



Storage comparison: Dell PowerMax 8500 vs. Pure Storage FlashArray//XL170

A Principled Technologies research report based on publicly available information

Strong performance and state-of-the-art security features for enterprise storage systems can be crucial to support your business-critical workloads, yet selecting the best solution for your infrastructure can seem daunting. To assist buyers in making informed decisions, we researched publicly available information about two all-flash arrays: Dell PowerMax 8500 and Pure Storage FlashArray//XL170.

We assessed both storage solutions in the following categories: expandability, mainframe support, capacity, latency, throughput, and suitability for secure environments. (In our research, technical information for the Dell PowerMax array was easy to access, while information for the Pure Storage array was either restricted or harder to locate.)

The information available on the Dell PowerMax 8500, which was plentiful, indicated that this array is more expandable, had significantly greater effective capacity and stronger performance, offers mainframe support for secure compatibility with legacy applications, and offers verified suitability for secure environments. (We provide our sources for these findings on the following pages.) Public information about the Pure Storage FlashArray//XL170, which was sparse, leaving us unsure about some aspects of the array, but indicated that it is less expandable and has lower overall storage performance than the Dell PowerMax 8500 array.



Introduction: Our approach and general findings

After compiling and summarizing publicly available information on the Dell PowerMax 8500 and Pure Storage FlashArray//XL170, we noted the following differences between the two storage offerings at maximum configuration (see Table 1, and see the following pages for in-depth information and sources).

Table 1: Comparison of the two arrays at maximum configuration using publicly available information. Source: Principled Technologies.

	Dell PowerMax 8500	Pure Storage FlashArray//XL170
Number of controllers	16	2
Effective capacity	18 PB	5.5 PB
Latency ¹	60 µs	150 µs
Mainframe support	Yes	No
Suitability for secure environments	DOD approved	Not DOD approved

Exploring publicly available data for the Dell PowerMax 8500 array

Prospective buyers can find key information about the Dell PowerMax 8500 array via a well-organized landing page on the Dell site. That page includes links to datasheets and other resources.² We had no problems finding technical information about the PowerMax

8500 array, including expected performance metrics. Notably, we accessed this information without having to create an account on the Dell website; it was all freely available in just a few clicks.

1 Note: Dell refers to the 60us latency as response time (reads). Pure specifies read latency as low as 150us for cache-friendly workloads.
 2 Dell Technologies, "Dell PowerMax, 8500," accessed August 16, 2022, <https://www.dell.com/en-us/dt/storage/powermax/powermax-8500-all-flash-storage-array.htm>.

Exploring publicly available data for the Pure Storage FlashArray//XL170 array

Public information about the Pure Storage FlashArray//XL170 array was sparse. It was especially difficult to locate specific information regarding the limits of the FlashArray//XL170, such as the maximum number of snapshots. These types of metrics can be important for planning storage infrastructure. The few public sources about the array that we found consisted mainly of early reviews of the product. These early reviews referred to a coming update that would expand capacity, but we were unable to find a Pure Storage source indicating that such an update was forthcoming or whether Pure had already released it.

The public areas of the Pure Storage Support portal also yielded few resources about the array. There is a “FlashArray, Hardware” heading, but the list of arrays under this heading does not include the FlashArray//XL.³ Aside from the information in the FlashArray//XL spec sheet and a few other marketing materials, we found very little public information about the array’s specific technical capabilities. This is very different from Dell, which makes virtually all technical specifications about the PowerMax 8500 array and the larger PowerMax family easy to find.

Though the Pure Storage datasheets suggest that the FlashArray//XL is in the same family as the FlashArray//X, it is unclear how much information about the //X line applies to the //XL variant. As of this writing, we found only a document entitled “NVMe-oF Overview,” which clearly references a different form factor, suggesting that the hardware components may not be interchangeable.⁴

In our research, we found public information about Pure Storage offerings in general to be thin. In fact, the publicly available areas of the Pure Storage Community portal provided no viewable information (see Figure 1). We presume that more information may be available behind a paywall or after registering with the site, but for this report we considered only information that is available to the public. We did attempt to register a Pure Storage account for research purposes, but were unable to procure this account due to Pure Storage’s approval process for new registrations.

