Micron® 7300 NVMe™ SSD: Fast, Thin and Affordable

Micron's 7300 SSDs Bring Capacity, NVMe Speed and Value to More Workloads, More Applications and More Data Centers

Micron 7300 Series of SSDs with NVMe

NVMe next-generation storage platform

Broad-base workload acceleration

Economical, high-bandwidth NVMe

Thin 7mm (2.5-inch) form factor

Power-efficient performance

Overview

High-performance NVMe SSDs have transformed data centers and cloud operations with fast IOPS, low latency, and tight Quality of Service (QoS). So why is NVMe not being adopted across the whole data center? Simple — budget and power.

The new Micron 7300 NVMe SSD extends the benefits of performance into the platforms whose storage or power budget was previously limited to legacy SSD options, now fully embracing the strong performance of all-flash designs.

- **Mainstream NVMe**: The ideal storage drive for broadly deployed, business-critical virtualized workloads like OLTP, BI/DSS, VDI, media streaming and for organizations deploying new environments looking to future-proof their investment.
- **Fast, efficient, affordable:** Enabling you to make the transition from legacy interfaces to modern NVMe infrastructure. Get more from your servers from day one.
- **Mixed-use, virtualized applications empowered:** Get breathtaking performance and optimal endurance with Micron 7300 NVMe SSDs.
- **Better SSDs from better NAND:** Micron's industry-leading 3D NAND technology (96-layer 3D TLC NAND) delivers density, throughput, endurance and power efficiency for modern storage demands.

NVMe Is the Storage Future for New Platforms

Since its inception, Non-Volatile Memory Express™ interface (NVMe) storage has grown at an amazing rate, fostering broadening appeal and selection. In a G2M Inc. blog post in December 5, 2018, Mike Heumann noted in their fifth edition of their semi-annual NVMe Market Sizing Report, there were over 127 models of NVMe SSDs and 121 servers with NVMe drive bays. He went on to say that they expected the overall NVMe market to continue to grow, reaching a revenue level of over $80MM by 2022.

Figure 1 shows his view on the NVMe market potential up to 2020.

