iXsystems FreeNAS Mini XL+ and Mini E Expand the Reach of Open Source Storage to Small Offices

On July 25, 2019, iXsystems® announced two new storage systems. The **FreeNAS® Mini XL+** provides a new top-end model in the FreeNAS Mini product line, and the **FreeNAS Mini E** provides a new entry-level model. These servers are mini-sized yet provide professional-grade network-attached storage.

FreeNAS Minis are Professional-grade and Whisper Quiet

Source: iXsystems

The FreeNAS Mini XL+ and Mini E incorporate technologies normally associated with enterprise servers, such as ECC memory, out-of-band management, and NAS-grade hard drives. Both are engineered for and powered by the widely adopted ZFS-based FreeNAS Open Source storage OS. Thus, the Mini XL+ and Mini E provide file, block, and S3 object storage to meet

nearly any SOHO/SMB storage requirement.

Early in my IT career, I purchased a tower server that was marketed to small businesses as a convenient under-desk solution. The noise and heat generated by this server quickly helped me understand why so many small business servers were running in closets. The FreeNAS Mini is not this kind of server.

All FreeNAS Mini models are designed to share space with people. They are compact and “whisper quiet” for use in offices and homes. They are also power-efficient, drawing a maximum of 56 to 106 Watts for the Mini E and Mini XL+, respectively.

Next-Generation Technology Powers Up the FreeNAS Mini XL+ and Mini E

The Mini XL+ and E bring multiple technology upgrades to the FreeNAS Mini platform. These include:

- Intel Atom C3000 Series CPUs
- DDR4 ECC DRAM
- +1 2.5” Hot-swappable Bay (Mini XL+)
- PCI Express 3.0 (Mini XL+)
- IPMI iKVM (HTML5-based)
- USB 3.0
- Standard Dual 10 Gb Ethernet Ports (Mini XL+)
- Quad 1 Gb Ethernet Ports (Mini E)

FreeNAS Mini is a Multifunction Solution

FreeNAS Mini products are well-equipped to compete against other small form factor NAS appliances; and perhaps even tower servers because of their ability to run network applications directly on the storage appliance.

Indeed, the combination of more powerful hardware, application

plug-ins, and the ability to run hypervisor or containerized applications directly on the storage appliance makes the FreeNAS Mini a multi-function SOHO/ROBO solution.

FreeNAS plugins are based on pre-configured FreeBSD containers called jails that are simple to install. iXsystems refers to these plugins as “Network Application Services”. The plugins are available across all TrueNAS® and FreeNAS products, including the new FreeNAS Mini E and XL+.

The available plugins include quality commercial and open source applications covering a range of use cases, including:

- Backup (Asigra)
- Collaboration (NextCloud)
- DevOps (GitLab)
- Entertainment (Plex)
- Hybrid cloud media management (Iconik)
- Security (ClamAV)
- Surveillance video (ZoneMinder)

FreeNAS Mini Addresses Many Use Cases

The FreeNAS Mini XL+ and Mini E expand the range of use cases for the FreeNAS product line.

Remote, branch or home office. The FreeNAS Mini creates value for any business that needs professional-grade storage. It will be especially appealing to organizations that need to provide reliable storage across multiple locations. The Mini’s combination of a dedicated management port, IPMI, and TrueCommand management software enables comprehensive remote monitoring and management of multiple Minis.

FreeNAS Mini support for S3 object storage includes bidirectional file sync with popular cloud storage services and private S3 storage. This enables low-latency local file access with off-site data protection for home and branch offices.

Organizations can also deploy and manage FreeNAS systems at the edge and use TrueNAS systems where enterprise-class support and HA are required. Indeed, iXsystems has many clients that deploy both TrueNAS and FreeNAS. In doing so, they gain the benefit of a single storage operating environment across all their locations, all of which can be managed centrally via TrueCommand.

Managed Service Provider. TrueCommand and IPMI also enable managed service providers (MSPs) to cost-effectively manage a whole fleet of FreeNAS or TrueNAS systems across their entire client base. TrueCommand enables role-based access controls, allowing MSPs to assign systems into teams broken down by separate clients and admins..

Bulk data transfer. FreeNAS provides robust replication options, but sometimes the fastest way to move large amounts of data is to physically ship it from site to site. Customers can use the Mini XL+ to rapidly ingest, store, and transfer over 70 TB of data.

Convenient Purchase of Preconfigured or Custom Configurations

iXsystems has increased the appeal of the FreeNAS Mini by offering multiple self-service purchasing options. It offers a straightforward online ordering tool that allows the purchaser to configure and purchase any of the FreeNAS Mini products directly from iXsystems. iXsystems also makes preconfigured systems available for rapid ordering and delivery via Amazon Prime. Either method enables purchase with a minimal amount of fuss and a maximum amount of confidence.

Thoughtfully Committed to Expanding the Reach of Open Source Storage

Individuals and businesses that purchase the new FreeNAS Mini

XL+ or Mini E are doing more than simply acquiring high-quality storage systems for themselves. They are also supporting the ongoing development of Open Source projects such as FreeBSD and OpenZFS.

iXsystems has decades of expertise in system design and development of Open Source software including FreeNAS, FreeBSD, OpenZFS, and TrueOS®. Its recent advances in GUI-based management for simplified operations are making sophisticated Open Source technology more comfortable to non-technical users.

iXsystems has thoughtfully engineered the FreeNAS Mini E and XL+ for FreeNAS, the world's most widely deployed Open Source storage software. In doing so, they have created high-quality storage systems that offer much more than just NAS storage. Quietly. Affordably.

For a thorough hands-on technical review of the FreeNAS Mini XL+, see this article on ServetheHome.

Additional product information, including detailed specifications and documentation, is available on the iXsystems FreeNAS Mini product page.

TrueNAS Plugins Converge Services for Simple Hybrid Cloud Enablement

iXsystems is taking simplified service delivery to a new level by enabling a curated set of third-party services to run directly on its TrueNAS arrays. TrueNAS already provided

multi-protocol unified storage to include file, block and S3-compatible object storage. Now preconfigured plugins converge additional services onto TrueNAS for simple hybrid cloud enablement.

TrueNAS Technology Provides a Robust Foundation for Hybrid Cloud Functionality

iXsystems is known for enterprise-class storage software and rock-solid storage hardware. This foundation lets iXsystems customers run select third-party applications as plugins directly on the storage arrays—whether TrueNAS, FreeNAS Mini or FreeNAS Certified. Several of these plugins dramatically simplify the deployment of hybrid public and private clouds.