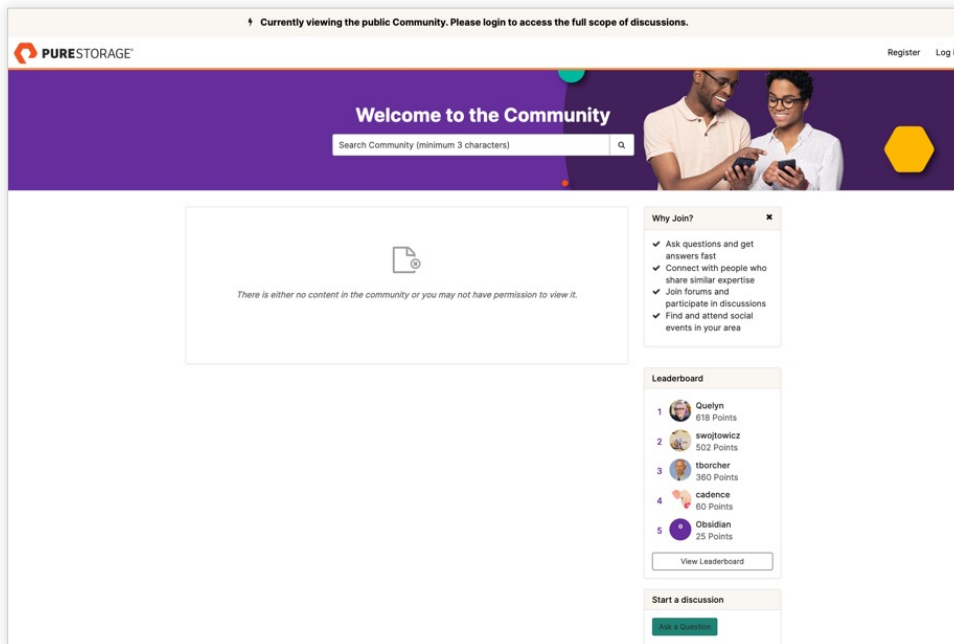


Figure 1: Screenshot of the Pure Storage public Community webpage.
Source: Principled Technologies.

3 Pure Storage, “FlashArray,” accessed August 15, 2022, <https://support.purestorage.com/FlashArray>.

4 Pure Storage, “NVMe-oF Overview,” accessed August 15, 2022, https://support.purestorage.com/FlashArray/FlashArray_Hardware/94_FlashArray_X/FlashArray_X_Product_Information/NVMe-oF_Overview.



Comparing expandability

According to the public information we found, a base-level Dell PowerMax 8500 is significantly more expandable than a Pure Storage FlashArray//XL170.

Scaling out is the practice of adding new hardware to expand the capabilities or capacity of an array. Scaling out brings increased capacity and increased performance to your environment. The Dell PowerMax 8500 array allows for up to eight node pairs to be connected and managed as a single platform.^{5,6} This ability gives organizations the ability to scale out as storage needs grow, by simply adding more nodes.

Our research suggests that the scale-out capabilities of the FlashArray//XL are limited. Each Pure FlashArray//XL170 or XL130 chassis (in which the FlashArray//XL resides) holds up to 40 drives.⁷ Administrators can attach only two additional DirectFlash shelves, each of which can hold additional 28 drives in 3U of rack space.⁸ If your organization needs more storage, you must purchase additional FlashArray arrays that you manage separately. This approach can present an administrative hassle because it entails creating new volumes rather than expanding the size of existing volumes.

Comparing effective capacity

Another area in which the Dell PowerMax 8500 array bested the Pure FlashArray//XL170 in our research was in effective storage capacity. Selecting systems with larger effective capacity can help organizations stave off purchasing new arrays and maximize the efficiency of their data center space.

According to the specifications table on the Dell website, the maximum configured effective capacity for the Dell PowerMax 8500 array is 18PB.^{9,10} The

maximum effective capacity of the Pure FlashArray//XL170 is 5.5PB.¹¹ Each PowerMax 8500 array thus has greater effective capacity than the FlashArray/XL170.

The Dell PowerMax 8500 array has a 4:1 data reduction rate compared to the 5:1 ratio of the Pure FlashArray//XL170; however, the Dell PowerMax array can support a higher capacity in part because of the number of arrays you can aggregate into a single storage domain.