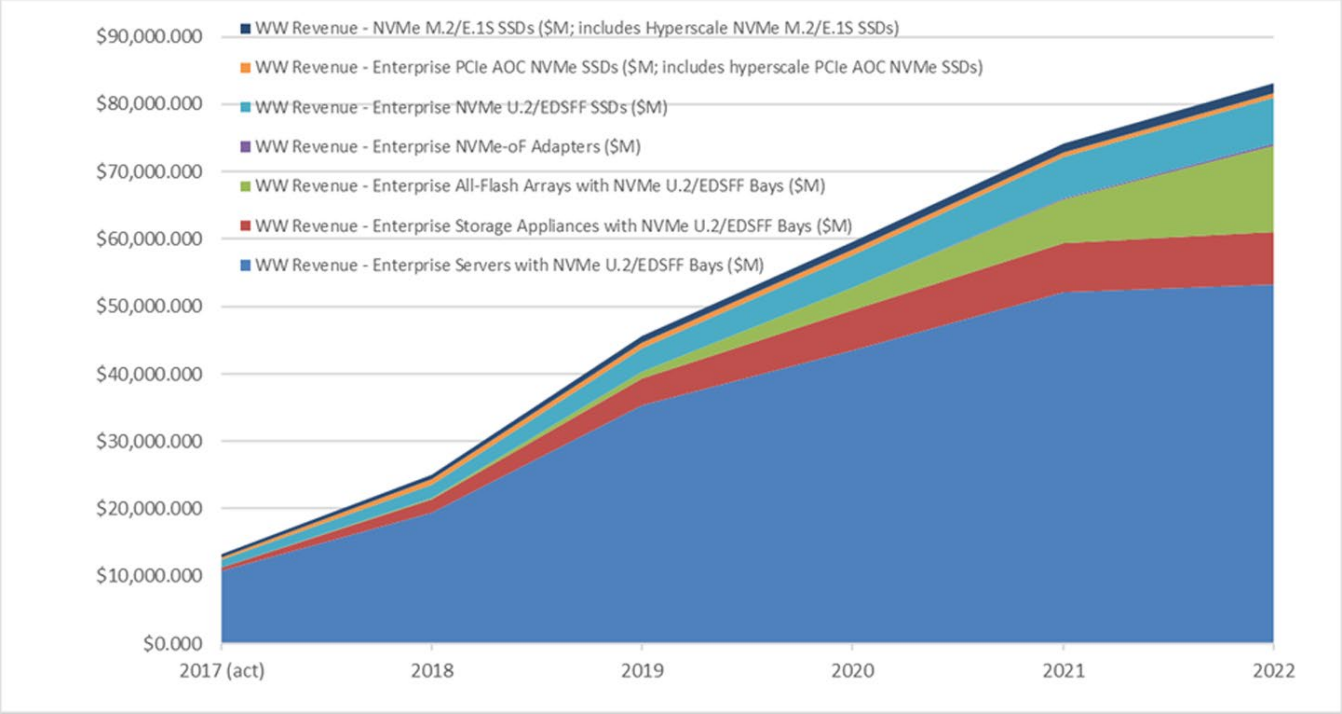


Figure 1: NVMe Ecosystem Revenue Growth (Source: G2M, Inc)

In the middle of this growth, NVMe SSD adoption into everyday data center and cloud workloads is still competing with legacy interface SSDs like SATA and SAS, whose basic designs were a holdover from decades ago when spinning storage ruled the data center.

Legacy interface SSDs can keep purchase prices low but their interfaces are laden with compromises to maintain backwards combability to HDDs. This can limit their capability and their value in emerging applications and workloads — they simply were not engineered to take full advantage of high performance[1], low-latency flash.

What we needed was a performance ***and*** budget focused, forward-looking, complete family of SSDs. SSDs that combined the benefits of a flash-only interface (NVMe) and its immense bandwidth with the approachable price point, form factor flexibility and dual-port options of legacy SSDs. Imagine the value a flash-optimized, NVMe SSD could unleash if it were priced similar to legacy interface SSDs.

This value is realized in the Micron 7300 series of NVMe SSDs. Available in both M.2 and U.2 (7mm) form factors that are designed to enable performance-starved applications and workloads to thrive, the Micron 7300 brings affordable NVMe to mainstream data center and cloud deployments.

1. In this paper we use the terms “performance,” ‘IOPS” and “MB/s” interchangeably.

Broad-Base Workloads Capitalized with NVMe

The Micron 7300 is a complete family of NVMe SSDs for business-critical workloads that combines the benefits of NVMe with the cost structure of legacy interface storage. (Figure 2)

