Understanding NVM and SSD Technology

**NVMe (Non-Volatile Memory Express)** is a communications interface and driver that defines a command set and feature set for PCIe-based SSDs with the goals of increased and efficient performance and interoperability on a broad range of enterprise and client systems. NVMe was designed specifically for SSDs, it communicates between the storage interface and the System CPU using high-speed PCIe sockets, independent of storage form factor.

Input/Output tasks performed using NVMe drivers begin faster, transfer more data, and finish faster than older storage models using older drivers, such as AHCI (Advanced Host Controller Interface). Because it was designed specifically for SSDs, NVMe is becoming the new industry standard.

**NVMe Input/Output Operations per Second** exceeds 1 million and is up to 900% faster than its AHCI equivalent. NVMe cuts out the middle man by communicating directly with the System CPU. NVMe-based drives work with all major Operating Systems, regardless of form factor.

### Benefits of NVMe Technology
- **Optimal Performance**
- **Superior Storage**
- **Superior Speed**
- **Superior Compatibility**

**PCIe sockets transfer >25x more data than their SATA equivalent**

NVMe begins sending commands more than 2x faster than AHCI drivers.

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**Beyond the Numbers**

**SSDs**

<table>
<thead>
<tr>
<th>Form Factor</th>
<th>NVMe (6GB/s)</th>
<th>SATA (600MB/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.2</td>
<td>1000MB/s</td>
<td>600MB/s</td>
</tr>
<tr>
<td>2.5&quot;</td>
<td>1000MB/s</td>
<td>600MB/s</td>
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</tbody>
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**Communication Drivers**

Used by Operating Systems to communicate data with storage devices:

- **Spinning Disk technology**
  - Can only send 1 command per queue
  - High CPU cycles
  - 6 microseconds latency

- **Flash technology**
  - Can send up to 64K commands per queue
  - Low CPU cycles
  - 2.8 microseconds latency

**Optimal Performance**

- NVMe-based drives work with all major Operating Systems, regardless of form factor.
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**What Should You Know?**

**Storage: Then and Now**

**Data Buses:** Transport data within a system.

**SATA**

- **Transfers up to:**
  - 150MB/s (SATA I)
  - 300MB/s (SATA II)
  - 600MB/s (SATA III)

**PCIe**

- **Using 16 lanes, PCIe Gen 4 can transfer data at:**
  - 32,000MB/s
  - 1000MB/s (PCIe Gen 2)
  - 2000MB/s (PCIe Gen 3)
  - 4000MB/s (PCIe Gen 4)

Contact your local Kingston representative to find out which Kingston SSD drive is right for you.