- 5 Dell Technologies, "Dell PowerMax, 8500," accessed August 16, 2022, <https://www.dell.com/en-us/dt/storage/powermax/powermax-8500-all-flash-storage-array.htm>.
- 6 Dell Technologies, "Dell PowerMax," accessed August 16, 2022, <https://www.dell.com/en-us/dt/storage/powermax/powermax-8500-all-flash-storage-array.htm#scroll=off&pdf-overlay=/www.delltechnologies.com/asset/en-us/products/storage/technical-support/powermax-2500-8500-spec-sheet.pdf>.
- 7 Pure Storage, "Pure Storage FlashArray//XL NVMe Storage," accessed August 16, 2022, <https://www.purestorage.com/docs.html?item=/type/pdf/subtype/doc/path/content/dam/pdf/en/datasheets/ds-flasharray-xl.pdf>.
- 8 Pure Storage, "Pure Storage FlashArray//XL NVMe Storage," accessed August 16, 2022, <https://www.purestorage.com/docs.html?item=/type/pdf/subtype/doc/path/content/dam/pdf/en/datasheets/ds-flasharray-xl.pdf>.
- 9 Dell Technologies, "Dell PowerMax, 8500," accessed August 16, 2022, <https://www.dell.com/en-us/dt/storage/powermax/powermax-8500-all-flash-storage-array.htm#>.
- 10 Dell Technologies, "Dell PowerMax," accessed August 16, 2022, <https://www.dell.com/en-us/dt/storage/powermax/powermax-8500-all-flash-storage-array.htm#scroll=off&pdf-overlay=/www.delltechnologies.com/asset/en-us/products/storage/technical-support/powermax-2500-8500-spec-sheet.pdf>.
- 11 Pure Storage, "Pure Storage FlashArray//X and FlashArray//XL," accessed August 15, 2022, <https://www.purestorage.com/content/dam/pdf/en/datasheets/ds-flasharray-x.pdf>.



Comparing performance: Latency

Latency, one measure of storage performance, is the time it takes a system to process requests. The lower latency your storage system has, the faster it handles requests.

According to the specifications table on the Dell website, the Dell PowerMax 8500 performs with latency as low as 60 microseconds.¹² This is less than half the latency the Pure Storage site reports for a Pure

Storage FlashArray//XL170, which is as low as 150 microseconds.¹³ The dramatically lower latency of the PowerMax 8500 array would be a win for applications that need top speed. Note that according to the Pure Storage documentation, achieving latency as low as 150 microseconds is contingent on running workloads that use DirectMemory cache; the spec sheet for FlashArray//XL170 lists latency as “150 microseconds to 1 millisecond,” a significant range.¹⁴

Comparing performance: Bandwidth/throughput

Bandwidth or throughput, another measure of storage performance, indicates the amount of data a system can process in a given time. (Note: Dell refers to this metric as bandwidth, while Pure refers to it as throughput.) Higher throughput numbers, which mean more data can move through the system at once, are better. The publicly available data we found suggests that the PowerMax arrays have a significant edge in throughput over the Pure Storage FlashArray//XL.

We were unable to find a publicly available throughput number for the PowerMax 8500 array. However, we found bandwidth metrics for two older arrays: the PowerMax 8000 has up to 350GB/sec bandwidth and up to 15M IOPS¹⁵ and the PowerMax 2000 has up to

80GB/sec and up to 2.7M IOPS.¹⁶ Because the 8500 array is newer, it should deliver comparable, if not better, performance.

The information we found on the Pure Storage FlashArray//XL indicates a throughput limit of 36GB/sec.¹⁷ Note that the 36GB/sec throughput number applies only to the highest end FlashArray (XL170); Pure Storage public documents say that the XL130 tops out at 26GB/sec.¹⁸

The quoted throughput numbers indicate that organizations looking for maximum throughput should consider the Dell PowerMax 8500 array.

12 Dell Technologies, “Dell PowerMax 8500,” accessed August 16, 2022, <https://www.dell.com/en-us/dt/storage/powermax/powermax-8500-all-flash-storage-array.htm#scroll=off>.

13 Pure Storage, “Pure Storage FlashArray//XL NVMe Storage,” accessed August 16, 2022, <https://www.purestorage.com/docs.html?item=/type/pdf/subtype/doc/path/content/dam/pdf/en/datasheets/ds-flasharray-xl.pdf>.

14 Pure Storage, “Pure Storage FlashArray//XL NVMe Storage,” accessed August 16, 2022, <https://www.purestorage.com/docs.html?item=/type/pdf/subtype/doc/path/content/dam/pdf/en/datasheets/ds-flasharray-xl.pdf>.

15 Dell Technologies, “Dell PowerMax 8000,” accessed August 16, 2022, <https://www.dell.com/en-us/dt/storage/powermax/powermax-8000-all-flash-storage-array.htm>.

16 Dell Technologies, “PowerMax: Family Overview,” accessed August 15, 2022, <https://infohub.delltechnologies.com/t/powermax-family-overview/>.