How it Works

iXsystems works with select technology partners to preconfigure their solutions to run on TrueNAS using FreeBSD jails, iocage plugins, and bhyve virtual machines. By collaborating with these technology partners, iXsystems enables rapid IT service delivery and drives down the total cost of technology infrastructure. The flexibility to extend TrueNAS functionality via these plugins transforms the appliances into complete solutions that streamline common workflows.

Benefits of Curated Third-party Service Plugins

There are many advantages to this pre-integrated plugin approach:

- Plugins are preconfigured for optimal operation on TrueNAS
- Services can be added any time through the web interface
- Simply turn it on, download the plugin and enter the associated login credentials
- Plugins eliminate network latency by moving processing to the storage array

- Third party applications can be run in a virtual machine without purchasing separate server hardware

Hybrid Cloud Data Protection

The integrated Asigra Cloud Backup software protects cloud, physical, and virtual environments. It is an enterprise-class backup solution that uniquely helps prevent malware from compromising backups. Asigra embeds cybersecurity software in its Cloud Backup software. It goes the extra mile to protect backup repositories, ensuring businesses can recover from malware attacks in their production environments.

Asigra is also one of the only enterprise backup solutions that offers agentless backup support across all types of environments: cloud, physical, and virtual. This flexibility makes adopting and deploying Asigra Cloud Backup easy with zero disruption to clients and servers. The integration of Asigra with TrueNAS is Storage Magazine's Backup Product of the year for 2018.

Hybrid Cloud Media Management

TrueNAS arrays from iXsystems are heavily used in the media and entertainment industry, including several major film and television studios. iXsystems storage accelerates workflows with any device file sharing, multi-tier caching technology, and the latest interconnect technologies on the marketplace. iXsystems recently announced a partnership with Cantemo to integrate its iconik software.

iconik is a hybrid cloud-based video and content management hub. Its main purpose is managing processes including ingestion, annotation, cataloging, collaboration, storage, retrieval, and distribution of digital assets. The main strength of the product is the support for managing metadata and transcoding of audio, video, and image files, but can store essentially all file formats. Users can choose to keep large original files on-premise yet still view and access the

entire library in the cloud using proxy versions where required.

The Cantemo solutions are used to manage media across the entire asset lifecycle, from ingest to archive. iconik is used across a variety of industries including Fortune 500 IT companies, advertising agencies, broadcasters, houses of worship, and media production houses. Cantemo's clients include BBC Worldwide, Nike, Madison Square Garden, The Daily Telegraph, The Guardian and many other leading media companies.

Enabling iconik on TrueNAS streamlines multimedia workflows and increases productivity for iXsystems customers who choose to enable the Cantemo service.

Cloud Sync

Both Asigra and Cantemo include hybrid cloud data management capabilities within their feature sets. iXsystems also supports file synchronization with many business-oriented and personal public cloud storage services. These enable staff to be productive anywhere—whether working with files locally or in the cloud.

Supported public cloud providers include Amazon Cloud Drive, Amazon S3, Backblaze B2, Box, Dropbox, Google Cloud Storage, Google Drive, Hubic, Mega, Microsoft Azure Blob Storage, Microsoft OneDrive, pCloud and Yandex. The Cloud Sync tool also supports file sync via SFTP and WebDAV.

More Technology Partnerships Planned

According to iXsystems, they will extend TrueNAS pre-integration to more technology partners where such partnerships provide win-win benefits for all involved. This intelligent strategy allows iXsystems to focus on enhancing core TrueNAS storage services, and it enables TrueNAS customers to quickly and confidently implement best-of-breed

applications directly on their TrueNAS arrays.

All TrueNAS Owners Benefit

TrueNAS plugins provide a simple and flexible way for all iXsystems customers to add sophisticated hybrid-cloud media management and data protection services to their IT environments. Existing TrueNAS customers can gain the benefits of this plugin capability by updating to the most recent version of the TrueNAS software.

TrueNAS M-Series Turns Tech Buzz into Music

NVMe and other advances in non-volatile memory technology are generating a lot of buzz in the enterprise technology industry, and rightly so. As providers integrate these technologies into storage systems, they are closing the gap between the dramatic advances in processing power and the performance of the storage systems that support them. The TrueNAS M-Series from iXsystems provides an excellent example of what can be achieved when these technologies are thoughtfully integrated into a storage system.

DCIG Quick Look

In the process of refreshing its research on enterprise midrange arrays, DCIG discovered that the iXsystems TrueNAS M-Series all-flash and hybrid storage arrays leverage many of

the latest technologies, including:

- Intel® Xeon® Scalable Family Processors

- Large DRAM caches
- NVDIMMs
- NVMe SSDs
- Flash memory
- High-capacity hard disk drives

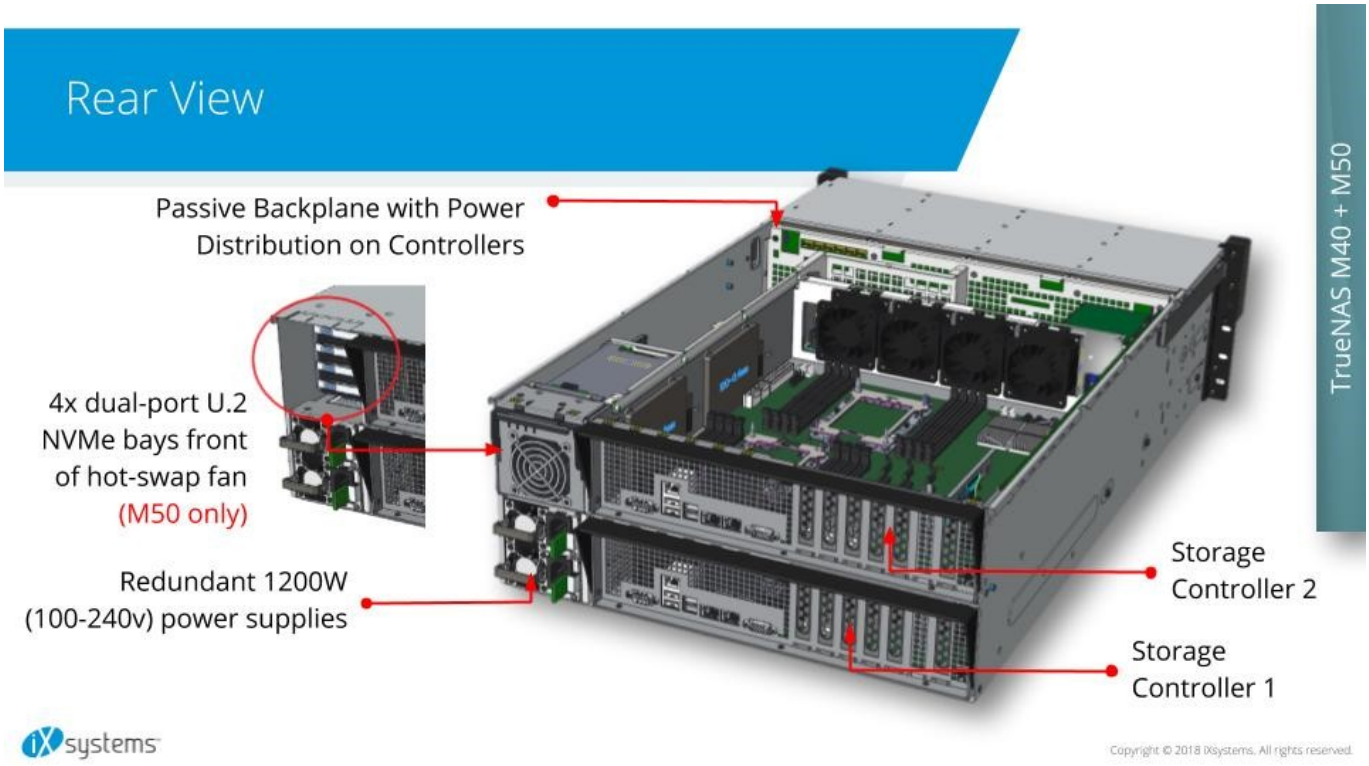
The TrueNAS M-Series lineup comprises two models: the M40 and the M50. The M40 is lower entry cost, scalable to 2 PB, and includes 40 GbE connectivity with SAS SSD caching. The M50 scales to 10 PB and adds 100 GbE connectivity with NVMe-based caching.