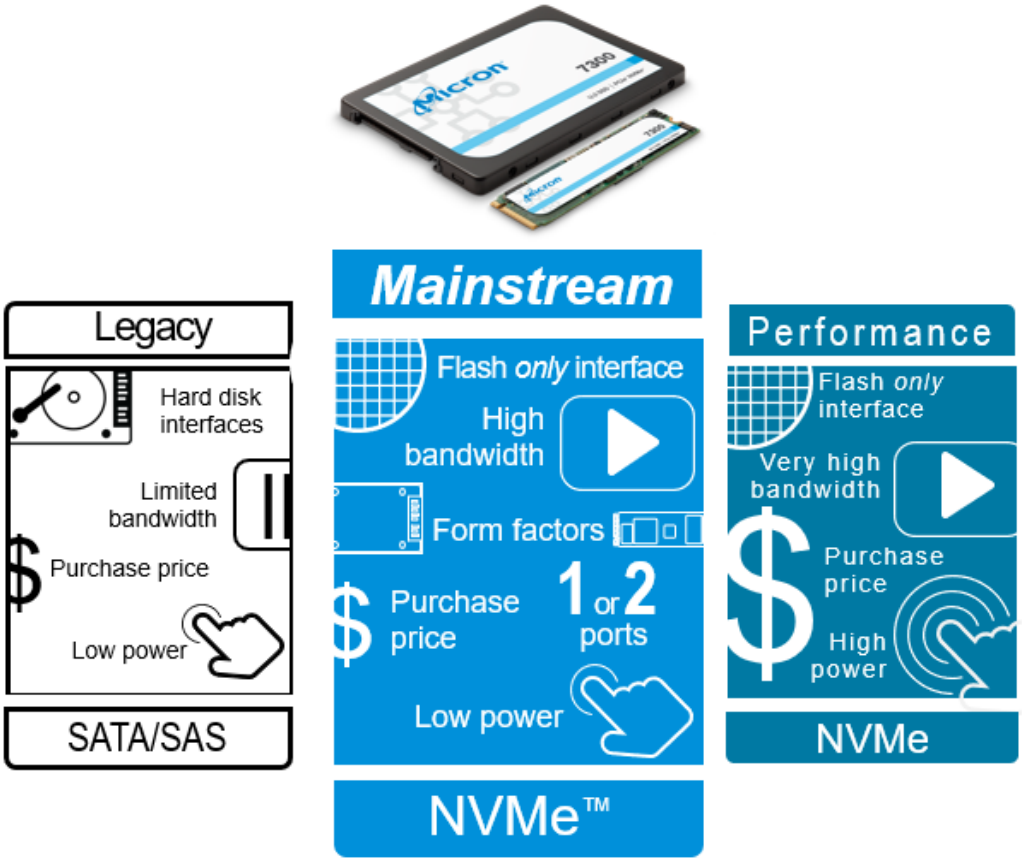
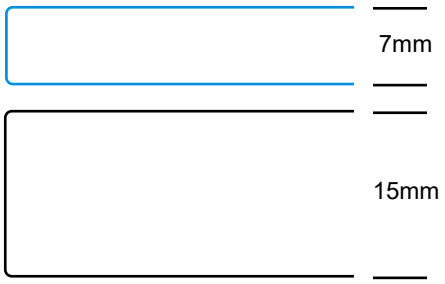


Figure 2: NVMe capability for mainstream workloads

Thin 7mm Scales up Easily

While many performance-focused NVMe SSDs rely on the maximum 15mm footprint (as noted in the U.2 form factor specification), their extra thick cases can limit the number of SSDs that can be housed in a standard platform (just 24 in a standard 2U server platform).



At just 7mm (z-height), the Micron 7300 U.2 series can increase SSD density per standard server.

Figure 3: Micron 7300 and standard U.2

When workloads can benefit from extra drives or reserving space for expansion, we have had to find other work-arounds or use on custom or proprietary chassis designs. This can be costly and difficult to manage.

As shown in Figure 3, Micron's 7300 SSDs take a very different approach in this U.2 design: thinning the single SSD z-height from the industry standard maximum of 15mm to a much thinner — and potentially denser — 7mm, less than half the thickness.

7300 Family Simplifies Design

NVMe adoption growth may be leading system designers away from simplicity, toward ultimate performance at the expense of easy management. It should not.

Purpose-built and broad-use platforms relying on simple, useful storage devices should be the norm, making management a breeze. Looking at a typical analytics hardware platform's storage, we can see how just the SSDs (devices that should be among the simplest in the platform) may not embrace the trend.

We need a storage device to boot the system, and if we are using storage tiering, we need another for a cache drive and more for capacity drives. That is the potential for three different device types from three sources.

The Micron 7300 can make this much simpler with M.2 form factors for boot up, U.2 MAX (mixed-use) for cache, and U.2 PRO (read-intensive) for capacity tier. (Figure 4) All in the same system. All from the same family, from one supplier.

Integrating SSDs for system boot up, written-intensive and cache tier storage with mixed-use capacity tier storage is simple. The 7300 family is available in a wide variety of form factors, capacities and endurance levels.

