Why You Should Modernize
Your Mindset for Data Storage in Servers

WHITE PAPER

No single type of storage architecture works equally well for all workloads, so organizations need to examine their SSD portfolio to ensure they have ideal storage options for a wide range of applications and use cases. This paper provides specific suggestions on how to construct your storage solutions to address different needs and challenges.

The much-discussed transition from spinning hard disk drives to solid-state disks (SSDs) as the storage technology for a wide range of applications and workloads is now a fait accompli. Hard drive shipments have declined annually since their peak in 2010, and SSDs global shipments continue to surge.[1]

In fact, global SSD revenues are expected to eclipse $25 billion by 2025, representing a projected compound annual growth rate of nearly 15% from 2018.[2] From the most basic endpoint system to the most performance-intensive data center environment, the primacy of SSD storage is now a given.

But that doesn't mean IT professionals, storage administrators and infrastructure managers don't have some important, and potentially tricky, decisions to make when it comes to storage solutions. For large enterprises, data centers and small businesses alike, workloads have become more numerous and diverse, owing to the dramatic expansion in the sheer volume of data and its application in new and often-surprising applications.

Some workloads can be easily supported with SSDs at relatively low price points, capacity and performance levels, while others demand extremely high IOPS and the lowest possible latencies with near-infinite capacity scalability. What may be performance overkill for some workloads may not be powerful enough for others, making it impossible for a single type of SSD architecture or interface to be utilized for all possible workloads.

1 "Worldwide unit shipments of hard disk drives (HDD) from 1976 to 2020 (in millions)," Statista, 2018.

2 "Solid state drive market worth $25.51 billion by 2025," Grand View Research, February 2018.

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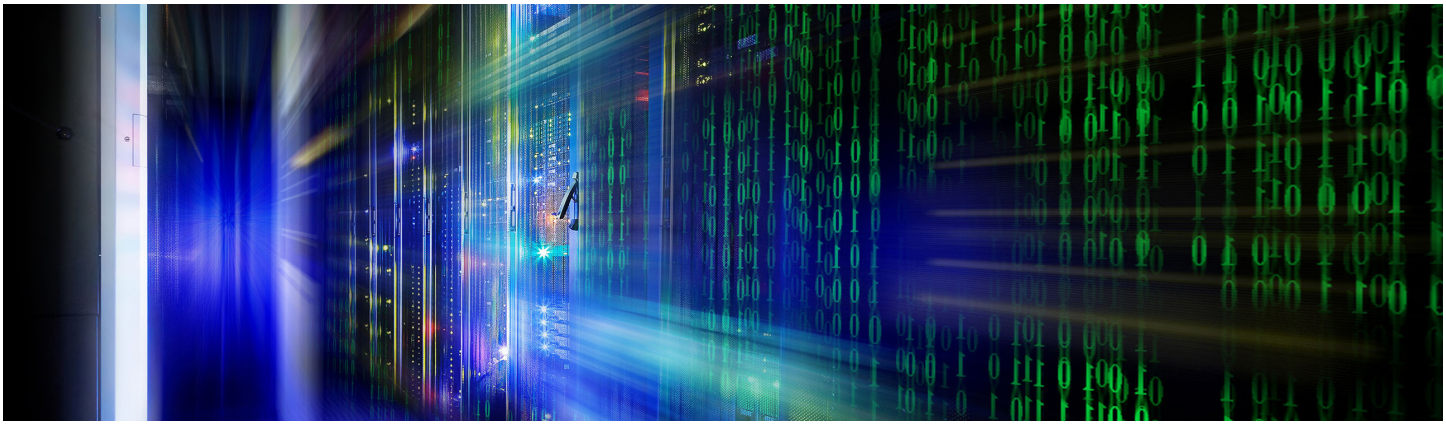

It has become increasingly clear that decision-makers need to migrate to new classes of SSD solutions. In particular, storage and infrastructure managers should plan and implement aa strategy that replaces legacy SATA solutions with a modernized, higher-performance set of SSD interfaces. In particular, these organizations' "life after SATA" should focus on SSDs with new, optimized versions of SAS and NVMe interfaces.

This paper gives readers a sense of which classes of SSD solutions align best with different workloads, why value SAS and data center NVMe SSDs will replace SATA, and why it makes sense to work with a reputable, innovative storage market leader with a diverse array of SSD solutions.

A Good Solution—SATA

Since it was first introduced in 2000, the Serial Advanced Technology Attachment (SATA) storage interface has been the workforce for a wide variety of the most popular computing workloads. Desktop systems, notebooks and commodity servers typically used SATA-based storage devices for both business and personal use because it delivered good performance at attractive price points.

The reasons why are plentiful:

- The interface was well-defined and widely adopted, making alternate sourcing of SATA-based hard drives and, more recently, SATA-based solid-state disks (SSDs) easy and reliable.
- From an engineering and integration standpoint, SATA was cost efficient to build into systems, even for data center servers.
- As a mature technology, SATA offers stability and reliability.
- Over the years, SATA supported escalating storage capacities and the need for improved performance for increasingly demanding workloads.

That's why volumes of SATA-based storage for enterprise servers have soared during the past two decades.

SATA is reaching the limits of its capabilities, particularly to support server performance in higher-end workloads that have become increasingly important for all types and sizes of organizations. Powerful servers such as Dell's PowerEdge line are now the compute foundation for sophisticated workloads such as machine learning, private clouds, OLTP and data warehouses, and these cutting-edge servers need an upgraded, modernized storage platform.