Both models come standard with redundant storage controllers for high-availability and 24×7 service. Though single-controller configurations are available for less critical applications.

Advanced Technologies in Perfect Harmony

DCIG analysts are impressed with the way iXsystems engineers have orchestrated the latest technologies in the M50 storage array, achieving maximum end-to-end cost-efficient performance.

The M50 marries 40 Intel® Xeon® Scalable Family Processor cores with up to 3 TB of DRAM, a 32 GB NVDIMM write cache and 15.2 TB of NVMe SSD read-cache in front of up to 10 PB of hard disk storage. (The M-Series can also be configured as an all-flash array.) Moreover, iXsystems attaches each storage expansion shelf directly to each controller via 12 Gb SAS ports. This approach adds back end throughput to the storage system as each shelf is added.



iXsystems TrueNAS M50

This well-balanced approach carries through to front-end connectivity. The M50 supports the latest advances in high-speed networking, including up to 4 ports of 40/100 Gb Ethernet and 16/32 Gb Fibre Channel connectivity per controller.

TrueNAS is Enterprise Open Source

TrueNAS is built on BSD and ZFS Open Source technology. iXsystems is uniquely positioned to support the full Open Source stack behind TrueNAS. It has developers and expertise in the operating system, file systems and NAS software.

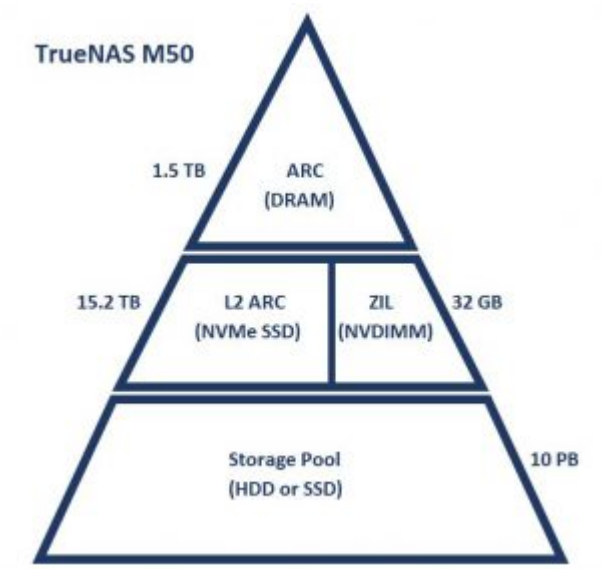
iXsystems also stewards the popular (>10 million downloads) FreeNAS software-defined storage platform. Among other things, FreeNAS functions as the experimental feature and QA testbed for TrueNAS. TrueNAS can even replicate data to and from FreeNAS. Thus, TrueNAS owners benefit from the huge ZFS and FreeNAS Open Source ecosystems.

NVM Advances are in Tune with the TrueNAS Architecture

The recent advances in non-volatile memory are a perfect fit with the TrueNAS architecture.

Geeking out just a bit…

ZFS uses DRAM as a read cache to accelerate read operations. This primary read cache is called the ARC. ZFS also supports a secondary read cache called L2ARC. The M50 can use much of the 1.5 TB of DRAM in each storage controller for the ARC, and combine it with up to 15.2 TB of NVMe-based L2ARC to provide a huge low-latency read cache that offers up to 8 GB/s throughput.



The ZFS Intent Log (ZIL) is where all data to be written is initially stored. These writes are later flushed to disk. The M50 uses NVDIMMs for the ZIL write cache. The NVDIMMs safely provide near-DRAM-speed write caching. This enables the array to quickly acknowledge writes on the front end while efficiently coalescing many random writes into sequential disk operations on the back end.

Broad Protocol Support Enables Many Uses

TrueNAS supports AFP, SMB, NFS, iSCSI and FC protocols plus S3-compliant object storage. It also offers Asigra backup as an integrated service that runs natively on the array. This broad protocol support enables the M50 to cost-effectively provide high performance storage for:

- File sharing
- Virtual machine storage

- Cloud-native apps
- Backup target

All-inclusive Licensing Adds Value

TrueNAS software licensing is all-inclusive; with unlimited snapshots, clones and replication. Thus, there are no add-on license fees to negotiate and no additional PO’s to wait for. This reduces costs, promotes full utilization of the extensive capabilities of the TrueNAS M-Series and increases business agility.

TrueNAS M50 Turns Tech Buzz into Music

The TrueNAS M50 integrates multiple buzz-worthy technologies to deliver large amounts of low-latency storage. The M50 accelerates a broad range of workloads—safely and economically. Speaking of economics, according to the iXsystems web site, TrueNAS storage can be expanded for less than $100/TB. That should be music to the ears of business people everywhere.