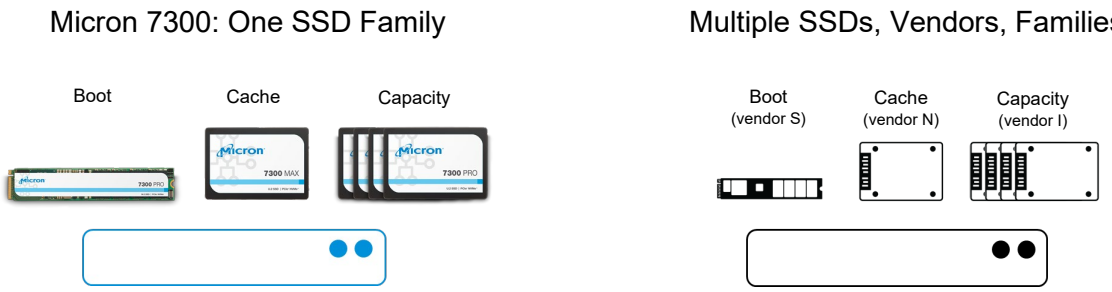


Figure 4: System simplicity comparison

7300 M.2: System Boot – Offered in both 80mm and 120mm M.2 with capacities ranging from 400 GB to 3.84 TB, the 7300 M.2 enables robust, data center SSD class startup without sacrificing a data storage slot.

7300 MAX: Mixed-Use IO – Some of the most critical data, the data we write and modify most, is the hottest data in a platform. Hot data drives your business, day in and day out. Hot data is not stagnant — far from it. Hot data is not written (ingested) into the system in neat, orderly, and sequential chunks. Hot data can be random or sequential, small or large blocks, organized or not.

Extreme uses demand different storage. Storage with high endurance (often filling the SSD three times per day while demanding the ability to consistently absorb massive streams of data quickly with low, predictable latency.

7300 PRO: Read-Intensive IO – Quickly leverage vast data stores and their incredible value in the data you already have. Unlock that value by finding it, sorting it and acting on it right away. The 7300 PRO offers a capacity stretching 7.68TB per 7mm U.2 SSD to build platform and rack density at lightning speed.

One Port or Two

A storage device port is an access path between data on an SSD and a platform, application or workload using that data. Dual ports enable redundancy where storage systems can share the IO load. U.2 SSDs can support either single port or dual port depending on which Micron 7300 SSD is selected. Both types use the standard four-lane PCIe host connection; single port uses all four in a single connection, dual port uses half of the lanes on each port. Both single- and dual-port NVMe SSDs use four lanes to the host.

Figure 5: Port options

Single port is commonly used in server-side designs using software defined storage (SDS); dual port is commonly used in designs with separate storage controllers and purpose-built storage arrays, that share storage to other systems (over high-bandwidth, low-latency fabrics).

Power Stingy

Reducing data center power consumption and environmental footprints offers multiple benefits. As data center capacity, traffic and throughput grow, their available power may not. Whether building new platforms to replace retiring systems or extending overall footprint, careful power envelope planning and storage selection can help optimize results — especially for massive, high demand hosting, AI and ML workloads.

Micron's 7300 is power-stingy with overall consumption similar to legacy SSDs while enabling the performance of NVMe. (Figure 6

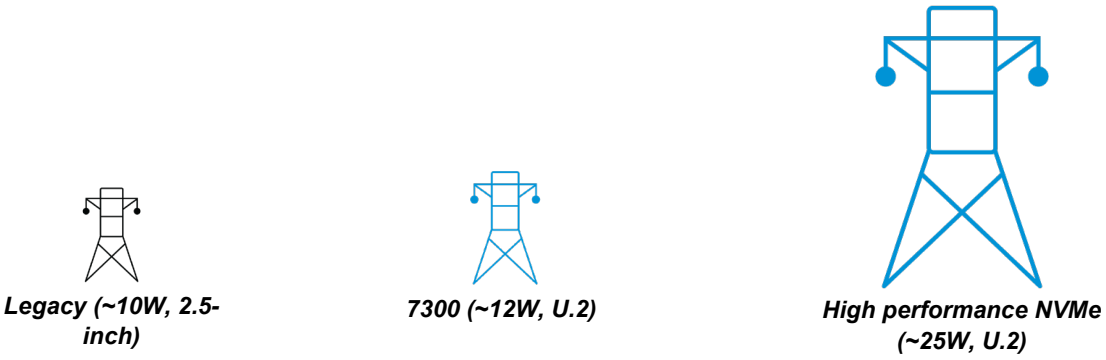


Figure 6: Power consumption[2]

Working in an area that is power limited? The Micron 7300 low power draw also means it needs less cooling.