Many decision-makers are facing an important choice as to when and how to transition to different storage interfaces for new workloads, given that SATA's performance roadmap ends at 6 gigabits per second. Clearly, customers need to plan for "life after SATA" when considering their storage options for high-performance server workloads.

The Better Solution—Value SAS

For higher-end workloads, many storage administrators and IT decision-makers often choose solutions based on the Serial-Attached SCSI (SAS) interface. SAS offers higher throughput than SATA, making it a better choice for workloads like data protection and high availability. SAS's technology roadmap is well-defined and is broadly supported by a large number of infrastructure component, software and firmware providers, giving it the largest and most mature ecosystem for data center servers and storage.

Since the vast majority of enterprise servers come equipped with a SAS interface through an on-board chip accessed via an I/O or RAID controller, SATA-based SSDs can be easily upgraded and swapped for alternative brands when desired.

However, IT decision-makers are increasingly looking for new approaches that offer similar levels of performance, but at lower price points normally associated with SATA.

Enter Value SAS, a better option. Value SAS is designed and optimized for powerful, yet cost-efficient servers such as Dell PowerEdge at a similar price point to SATA. It is a very attractive option that can easily replace SATA SSDs in servers without any changes to the infrastructure, since servers typically are deployed with SAS built-in.

Value SAS is ideal for today's SSDs that are being deployed in such workloads as virtual desktop infrastructure (VDI), smaller databases, mainstream enterprise applications and test/dev. For environments where SATA-based SSDs can no longer keep up with performance requirements for modern workloads, Value SAS is a better option.

The Best Solution—Data Center NVMe

But many of the industry's most exciting and promising workloads demand even more performance, higher availability and lower latency than mainstream SSDs can support for server-side storage.

In these cases, the best solution is SSDs equipped with the top-of-the-line performance characteristics of NVMe, which utilizes the ultra-high-speed PCIe bus. NVMe represents a quantum leap in functionality, performance and scalability for modernized data centers because it was designed specifically for flash storage, it streamlines the storage infrastructure stack and it achieves both extremely high IOPS and extremely low latency.

A class of SSD interface—called Data Center NVMe because of its central role in supporting server-side storage for scale-out workloads—has emerged as the ideal solution for the moderate performance-intensive workloads that also demand lower latency than SAS or SATA.

While Data Center NVMe workloads typically are found in modern data centers, the high-end interface also is well-suited for workloads associated with very large data sets and the need for high performance at scale, such as analytics, data warehouses, large databases, medical imaging and the internet of things.

NVMe today is supported by a large and fast-growing ecosystem of suppliers of everything from storage devices and chip sets to firmware, and is being deployed in many of the data centers around the world, including those managed by cloud service providers, co-location firms and social media giants.

For workloads characterized by large numbers of sequential read/writes, metadata indexing and random content access—traditionally supported by RAID or replication solutions—Data Center NVMe will often be the best solution in a storage administrator's toolbox.

KIOXIA America Inc.'s SSD Portfolio

Committing to a SATA replacement strategy for SSD interface options in server-side storage is the first step, but it needs to be followed by a precise, demanding and diligent evaluation of potential storage partners that can fulfill the organization's storage portfolio strategy.

KIOXIA offers a broad and deep lineup of SSD solutions based on the SATA, Value SAS and Data Center NVMe interfaces to support any organization's full array of enterprise computing workloads. This ability to provide the right tool for the right job has made KIOXIA America Inc. a leading, trusted and reliable supplier of SSD solutions for organizations across industries and geographies, and allows it to meet the workload requirements for the world's largest organizations as well as small, emerging companies that often evolve into market leaders themselves.

For instance, organizations that need the most cost-efficient SSD solution that also can keep up with escalating performance requirements, KIOXIA offers SATA-based solutions for workloads marked by large, highly parallel reads and the need to process large amounts of data.

For organizations that need to ensure that there is "life after SATA," KIOXIA provides a family of Value SAS-based solutions that offer higher performance but at price points normally associated with SATA-based solutions. These might be workloads such as data warehouses, machine learning or medical imaging.

And, for the most demanding data center workloads, such as OLTP, and others requiring very low latency, such as Hadoop/Spark big data analytics, KIOXIA America Inc. offers Data Center NVMe solutions for high-intensity random reads and writes, as well as sequential log writes, metadata indexing and random access to extremely large, unstructured data sets.

Conclusion

The amazing advances in capabilities across compute and storage platforms has allowed organizations to support workloads that are increasingly demanding in performance, while also delivering dramatic advances in business value. Having a broad mix of storage options is essential to support these organizations' full palette of workloads, and is now embodied as a good/better/best mindset.

From a storage interface perspective, this means that organizations need storage solutions offering good, better and best performance levels, balanced by the need to have a mix of economic solutions. Today, this is being translated as SATA as the good choice, Value SAS as the better choice and Data Center NVMe as the best choice for similarly priced SSDs. All play an important role in any organization's workload portfolio, and it is important for IT decision-makers to ensure that all interfaces are part of their storage landscape—and that they team with an experienced, reliable storage partner like KIOXIA to support that strategy.

For more information on KIOXIA America Inc.'s good/better/best options for your server-based storage, please visit www.lifeafterSATA.com, or #LifeAfterSATA.