Two Hot Technologies to Consider for Your 2019 Budgets

Hard to believe but the first day of autumn is just two days away and with fall weather always comes cooler temperatures (*which I happen to enjoy!*) This means people are staying inside a little more and doing those fun, end of year activities that everyone enjoys – such as planning their 2019 budgets. As you do so, solutions from BackupAssist and StorMagic are two hot new technologies for companies to consider making room for in the New Year.

BackupAssist 365.

BackupAssist 365 backs up files and emails stored in the cloud. While backup of cloud-based data may seem rather ho-hum in today's artificial intelligent, block chain obsessed, digital transformation focused world, it solves a real world that nearly every size organization faces: how to ***cost-effectively*** and ***simply*** protect all those pesky files and emails that people store in cloud applications such as DropBox, Office 365, Google Drive, OneDrive, Gmail, Outlook and others.

To do so, BackupAssist 365 adopted two innovative yet practical approaches to protect files and emails.

- First, it interfaces directly with these various cloud providers to backup this data. Using your login permissions (*which you provide when configuring the software,*) BackupAssist 365 accesses data directly in the cloud. This negates the need for your server, PC, or laptop to be turned on when these backups occur so backups can occur at any time.
- Second, it does ***cloud-to-local*** In other words, rather

than running up more data transfer and network costs that come with backing up to another cloud, it backs the data backup to local storage on your site. While that may seem a little odd in today's cloud-centric world, companies can get a great deal of storage capacity for nominal amounts of money. Since it only does an initial full backup and then differential backups thereafter, the ongoing data transfer costs are nominal and the amount of storage capacity that one should need onsite equally small.

LICENSING	
USERS	**Per user per month (USD)**
First 24 Users	$1.00
25-49 Users	$0.95
50+	$0.90

Perhaps the best part about BackupAssist 365 is its cost (*or lack thereof.*) BackupAssist 365 licenses its software on a per user basis with each user email account counting as one user license. However, this one email account covers the backup of that user's data in any cloud service used by that user. Further, the cost is only $1/month per user with a decreasing cost for greater number of users. In fact, the cost is so low on a per user basis, companies may not even need to budget for this service. They can just start using it and expense their credit cards to keep it below corporate radar screens.

StorMagic SvSAN

The StorMagic SvSAN touches on another two hot technology trends that I purposefully (*or not so purposefully*) left out above: hyperconverged infrastructure or HCI and edge

computing. However, unlike many of the HCI and edge computing plays in the marketplace such as Cisco HyperFlex, Dell EMC VxRail, and Nutanix, StorMagic has not forgotten about cost constraints that branch, remote, and small offices face.

As Cisco, Dell EMC, Nutanix and others chase the large enterprise data center opportunities, they often leave remote, branch, and small offices with two choices: pay up or find another solution. Many of these size offices are opting to find alternative solutions.

This is where StorMagic primarily plays. For a less well-known player, they play much bigger than they may first appear. Through partnerships with large providers such as Cisco and Lenovo among others, StorMagic comes to market with highly available, two-server systems that scale across dozens, hundreds, or even thousands of remote sites. To get a sense of StorMagic's scalability, walk into any of the 2,000+ Home Depots in the United States or Mexico and ask to look at the computer system that hosts their compute and storage. If the Home Depot lets you and you can find it, you will find a StorMagic system running somewhere in the store.

The other big challenge that each StorMagic system also addresses is security. Because their systems can be deployed almost anywhere in any environment, it does make them susceptible to theft. In fact, in talking to one of its representatives, he shared a story where someone drove a forklift through the side of a building and stole a computer system at one of its customer sites. Not that it mattered. To counter these types of threats, StorMagic encrypts all the data on its HCI solutions with its own software that is FIPS 140-2 compliant.

Best of all, to get these capabilities, companies do not have to break the bank to acquire one of these systems. The list price for the Standard Edition of the SvSAN software, which includes 2TB of usable storage, high availability, and remote

management, is $2,500.

As companies look ahead and plan their 2019 budgets, they need to take care of their operational requirements but they may also want to dip their toes in the water to get the latest and greatest technologies. These two technologies give companies the opportunities to do both. Using BackupAssist 365, companies can quickly and easily address their pesky cloud file and email backup challenges while StorMagic gives them the opportunity to affordably and safely explore the HCI and edge computing waters.

Get Ready for More Features and Still Lower All-flash Array Storage Prices

While the overall economy and even the broader technology sector largely boom, the enterprise storage space is feeling the pinch. As storage revenues level off and even drop, many people with whom I spoke at this past week's HPE Discover 2017 event shared their thoughts as to what is causing this situation. The short answer: there does not appear to be a single reason for the pullback in storage revenue but rather a perfect storm of events that is contributing to this situation. The good news is that this retrenching should ultimately benefit end-users.

I had a chance to stop by the HPE Discover 2017 event this past week in Las Vegas to catch up with many of the individuals in the industry that I know to get their "boots-on-the-ground" perspective on what they are hearing and seeing. Here are some of the thoughts they had to share:

1. ***Too many all-flash storage players.*** The number of companies selling enterprise flash storage products is staggering. Aside from the "*big*" names in the technology space such as Dell EMC, HDS, HPE, IBM, and NetApp offering flash storage solutions, there are many others including Tegile, Kaminario, Pure Storage, iXsystems, StorTrends, Fujitsu, NEC, Nimbus Data, Tintri, and Nexsan, just to name a few. Further, that list does not include the ones that were recently acquired (Nimble Storage and Solidfire) nor does it fully take into account the multiple lines of all-flash arrays from the big technology players. For example, HPE has all-flash arrays in its XP, 3PAR StoreServ, StoreVirtual, Nimble Storage and MSA product lines.
2. ***A race to the bottom.*** This much competition with so many product lines inevitably leads to price erosion. The cloud storage market (Amazon S3, Google Drive, Microsoft Azure) are not the only ones experiencing the race to the bottom in the per GB pricing model. This number of all-flash array competitors is causing similar downward pricing pressure in all-flash arrays.
3. ***Inability to differentiate.*** Keeping track of the large number of vendors coupled with the large number of all-flash array models can challenge even the most astute technologist. Now try to explain how they differ and what advantages that one offers over the other. For instance, I was uncertain as to exactly why HPE was so interested in acquiring Nimble Storage when it already had multiple storage lines. Turns out, it was Nimble's Infosight technology, its advanced integration with Docker, and its Cloud Volumes feature that piqued HPE's interest in acquiring Nimble Storage. Now HPE just needs to communicate those differentiators to the market place and adopt that technology across its other product lines.
4. ***Growth of hyperconverged infrastructure and software-defined storage technologies.*** One of the more difficult

factors to measure is to what degree hyperconverged infrastructure and software-defined storage solutions are impacting traditional storage sales. Even now, storage vendors tell me that they rarely encounter vendors of these products in their sales process. However, as these technologies get a foothold in organizations and take root, are they robbing storage vendors of future storage sales? My gut tells me yes but this is largely anecdotal evidence.

