IDC Innovators

IDC Innovators: NVMe/TCP, 2019

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IDC INNOVATORS IN NVME/TCP

There are multiple NVMe over Fabrics (NVMe-oF) host connection options available using different transports (Fibre Channel, Ethernet, InfiniBand), but to date, all these have required custom content on the server side (proprietary drivers, special host bus adapters). NVMe over Transmission Control Protocol (TCP) (NVMe/TCP) is a new NVMe-oF implementation that does *not* require custom content on the server side but still provides the performance benefits of NVMe-oF. It is the NVMe-oF version that IDC believes will ultimately enjoy the broadest adoption in the industry. For a broader discussion of the importance of NVMe-oF, see *IDC TechBrief: NVMe Over Fabrics* (IDC #US43854018, September 2018). NVMe-oF host connections are used on NVMe-based all-flash arrays (NAFAs).

IDC has identified three start-ups that are taking different approaches with their NVMe/TCP (and related NVMe-based systems) implementations, each of which offer customers different options. This IDC Innovators document reviews each of these three vendors, calling out the differentiation that their approach (and their products) provide to potential customers.

FIGURE 1

IDC Innovators in NVMe/TCP, 2019

IDC Innovators	IDC Innovators are emerging vendors with annual revenue <$100 million that have an innovative new technology or a groundbreaking business model.

NVMe over TCP

Company Name:	Founded:	Headquarters:
Lightbits Labs	2016	Kfar Saba, Israel
Excelero	2014	San Jose, California
Pavilion Data	2014	San Jose, California

Source: IDC, 2019

This document is an excerpt of the actual document, which is available on www.idc.com as IDC #US45088519, June 2019). In that document, this section includes a more detailed analysis of each of the three highlighted vendors (Lightbits Labs, Excelero and Pavilion Data) and their NVMe/TCP offerings.

TECHNOLOGY DEFINITION

NVMe is a new storage protocol, developed and optimized specifically for persistent solid-state storage, that delivers lower latencies, significantly greater throughput and bandwidth, and hugely greater parallelism than SCSI (a storage protocol that was developed specifically for hard disk drives [HDDs] nearly 40 years ago). Persistent solid state storage has come into wide use in the enterprise for general-purpose workloads, and the SCSI storage protocol was leaving a lot of the performance, capacity, and endurance potential of this new media type on the table. NVMe unlocks the full potential of persistent solid state storage (and in fact doesn't even support HDDs).

NVMe-oF enables the use of NAFAs over switched fabrics, a feature that allows high-performance storage systems based on NVMe to be efficiently shared across multiple hosts while equaling the latencies of server-based storage. This effectively creates an NVMe-based storage area network (SAN). Today, NVMe-oF connections can be based on Fibre Channel (FC), Ethernet (RDMA over Converged Ethernet [RoCE] or Internet Wide Area RDMA Protocol [iWARP]), or InfiniBand. When those customers with preexisting FC SANs move to NVMe-oF, they will often want to use the FC transport for NVMe-oF. Most newer applications being built are being connected to servers using Ethernet, so those customers will often be interested in one of the Ethernet options, and those few enterprise customers that already have InfiniBand networks in place may want to use the InfiniBand option (although InfiniBand is generally more of a massively parallel computing market play).

NVMe/TCP also uses the Ethernet transport, but it offers some significant differences. RoCE and iWARP both require custom HBAs and custom host-side drivers, but they support remote direct memory access (RDMA) for the absolute lowest latencies. NVMe/TCP supports NVMe over a switched fabric without the RDMA protocol support, but it supports latencies that are almost as low. Most importantly, it does not require custom HBAs or custom host-side drivers. This makes NVMe/TCP much cheaper to buy and easier to deploy and maintain than the RDMA-based options, and it is the NVMe-oF option that IDC predicts will quickly come to dominate the NVMe-oF market. NVMe/TCP also supports much larger switched networks than the RDMA-based versions, a feature of particular interest to customers with large web-scale infrastructures. It is the newest NVMe-oF protocol, however, and has just started to become available from vendors.

Persistent memory (PM) and storage-class memory (SCM) are two types of persistent storage devices built out of a new type of solid-state media that is faster than NAND flash but not as fast as dynamic random-access memory (DRAM). PM is accessed using a memory interface (DDR4/DDR5), whereas SCM is accessed over a block interface (like NVMe). The actual solid-state media in each of these device types may be the same (e.g., Intel Optane), but PM is faster because the memory interface is faster than the block interface. The NVMe block interface offers much better performance than the SCSI block interface though. For a more complete explanation of PM and SCM, see *IDC TechBrief: Persistent Memory and Storage-Class Memory* (IDC #US44891819, March 2019).

LEARN MORE

Related Research

- *IDC TechBrief: Persistent Memory and Storage-Class Memory* (IDC #US44891819, March 2019)
- *Enterprise NVMe Growth and Use Cases* (IDC #DR2019_BS2_EB, March 2019)
- *Enterprise NVMe Market Developing Quickly with Offerings from Start-Ups and Established Players Alike* (IDC #US44852719, February 2019)
- *IDC TechBrief: NVMe Over Fabric* (IDC #US43854018, September 2018)

Synopsis

IDC Innovators are emerging vendors with revenue <$100 million that have demonstrated either a groundbreaking business model or an innovative new technology – or both. This IDC Innovators study reviews three vendors, Lightbits Labs, Excelero, and Pavilion Data, calling out the differentiation that their approach (and their products) provides to potential customers. As digital transformation drives the need for higher storage performance, more customers are looking at NVMe and related technologies. When customers can deploy a shared storage solution that delivers the same latencies as local storage, there is a strong preference for it. This is because a shared storage environment offers easier scaling, higher capacity, better capacity utilization, and access to the types of enterprise-class data services typically only available in SAN-based solutions. For the most latency-sensitive customers, these shared storage solutions will be connected over an NVMe over Fabrics host connection. NVMe/TCP, a variant of this that is just starting to become available, will ultimately dominate the NVMe over Fabrics market because of several distinct advantages that are discussed in this document.

"Ease of management, simplified maintenance, and lower cost are the key advantages that will drive NVMe/TCP deployments in both enterprises and cloud service providers," said Eric Burgener, research vice president, Infrastructure Systems, Platforms, and Technologies. "This technology is just starting to become available now, but IDC expects to see very rapid adoption of it over the next two to three years."

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