

PCIe[®] Gen 4: Why it Matters to the Data Center



Data centers are rapidly changing and constantly adapting to growing market demands. With enterprise workloads moving to the cloud at hyper speed, moving more data, often with real-time speed and reduced latency has become imperative.

This shift to the cloud, along with ever-more sophisticated and complex Artificial Intelligence (AI) and Machine

Learning (ML) applications, is accelerating the adoption of higher speed storage devices like high-performance solid-state drives (SSDs) that meet if not exceed the demands of today’s overwhelming data explosion.

Peripheral Component Interconnect Express (PCIe®) devices are scalable via multi-lane links, backward compatible, and greatly supported by all modern operating systems, software, and drivers. This is why they are sizably adopted and continue to be considered in the data center, enterprise, and client PC markets.

PCIe - An Overview

PCIe is a standard interface for connecting high-speed peripheral hardware to the motherboard on a computer. It connects, for example, graphics and sound cards, Wi-Fi adapters, Ethernet and SSDs to the motherboard. PCIe slots available on your PC depends on the motherboard you have.

PCIe slots vary from x1, x4, x8, x16 & x32 physical configurations. The number after the x signifies the number of lanes that the PCIe slot has. For example, a PCIe x1 slot has one lane and can transmit data at one bit per cycle while a PCIe x2 slot has two lanes and can transmit data at two bits per cycle.

PCIe Generations Comparison

PCIe 4.0 debuted in 2017 and offers 64 GB/s of throughput and supports 16GT/s bit rate (about 2GB/s per single lane, compared to 8GT/s bit rate for PCIe 3.0 (1GB/s). It’s widely available for enterprise-grade servers but only became available for SSDs in 2019.

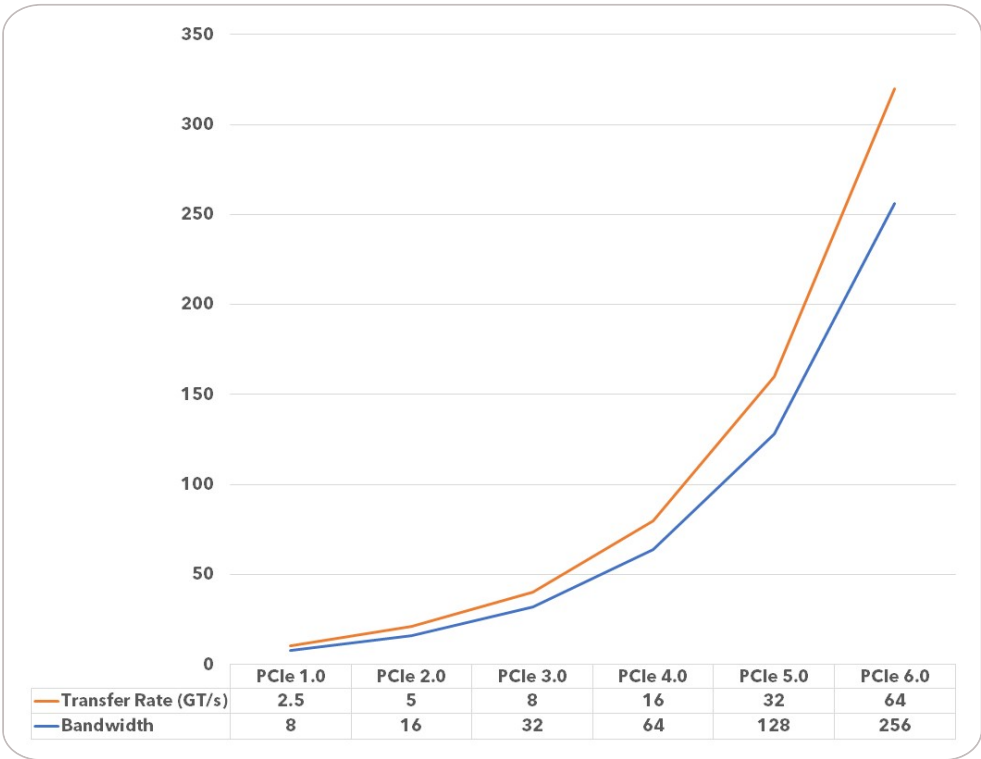


Image on the right shows the bandwidth and transfer rates of all PCIe generations.

PCIe in the Data Center

The continuing growth in cloud computing applications has compelled data centers to increase computing power by incorporating faster CPUs. Data centers have also adopted newer processing techniques with GPUs and accelerators to support applications such as machine learning, artificial intelligence, and deep learning workloads. These kinds of use-cases require higher performance processing coupled with higher performance storage, all with minimal latency – a paradigm that demands interconnect to maximize processing capabilities.

The adoption of next-generation NVMe™ storage technologies in data centers clearly benefits from the proliferation of PCIe 4.0. NVMe is a non-volatile memory interface standard that utilizes PCIe interfaces for SSDs.

Meanwhile, with the impending saturation of existing PCIe Gen 3.0 interfaces ushered in by emerging NVMe storage technologies and applications, PCIe Gen 4.0 and future generations will significantly alleviate bandwidth roadblocks and potentially deliver better performances.

What the Future Looks Like for PCIe

PCI-SIG®, (Peripheral Component Interconnect Special Interest Group), the industry consortium governing PCIe, has been working on the release of the PCIe 5.0 specification. PCI-SIG has also developed a cabled technology called OCuLink to connect PCIe devices, thereby offering new out-of-the-box compute and storage use-cases. With these innovations, PCIe's undeniable significance to the compute and storage infrastructure has determined its role in the data center of the future.

*A recent study by Forward Insight on the Total PCIe market trend shows a **23%** average annual growth rate from \$8B in 2020 to \$18.5B in 2024*

SATA dropped from \$4B in 2020 to \$1.5B in 2024.

Want to get more details on the current market trends on Enterprise SSDs? [Send us a note.](#)

PCI Express 5.0 is the next generation of I/O performance for workstations and servers alike. At 32GT/s, it doubles

the throughput of Gen 4.0 based technologies. This much speed acceleration is critical in powering new AI/ML and cloud applications and workloads. AI applications creates and processes colossal amounts of data. A smart car, for example can generate up to 4TB of data per day!

PCI-SIG is aiming to complete PCIe 6.0 by 2021. Considering its average 12-month adoption period, we can expect PCIe 6.0 available by 2022.

Our PCIe Gen 4 SSD Solutions

Solid State Storage Technology Corp. offers a range of customizable PCIe Gen 4 SSD solutions that cater to the client and enterprise markets; supporting various applications such as High-Performance Computing (HPC), Cloud Gaming, Big Data Analytics, Media Streaming, OLTP, SQL Logging, and Storage to name a few. Below is a snapshot of our Gen 4 Solutions.

EJ3 Series | Enterprise SSD

- U.2 Form Factor
- Power Loss Protection
- Single and Dual Port options
- SRIOV 128VFS
- T10 DIF
- Secure Boot
- Hot-Pluggable



CA6 Series | Client SSD

- Slim form factor— M.2 2280
- Random read/write up to 1000K/1000K IOPS
- Low latency
- LDPC technology



Storage Technology Corp. representative for details.



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