17 Pure Storage, “Limitless Scale and Multi-Array Management,” accessed August 16, 2022, <https://www.purestorage.com/content/dam/pdf/en/infographics/ig-pure-flasharray-vs-dell-powermax.pdf>.

18 Pure Storage, “An Insider’s Look at the New FlashArray//XL,” accessed August 15, 2022, <https://www.purestorage.com/de/video/anatomy-of-a-powermax-killer-an-insiders-look-at-the-new-flash/6307203067112.html>.

Comparing mainframe support

Many industries—including banking, insurance, and credit card functions—still rely on mainframe systems to run applications. As workloads grow and modernize, mainframe-based applications need additional backing storage. Selecting a storage platform that you can leverage for both mainframe and open system platforms can help storage administrators plan and manage storage more easily.

We found no publicly available information asserting that the Pure Storage FlashArray//XL has direct support for working with mainframes or other such legacy applications.

In publicly available information, Dell asserts that the PowerMax storage family provides software support that makes working with mainframes and mainframe-based applications easier.¹⁹ This PowerMax mainframe support includes components such as zBrick, zEssentials, zPro, and more, and the family overview states, “large-scale workload consolidation in which Open Systems and mainframe block storage can co-exist with file storage on the same platform.”²⁰ To make this possible, PowerMax 8000 arrays offer a generic open systems option that uses regular PowerMax “bricks” (nodes) and a mainframe version called zBrick. If your organization needs fast, modern storage attached to a mainframe, PowerMax offers software tools to help.

Comparing suitability in secure environments

If your organization seeks storage for secure environments, selecting systems that industry leaders and organizations with high security needs have vetted can bolster confidence that your data will remain safe. The United States Department of Defense maintains a consolidated, approved product list: the Department of Defense Information Network (DoDIN) Approved Products List (APL). According to the website, “This process provides a single, consolidated list of products that have met cybersecurity and interoperation certification requirements.” Dell PowerMax 8000 and 2000 both appear as approved products on the DoDIN APL, which suggests their suitability for secure environments.²¹ In contrast, no product from Pure Storage product appears on the approved product list as of this writing.

Dell has a demonstrably robust approach to security and provides detailed information on their adherence to and implementation of the National Institute of Standards and Technology (NIST) Cybersecurity Framework,²² including FIPS 140-2 validated hardware encryption and Common Criteria compliance.²³ The Pure FlashArray platform also provides FIPS 140-2 validation and compliance with Common Criteria,²⁴ but we were unable to find comprehensive public materials about their overall approach to security and alignment to the specific areas of the NIST-CSF like Dell provides.

19 Dell Technologies, “Dell PowerMax,” accessed August 16, 2022, <https://www.dell.com/en-us/dt/storage/powermax/powermax-8500-all-flash-storage-array.htm#pdf-overlay=//www.delltechnologies.com/asset/en-us/products/storage/technical-support/powermax-2500-8500-data-sheet.pdf>.

20 Dell Technologies, “Dell EMC PowerMax: Family Overview,” accessed August 16, 2022, https://www.delltechnologies.com/asset/en-us/products/storage/industry-market/h17118_dell_emc_powermax_family_overview.pdf.

21 DISA, “DoDIN Approved Products List,” accessed August 16, 2022, <https://aplits.disa.mil/processAPList.action>.

22 Dell Technologies, “Enabling U.S. Federal Customer Compliance,” accessed September 14, 2022, <https://www.delltechnologies.com/asset/en-us/products/storage/industry-market/dellemc-powermax-helping-us-federal-achieve-cyber-security-framework-goals.pdf>.

23 Dell Technologies, “Common Criteria Certification List,” accessed September 14, 2022, <https://www.dell.com/en-us/dt/corporate/about-us/security-and-trust-center/common-criteria-compliance.htm#accordion0&accordion1&accordion2>.

24 Pure Storage, “FlashArray Security and Compliance,” accessed September 14, 2022, <https://www.purestorage.com/content/dam/pdf/en/white-papers/wp-flasharray-data-security-and-compliance.pdf>.



Conclusion

One of the ways vendors support buyers of their offerings is by providing public information about their products. We found that Dell offered easy-to-find vital data about the PowerMax 8500 array to assist organizations making a storage decision. In contrast, Pure Storage offered comparatively little public information about the PureArray//XL170 as of this writing. The publicly available information we found suggests that the Dell PowerMax 8500 array surpasses the Pure Storage PureArray//XL170 in the categories we researched, with greater expandability and capacity, higher throughput and lower latency, mainframe support, and verified suitability for secure environments.

This project was commissioned by Dell Technologies.



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