The primary factor working against lower all-flash arrays prices is a tight supply of flash. While not cited as a major contributor, individuals did share with me that some storage shipments have slipped due to tight supplies of flash. As such, product sales that vendors expected to make in a specific quarter get pushed out due to the unavailability or late deliveries of flash components. These same individuals stress that they are working with their suppliers to get this situation corrected and no one cited any specific supplier as the cause of the problem (*possibly because they want to stay on their good side.*) However, the fact that I heard this as a contributing factor to the storage sales slowdown from multiple sources seems to suggest that until suppliers increase their flash production levels, it may negatively impact their enterprise storage sales and cause higher prices for end-users.

This combination of factors among others is having a cumulative effect of slowing storage sales and eroding prices. However, end-users may and probably should view these factors as huge positives and ultimately working in their favor. While they may not relish the confusion and the time it takes to sort through products to find the right all-flash array for them nor delays in receiving products they order, those that take the time to compare products and get competitive bids will likely be able to obtain a model that very closes matches their needs and get it at a price that meets or comes in below

budget.

DCIG 2016-17 Midrange Unified Storage Array Buyer's Guide Now Available

DCIG is pleased to announce the availability of the *DCIG 2016-17 Midrange Unified Storage Array Buyer's Guide* developed from the enterprise storage array body of research.

The *DCIG 2016-17 Midrange Unified Storage Array Buyer's Guide* weights, scores and ranks more than 100 features of twenty-three (23) products from eight (8) different storage vendors. Using ranking categories of *Best-in-Class*, *Recommended* and *Excellent*, this Buyer's Guide offers much of the information an organization should need to make a highly informed decision as to which high end storage array will suit their needs.

Each array included in the *DCIG 2016-17 Midrange Unified Storage Array Buyer's Guide* had to meet the following criteria:

- Must be available as an appliance that includes its own hardware and software
- Must support one or more block-based (SAN) storage protocols: Fibre Channel, FCoE, or iSCSI
- Must support one or more file-based (NAS) storage protocols: CIFS/SMB or NFS protocols
- Must support scaling to at least two controllers
- Must be formally announced and/or generally available for purchase as of July 1, 2016

DCIG's succinct analysis provides insight into the state of the midrange unified storage array marketplace. The Buyer's Guide identifies the specific benefits organizations can expect to achieve using a midrange unified storage array and key features organizations should be aware of as they evaluate products. It also provides brief observations about the distinctive features of each product. Ranking tables enable organizations to get an "at-a-glance" overview of the products; while DCIG's standardized one-page data sheets facilitate side-by-side comparisons assisting organizations to quickly create a short list of products that may meet their requirements.

End users registering to access this report via the DCIG Analysis Portal also gain access to the DCIG Interactive Buyer's Guide (IBG). The IBG enables organizations take the next step in the product selection process by generating custom reports, including comprehensive side-by-side feature comparisons of the products in which the organization is most interested.

DCIG 2016-17 High End Storage Array Buyers Guide Now Available

DCIG is pleased to announce the availability of the *DCIG 2016-17 High End Storage Array Buyer's Guide* developed from the enterprise storage array body of research. Other Buyer's Guide Editions based on this body of research will be published in the coming weeks and months, including the *2016-17 Midrange Unified Storage Array Buyer's Guide*.

The *DCIG 2016-17 High End Storage Array Buyer's Guide* weights, scores and ranks more than 100 features of fifteen (15) products from seven (7) different storage vendors. Using ranking categories of Best-in-Class, Recommended and Excellent, this Buyer's Guide offers much of the information an organization should need to make a highly informed decision as to which high end storage array will suit their needs.

Each array included in the *DCIG 2016-17 High End Storage Array Buyer's Guide* had to meet the following criteria:

- Be identified by the vendor as a high end storage array
- Support multiple controllers in an Active-Active configuration
- Be intended for the storage of production data (as opposed to archive or backup data)
- Provide synchronous replication for non-disruptive operations across two or more physical locations
- Have the ability to either scale-out or scale-up to at least 3 PB of raw capacity
- Provide sufficient information for DCIG to draw a meaningful conclusion
- Must be formally announced and/or generally available for purchase as of September 1, 2016

DCIG's succinct analysis provides insight into the state of the high end storage array marketplace. The Buyer's Guide identifies the specific benefits organizations can expect to achieve using a high end storage array and key features organizations should be aware of as they evaluate products. It also provides brief observations about the distinctive features of each product. Ranking tables enable organizations to get an "at-a-glance" overview of the products; while DCIG's standardized one-page data sheets facilitate side-by-side comparisons assisting organizations to quickly create a short list of products that may meet their requirements.

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DCIG 2016-17 Midmarket Enterprise Storage Array Buyer’s Guide Now Available

Since 2010, DCIG Buyer’s Guides have been helping organizations make better technology purchasing decisions, faster. DCIG Buyer’s Guides drive time, and therefore cost, out of the technology selection process by helping enterprise technology purchasers understand key product considerations and by giving them access to normalized comparative feature data. This enables technology purchasers to quickly identify a short list of products that possess the features required by the organization and then focus their evaluation efforts on the short-listed products.

DCIG’s analysts do the leg work for enterprise technology purchasers by:

- Identifying a common technology need with many competing solutions but with little comparative data available to technology purchasers
- Scanning the environment to identify available products in the marketplace
- Gathering normalized data about the features each product supports
- Providing an objective, third-party evaluation of those

features from an end-user perspective
- Describing key product considerations and important changes in the marketplace
- Presenting DCIG's opinions and product feature data in a way that facilitates rapid feature-based comparisons

DCIG recently adopted a Body of Research approach that enables DCIG to be much more responsive to changes in the marketplace. In DCIG's original approach, developing a particular buyer's guide frequently required 9 months from identification of the need to publication of the buyer's guide. Using DCIG's updated body of research methodology, DCIG can produce a specific Buyer's Guide Edition within two months of identifying the need.

By researching an extensive range of products and consolidating the collected data into a single topic-based data repository, DCIG has the flexibility to quickly and effectively analyze that data based on a wide variety of use cases. These use cases may be the traditional classifications based on features such as protocol support and scalability, or any set of features that define an emerging marketplace such as a specific application certification.

