SSD Performance in Network Attached Storage Environments

Highlights

Network Attached Storage (NAS Devices) are common in home offices as well as small to medium sized businesses. It is only recently that performance has become just as important as capacity and with the addition of a WD Red solid-state drive (SSD) used for caching or in an all-flash array, users can see a significant improvement in performance, coupled with a seamless user experience at a nominal higher cost.

Solution

- Combining the best of SSD and HDD provides a cost-effective, high performance system
- Access large files in less time and improve IOPS through SSD caching
- Faster response time provides more seamless end-user experience

Storage Solutions for Modern NAS Demands

The recent growth in analytics-driven solutions for businesses is changing the workloads of storage devices. Small to medium-sized businesses have more users accessing a variety of files more frequently than before and the files become heavier with high definition video content, multimedia files or design files. Supporting all users while simultaneously accessing data in the background can push the limits of HDD performance. Whether you are working from home or editing a large company file, performing these operations on an SSD can be significantly faster. If you are creating video content, utilizing an SSD in a partial or full array can greatly improve the overall process of rendering files, as well as editing and upload times for others to access.

In addition, today's NAS systems often come with 10GbE (gigabit ethernet) which allows greater performance from the system, taking full advantage of all of the speed and capabilities of SSDs.

SSDs provide much faster access to data but since the price of an SSD can often be higher than the price of an HDD for the same amount of capacity, the system owner has to balance performance and cost. There are three common alternatives: single SSD cache storage, single SSD tiered storage, or all-SSD array.

WD Red SSD in NAS for Modern Storage Demands of Small to Medium-sized Businesses

There are two ways companies can incorporate SSDs into their NAS devices: one SSD can be introduced into the array that will serve as cache for the system or serve as storage for files most frequently used (hot data), alternatively the entire NAS device can be filled with SSDs creating what is known as an all-SSD or all-flash array.

SSD as Cache or Tiered Storage

Adding just one SSD drive to a NAS device maintains high storage density while meeting the performance needs of the users for less than a few hundred dollars, a nominal price increase for a business. The cache, which serves as temporary storage of files that are accessed frequently, can significantly improve performance of the system as SSDs significantly outperform traditional HDDs. Many modern NAS devices also have tiered storage where the most frequently used data is kept on the SSD so it is readily available to users reducing loading time of the files.

All-SSD Array

If maximum performance of a NAS device is of utmost importance to a company, then the entire array can be filled with SSDs. While this may be more expensive, it maximizes the performance of the system since all data will be stored and accessed from SSDs so all information is readily available to all users.

Choosing the Right SSD

SSDs are available in different levels of performance, reliability, endurance, temperature range, warranty terms and price points. Different NAS vendors offer configuration and aftermarket alternatives to meet the different customer requirements. The WD Red SSD has been designed and optimized specifically to be used in NAS devices to achieve improved performance, high reliability and endurance to increase system response time and cache uptime.

Summary

There are three options for incorporating SSDs into a NAS device (caching, tiered storage, all-SSD array), each of which offers different benefits. The addition of one or two SSDs opens the possibility for SSD caching. Whether the SSD is used for tiered storage to maintain the hot data on the SSD or used for caching purposes, it will significantly improve performance for small to medium-sized businesses at little cost. The tiered storage option will help maintain the high storage density of the NAS with the HDDs while still recognizing a performance increase from the SSD. Alternatively, companies and users can opt to fill the entire array with SSDs to maximize performance if this is the primary concern.

Western Digital has designed the WD Red product line specifically to meet the workloads and requirements of NAS devices. For years, we have been manufacturing and selling various HDDs for this space, and in the fall of 2019, we expanded our portfolio to include our first WD Red SSD to provide benefits to users as outlined above in this document.

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