Flash Forward to Economical, High-Bandwidth NVMe

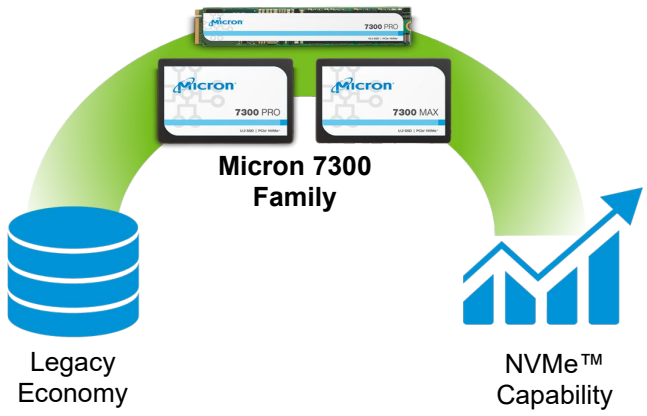
Performance-focused NVMe SSDs have been designed for applications and workloads that need the utmost storage performance — the highest IOPS and GB/s with the lowest latencies (fastest response time). These applications depend on high-performance NVMe SSD speed for their success. These workload demands could not be met with existing SATA or SAS SSDs — satisfying their insatiable storage appetites came at a price.

As performance-focused NVMe adoption grew and developments in legacy interfaces lagged, legacy interface SSDs still found adoption in new applications and platforms, while also providing a path to preserve existing server assets' service life through simple, drop-in storage upgrades (SATA capable server sockets still abound).

The Micron 7300 SSDs bring the benefits of NVMe to even more applications and workloads — at an approachable price point.

Rapid adoption of both performance NVMe and legacy interface SSDs embraced a broad range of customer needs. They "bookended" SSDs into the highest of the high (performance NVMe) and the daily worker (legacy). They left an open (and potentially compromise-laden) middle ground.

For some workloads, legacy interface SSDs had to suffice because the additional cost for performance NVMe may have been out of reach (Figure 7). When we needed more, we made a significant jump into performance NVMe with an expected price premium. A broad, unsatisfied workload middle ground remained.



Micron's 7300 series of SSDs brings NVMe performance to more applications and workloads while embracing the economy of legacy interface SSDs.

Figure 7: Micron 7300 Economy and Performance

Until Micron released the 7300 SSDs, data center planners, platform architects and purchasing teams had to choose between the affordability of legacy interface SSDs and the application and workload benefits of NVMe. We could have either low cost or performance, but not both. NVMe SSDs were typically priced outside the range of everyday workloads.

The Micron 7300 SSDs change this perspective, bridging the gap between the capability of NVMe and the economy of legacy interface SSDs.

Conclusion

Micron's 7300 series of SSDs combine NVMe capability with approachable price points, dense packaging and broad product line sets new heights for more applications and more workloads. At up to 7.68TB in a 7mm thin U.2

form factor — with single or dual port — and compact, speedy M.2 boot devices, the 7300 family has the capability, versatility and capacity to affordably bring NVMe to your data center.

For cloud providers and data center IT organizations moving up from legacy SAS/SATA infrastructure who need fast, consistent application storage performance for virtualized, mainstream workloads, the Micron 7300 series NVMe U.2 and M.2 SSDs deliver PCIe performance at SATA power and price levels while improving latency, and throughput.

Unlike competing drives built on old NAND technology with limited capacities, form factors, and high-power requirements, the Micron 7300 series of 96-layer 3D TLC NAND SSDs delivers strong, tight-QoS performance for less and makes it easier to future-proof storage technology.

Learn More

Visit www.micron.com/7300 to learn more about our 7300 series of SSDs with NVMe. Contact our Samples Center to evaluate the 7300 SSD in your environment.

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