DCIG recently completed the first phase of its Enterprise Storage Array Body of Research. This body of research includes more than 130 products from more than 20 vendors. In order to keep this first phase of the research to a manageable scope, DCIG used the following inclusion and exclusion criteria:

- Must be available as an appliance that includes its own hardware and software
- Must be a traditional or hybrid array (the vendor must support a configuration that includes hard disk drives)
- Must support a dual, redundant controller configuration
- Must not be marketed as scale-out NAS
- Must not be marketed as an all-flash array

Scale-out NAS and all-flash arrays are certainly enterprise storage arrays, and overlap in many ways with products in this body of research. The second phase of DCIG's enterprise storage array research will add these products to the DCIG Enterprise Storage Array Body of Research by the end of 2016.

DCIG is pleased to announce the availability of the *DCIG 2016-17 Midmarket Enterprise Storage Array Buyer's Guide* as the first Buyer's Guide Edition developed from this body of research. Other Buyer's Guides based on this body of research will be published in the coming weeks and months, including the *2016-17 Midrange Unified Storage Array Buyer's Guide* and the *2016-17 High End Storage Array Buyer's Guide*.

The *DCIG 2016-17 Midmarket Enterprise Storage Array Buyer's Guide* includes seventeen (17) storage arrays from the following ten (10) storage providers (in alphabetical order): AMI, Dell, EMC, Fujitsu, HPE, iXsystems, Nimble Storage, Pivot3, Seagate and Tegile. To identify products likely to be of greatest interest to midmarket organizations, DCIG evaluated arrays with a maximum raw storage of 500TB.

The arrays that met DCIG's inclusion requirements and achieved a ranking of *Good*, *Excellent* or *Recommended* are included in this Buyer's Guide. Most of the arrays are the "Lite" version in a series of products. The included products generally provide all of the features of other products in the series, but at a smaller scale and lower cost.

Like all prior DCIG Buyer's Guides, the *DCIG 2016-17 Midmarket Enterprise Storage Array Buyer's Guide* does the heavy lifting for organizations as they look to purchase a midmarket enterprise storage array by:

- Delineating the storage array features that are supported
- Weighting these features according to what end users consider most important
- Ranking each product
- Creating a standardized one-page data sheet for each product

The end result is that the *DCIG 2016-17 Midmarket Enterprise Storage Array Buyer's Guide* drives time and cost out of the product selection process by enabling prospective buyers to do "at-a-glance" comparisons between many different arrays. The standardized one-page data sheets make it easy to do quick, side-by-side comparisons of midmarket storage arrays so organizations may quickly arrive at a short list of products that may meet their requirements.

The *DCIG 2016-17 Midmarket Enterprise Storage Array Buyer's Guide* is available immediately through the DCIG Analysis Portal for subscribing users at https://portal. dcig.com. End users new to the DCIG Analysis Portal may register using this link to access this Buyer's Guide.

End users registering to access this report via the DCIG Analysis Portal also gain access to the DCIG Interactive Buyer's Guide (IBG). The IBG enables organizations take the next step in the product selection process by generating custom reports, including comprehensive side-by-side feature comparisons of the arrays in which the organization is most interested.

The Introduction of Enterprise File Sync and Share into Mid-to-Enterprise Class Arrays; Interview with Nexsan CeO Robert Fernander, Part 2

Formally or informally, almost all size organizations currently implement file sync and share in some capacity. However, almost all organizations have reservations about its implementation, especially when using public cloud file sync and share solutions such as DropBox. Nexsan's UNITY™ represents the first storage platform in the mid-to-enterprise market to introduce enterprise file sync and share that operates inside of corporate file walls. In part 2 of my interview series with Nexsan's CEO, Robert (Bob) Fernander, he explains how this works and what benefits early Nexsan customers are seeing from it.

Jerome: *Please tell me more about your new UNITY product line and what differentiates it in the mid-to-enterprise array space.*

Bob: The Unity platform is a unified storage array on steroids. We have unified NAS and SAN as people would typically expect. But we have also integrated it with our object store, Assureon, such that we can have a file system watcher on the NAS side. That is a feature we will have later in the year. Simultaneously, we have the ability to natively

create a volume and have that volume be a synchronized volume across the enterprise between different UNITY front end heads.

For instance, if an organization has three sites and wants to synchronize a group of files, it simply creates a volume which then becomes the sync volume. Approved users within the organization can save local data to that volume, that volume syncs with all of the other sites, so that all approved users have local access to that content.

The use cases that have come out of providing what we call "enterprise sync" on a mid-to-enterprise class array have been surprising to us. Everything from, "*Oh gee, this changes the way I look at availability and redundancy*" to "*It will really change my data protection mechanisms.*"

If organizations access files locally, and then those files on the local resources go away for some reason, they have instantaneous access to those files at other facilities since all files are synchronized across all of the facilities. In this way they do not have any downtime.

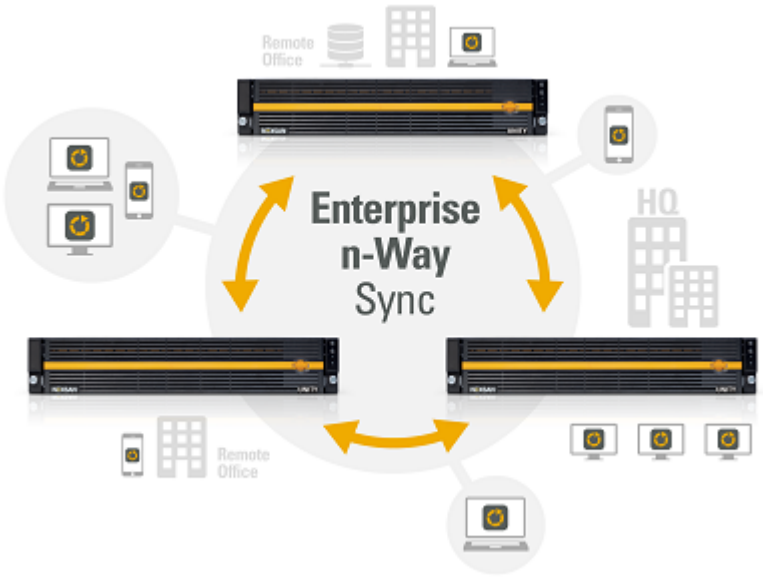
Granted, they may operate at WAN bandwidth speeds, but at least they have access to the files and do not have to recover from a backup. In most case, they do not have any downtime at all. Then when the local system comes back up, it immediately resynchronizes with everything else before it makes itself available to the local users again.

