	How to respond
<b>No synchronous replication natively on the product</b>	<ul style="list-style-type: none"> <li>Native asynchronous replication is supported in the initial release. Sync rep planned for future release.</li> <li>VPLEX and RecoverPoint for VMs can also be leveraged.</li> <li>If native sync is required, position Unity XT / PowerMax.</li> </ul>
<b>No native metro replication in initial release</b>	<ul style="list-style-type: none"> <li>Customers who require metro replication with PowerStore can use VPLEX (metro node)</li> <li>If native metro replication is required, position PowerMax.</li> </ul>
<b>Lacks advanced file features, replication, etc.</b>	<ul style="list-style-type: none"> <li>PowerStore DOES have a strong file solution in its initial release. Future releases will provide additional advantages.</li> <li>If additional advanced file features such as file async replication or file auditing/reporting, are required today, position Unity XT</li> </ul>
<b>No software only version</b>	<ul style="list-style-type: none"> <li>PowerStore's VMware architecture already provides many of the mobility/flexibility advantages</li> <li>If a VSA version is required, position Unity X</li> </ul>
<b>No native cloud tiering</b>	<ul style="list-style-type: none"> <li>PowerStore VMware architecture already provides many of same integration/mobility advantages</li> <li>Hybrid/multi-cloud solutions with end-to-end operational consistency</li> <li>VCF, Cloud Storage Services DRaaS to VMware Cloud on AWS, etc.</li> <li>If native cloud tiering required today, position Unity XT</li> </ul>
<b>Too expensive (All Flash only, no hybrid)</b>	<ul style="list-style-type: none"> <li>PowerStore's extreme efficiency (4:1 average DDR guaranteed) makes cutting-edge NVMe affordable/accessible</li> <li>Position Unity as our leading hybrid platform.</li> <li>Now exploring support for low-cost flash options such as QLC and TLC</li> </ul>
<b>Doesn't support latest version of vSphere</b>	<ul style="list-style-type: none"> <li>Initial release supports vSphere 6.7, subsequent releases will track with VMware</li> <li>Continuous development will leverage deep VMware partnerships to provide new capabilities</li> <li>Support for new vSphere versions will be delivered as free, non-disruptive upgrades</li> </ul>

## Sales resources

In addition to the following links, see the [PowerStore Inside Dell page](#) and [PowerStore Knowledge Center](#) for all the resources you need to learn about and sell PowerStore.

- [PowerStore Data Sheet](#)
- [PowerStore Quick Selling Guide](#) (2-page cheat sheet)

- [PowerStore Spec Sheet](#)
- [PowerStore Top 10 Reasons](#)
- [PowerStore Website](#)
- [YouTube Playlist](#)
- [3D Interactive Tour](#)
- [Virtual Product Tour](#)
- [Hands-on Labs](#)
- [Interactive Demo](#)
- [Technical Documentation & Videos](#)
- [SalesU Learning Portal](#)
- [Marketing Campaign Playbook](#)
- [Social Media Activation Kit \(SMAK\)](#)