The Benefits of NVMe™ & NVMe-oF™

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Debates over the value of Non-Volatile Memory Express (NVMe™) seem to have faded a fair bit. The features and benefits are coming into better focus and enterprise's interest in the potential of coercing every bit of performance (and value) out of their storage infrastructure is undeniable. However, whether we need another article on the subject is probably debatable. So, I am not going to go over all the technology on the topic, but instead provide a brief outline of the benefits of NVMe and NVMe over Fabrics.

Fibre Channel (FC) continues to be a trusted, secure, and reliable network infrastructure, especially for mission-critical storage applications. The use of FC over the last 20 years has proven not only its value, but also its ability to evolve alongside the rest of the datacenter. That is not to say that some of these changes have not dampened FC market revenues, because some have – like Cloud Storage and increased network attached storage (NAS) due to the exponential growth of unstructured data. However, some emerging trends are positives for FC, such as all-flash arrays and NVMe.

All-flash arrays are an important driver for the use of NVMe, as increased speed and performance on these arrays has created bottlenecks at other points in the network. The NAND-based flash in arrays today are non-volatile memory (NVM), or persistent in the retention of stored data even in a powered-off state, and the foundation for NVMe. Since NVMe is designed and optimized for NVM drives, it can take advantage of the increased read and write operations. NVMe also supports a greater number of queues, offers higher IOPs with fewer CPU instructions, reduces latency, and significantly increases overall performance. Also, since NVMe communicates over PCI Express (PCIe) transfer rate caps are considerably higher than SATA interfaces.

So, where does FC fit in this picture? Enter NVMe over Fabrics (NVMe-oF™). The NVMe-oF standard allows for the use of NVMe over a variety of network transports, extending optimized performance to external networked storage. While the NVMe-oF standard is transport agnostic, there are multiple reasons that FC will be the initial solution of choice. The network needs to be NVMe ready (which FC is), it needs to be capable of high-speed and low latency to support all-flash arrays, and it must be stable and reliable enough to ensure that the network transport doesn't, by its use, create new bottlenecks. Those requirements sound a lot like FC. Maybe most importantly, NVMe over FC would allow users, especially large enterprises, to leverage their existing storage infrastructure while they design, deploy, and optimize their storage applications with NVMe. Not having to tear down the existing network is always music to a CFO's ears. The fact that FC SANs are air-gapped is also a benefit in this scenario, since a dedicated storage network absent the pesky employees playing with their iPhones and Facebook, means fewer potential problems to troubleshoot.

Will NVMe over FC always be the network transport of choice? It is hard to imagine that Ethernet will ever go quietly into the night. So, I never count it out. The way to think about that from a market share perspective is to expect the growth to move towards the solutions with the best economics. Ethernet speeds and feeds (and their associated average selling prices) are likely to outpace FC at some point. Network and datacenter evolution will undoubtably continue and which transport that change favors is difficult to predict but it favoring Ethernet is likely. In the meantime, NVMe and NVMe-oF will benefit the FC market and make a case for additional bandwidth and new refreshes.