One of the benefits of Connected Data's Transporter software was the complex file system they built that provided for this n-way synchronization. The first thing we have done in launching UNITY is to provide this enterprise sync function.

The feature set is pretty straightforward from the point of view of integration of our existing products and this new global file system. When you layer that on top of the Nexsan NST's existing value, it reads like buzzword soup, which I don't like, but it helps people understand the flexibility of

the product.

I have customers today that say, I'm a Nimble customer and a NetApp customer, and with NST I can buy a single product and it's as fast as Nimble on the block side, it's as flexible as NetApp on the file side, and it's less expensive for me to deploy and maintain. When they add this n-Way Sync capability, they see even greater value.



Source: Nexsan

For example, one of our archive customers is a huge call center operator and they use Assureon to archive all the phone calls they make on behalf of their customers. They like to expose those phone calls to their customers for review. They are looking at this ability to have a volume, a shared volume, between themselves and their customers who see this as a great value. Using UNITY, every time there is a new phone call, they can save the audio file to this file system and it immediately syncs with the customer's version of the file system giving their customer fast and easy local access to it.

Another example. We were at NOAA (National Oceanic and Atmospheric Administration) in Denver last month and these guys have all kinds of needs to create sensor data and capture

it. That data is distributed globally to something like 26 sites. They are a current NST user. They were like, "*Wow, the ability for us to acquire information and sync it to a volume back here where we do analysis, and then on the reverse side have another volume where it went post analysis, we can disseminate information to our clients, is of great value. To do that in an automated, unburdened fashion that is secure and inside our private environment is exactly what we need*." They are going to be an early customer.

In Part 1 of this interview series, Bob provides a peek beneath the covers of the "New" Nexsan.

In Part 3 of this interview series, Bob talks about how the UNITY platform helps to address the world of shadow IT.

A Peek Beneath the Covers of the New Nexsan: Interview with Nexsan's CEO Robert Fernander, Part 1

What is old is new again and perhaps nowhere does that adage hold more true than with Nexsan. Having once been a standalone company before being acquired by Imation a few years ago, Nexsan is now back as a storage company with Imation operating in the background as a holding company.

To provide some insight into how this will work, I recently spoke with Robert (Bob) Fernander who currently functions as the CEO for both Imation and Nexsan. In this first installment in my interview series with him, he provides some details on

the “new” Nexsan as well as provides an overview as to what products new and old that organizations can now expect to find as part of its product portfolio.

***Jerome**: Bob, thanks for taking time out of your schedule to join me today. For the benefit of DCIG’s readers, could you provide a little background on yourself and Nexsan?*

Bob: Thanks, Jerome, and it is my pleasure to join you. Imation is Nexsan’s parent corporation with Imation now a holding company with no operating component to it. It is simply a financial organization, an HR organization, legal, administrative, public accounting and reporting entity. The intent for the parent company is to acquire, fix and then divest other companies where it believes it can lend value. That’s the long term goal of the parent company.

We also have a number of activities that are outside of the Nexsan world that are related to that, one of which you might publicly see where we just bought a bunch of shares in a mortgage REIT. We are in the process of talking to their management about how they might improve their operations, and/or help them to fix it up.

For Nexsan, we have separated it from Imation and put it back, in a sense, to the way it was before Imation purchased it by making it a standalone business entity with no real requirements for support coming out of the parent.

We have done a good job of that over the last six months.

However, the great news is that the parent does invest in Nexsan and we have got plenty of cash in the parent to support Nexsan's requirements and growth going forward. We have made and continue to make a significant investment in the development of Nexsan's UNITY next gen unified storage solution, and some next generation E-Series products as well.

My role, at least for now, is to wear two hats, I am the CEO of the parent corporation, I am also the CEO of Nexsan. I physically work out of the Nexsan offices in Campbell, California, which is our current Nexsan headquarters.

Jerome: *Do you see your role changing?*

Bob: That is to be determined. I was first a board member at Imation before I came inside. I am an interim executive with a contract that runs out sometime in mid-October 2016. It is my intent to be here as long as I am useful. However it is my expectation that as things evolve, I will probably stay with Nexsan, and they will bring in someone that is more of a financial person and less of a technology person for the parent company.

Jerome: *Thanks for that background. Can you now also provide me with an overview of Nexsan's current product line and where that stands.?*

Bob: One of our primary partners in selling the E-Series product is with CommVault, where we are the backend storage underneath the CommVault head. The E-Series and the Beast, which we just recently brought back as a brand, make up a little more than half of our sales and are critical to our success – consequently, we are continuing to innovate there.

NST is our unified storage product. This is a hybrid product that supports both SAN and NAS. It also offers DRAM caching, flash tiering, and spinning disk, all configurable in the platform so that we can balance cost and IOPS for midrange users and midrange use cases.

This is not an all flash, performance is everything appliance. This is a workhorse for the midmarket. The NST is for environments that may support virtual machines on one side of the house but may also push files out through the NAS head. It's the midrange, consolidated approach to solving the problem. It has been and continues to be very well received and is widely deployed.

Then we have Assureon, which is our secure archive product. It's an object store. This product was purpose built to be an object store for immutability and competes with Centera. That product has been phenomenally successful for us and right now represents about 25 percent of our sales.

Transporter is software that we obtained as part of our Connected Data acquisition back in October of 2015. We had a vision that primary storage users over time will have a ubiquitous requirement for mobile accessed information. We believed in the vision that Connected Data had of providing for that through a private cloud mechanism. We did not believe that going to the public cloud solved the problem because it was fraught with security and availability problems, as well as expense-related issues.

We liked Connected Data's approach. We acquired Connected Data, brought it in house, and have now integrated the Transporter software into the NST platform. That is what we recently announced to the general public: the integration of that software with our NST line of product to create a new storage solution called UNITY.

In part 2 of this interview series, Bob shares some more details about the new Nexsan Unity product line and how its feature set differentiates itself from other products on the market.

In Part 3 of this interview series, Bob talks about how the UNITY platform helps to address the world of shadow IT.

Key Considerations When Selecting a Hybrid Storage Array

A storage decision that many small, midsize and large enterprise organizations are trying to make regards what type of array to host their production data on. This often comes down to the selection of either an all-flash or a hybrid storage array. Since most organizations do not have the luxury of saying, "*Money is no object*," the majority are, for now, selecting hybrid storage arrays to get flash-like performance for their most active application data while using disk to store the bulk of their application data. It as organizations evaluate hybrid storage arrays that there are key factors that they need to consider.

The top three (3) trends that are currently driving the adoption of hybrid storage arrays in enterprises and the evolution of technologies within them are:

- ***Data center consolidation.*** Organizations are looking to use a fewer number or even ideally only one (1) storage array to host all of their application data. Many of today's hybrid storage arrays offer the performance, scalability and network connectivity options at cost-effective price points to facilitate these data center consolidations.
- ***Resource optimization.*** Once a hybrid storage array is deployed, organizations will need to optimize the available storage resources on it to store as much data as possible. All hybrid storage arrays now support thin provisioning and the majority offer compression,

deduplication or both to maximize storage efficiencies.

- ***Workload prioritization.*** Storing the data of a business critical application alongside the data of application that primarily archives data makes sense on the surface. However the business critical application may generate so many I/Os that I/Os from the archiving application never get serviced. Or the archiving application may get unexpectedly busy and negatively impact the performance of the business critical application. This makes it imperative that that hybrid storage array offer sophisticated automated storage tiering (AST) and quality of service (QoS) features to ensure that all of the applications that it hosts get serviced appropriated.

These and other hybrid storage array trends and features were covered in a webinar that I recently presented live and which is now available for on-demand viewing in this recorded YouTube video.

In this video, I go into more detail and examine:

- To what capacity hybrid storage arrays scale overall, how much flash capacity they can hold and why the ratio of flash to disk capacity matters
- What storage networking protocols hybrid storage arrays offer and how their support of these protocols affect data center consolidations
- Why disk is still a viable and cost-effective means to store production data
- The different ways that compression and deduplication are implemented on hybrid storage arrays and why organizations need to verify that the method in which they are implemented may directly impact capacity optimizations and performance of the applications hosted on the hybrid storage array
- Why QoS is almost a “must-have” feature on any hybrid

DCIG 2015-16 Hybrid Storage Array Buyer's Guide Now Available

DCIG is pleased to announce the availability of its **2015-16 Hybrid Storage Array Buyer's Guide** that evaluates and ranks more than ninety (90) features of fifty-nine (59) hybrid storage arrays from eighteen (18) different providers.

DCIG defines a Hybrid Storage Array as a physical storage appliance that dynamically places data in a storage pool that combines flash memory and HDD storage resources (and in some cases NVRAM and/or DRAM) by intelligently caching data and metadata and/or by automatically moving data from one performance tier to another.

DCIG's goal in preparing this guide is to evaluate and rank each solution based upon a comprehensive list of features that reflects the needs of the widest range of organizations. The Buyer's Guide rankings enable "at-a-glance" comparisons between many different models, and its standardized data

sheets facilitate side-by-side reviews to quickly enable organizations to examine products in greater detail.

The DCIG 2015-16 Hybrid Storage Array Buyer's Guide covers models from the following storage providers (in alphabetical order):

- AMI
- Dell
- Dot Hill
- EMC
- Fujitsu
- HDS
- HP
- IBM
- Imation Nexsan
- iXsystems
- NetApp
- NexGen Storage
- Nimble Storage
- Oracle
- Tegile
- Tintri
- Winchester Systems
- X-IO Technologies

About the DCIG 2015-16 Hybrid Storage Array Buyer's Guide

DCIG creates Buyer's Guides in order to help end users accelerate the product research and selection process—driving cost out of the research process while simultaneously increasing confidence in the results.

The DCIG 2015-16 Hybrid Storage Array Buyer's Guide achieves the following objectives:

- Provides an objective, third party evaluation of products that evaluates their features *from an end user's perspective*

- Ranks each array in each ranking category
- Provides a *standardized data sheet* for each of the arrays so organizations may quickly do side-by-side product comparisons
- Provides insights into what features the arrays offer to optimize integration into virtualization environments
- Provides a solid foundation for getting competitive bids from different providers that are based on "apples-to-apples" comparisons

The DCIG 2015-16 Hybrid Storage Array Buyer's Guide is available immediately to subscribing users of the DCIG Analysis Portal. Individuals who have not yet subscribed to the DCIG Analysis Portal may test drive the DCIG Analysis Portal as well as download this Guide by following this link.

HP 3PAR StoreServ 8000 Series Lays Foundation for Flash Lift-off

Almost any hybrid or all-flash storage array will accelerate performance for the applications it hosts. Yet many organizations need a storage array that scales beyond just accelerating the performance of a few hosts. They want a solution that both solves their immediate performance challenges and serves as a launch pad to using flash more broadly in their environment.

Yet putting flash in legacy storage arrays is not the right approach to accomplish this objective. Enterprise-wide flash deployments require purpose-built hardware backed by Tier-1 data services. The HP 3PAR StoreServ 8000 series provides a

fundamentally different hardware architecture and complements this architecture with mature software services. Together these features provide organizations the foundation they need to realize flash's performance benefits while positioning them to expand their use of flash going forward.

A Hardware Foundation for Flash Success

Organizations almost always want to immediately realize the performance benefits of flash and the HP 3PAR StoreServ 8000 series delivers on this expectation. While flash-based storage arrays use various hardware options for flash acceleration, the 8000 series complements the enterprise-class flash HP 3PAR StoreServ 20000 series while separating itself from competitive flash arrays in the following key ways:

- ***Scalable, Mesh-Active architecture***. An Active-Active controller configuration and a scale-out architecture are considered the best of traditional and next-generation array architectures. The HP 3PAR StoreServ 8000 series brings these options together with its Mesh-Active architecture which provides high-speed, synchronized communication between the up-to-four controllers within the 8000 series.
- ***No internal performance bottlenecks.*** One of the secrets to the 8000's ability to successfully transition from managing HDDs to SSDs and still deliver on flash's performance benefits is its programmable ASIC. The HP 3PAR ASIC, now it's 5th generation, is programmed to manage flash and optimize its performance, enabling the 8000 series to achieve ***over 1 million IOPs***.
- ***Lower costs without compromise.*** Organizations may use lower-cost commercial MLC SSDs (cMLC SSDs) in any 8000 series array. Then leveraging its Adaptive Sparing technology and Gen5 ASIC, it optimizes capacity utilization within cMLC SSDs to achieve high levels of performance, extends media lifespan which are backed by

a 5-year warranty, and increases usable drive capacity by up to 20 percent.

- ***Designed for enterprise consolidation.*** The 8000 series offers both 16Gb FC and 10Gb Ethernet host-facing ports. These give organizations the flexibility to connect performance-intensive applications using Fibre Channel or cost-sensitive applications via either iSCSI or NAS using the 8000 series' File Persona feature. Using the 8000 Series, organizations can start with configurations as small as 3TB of usable flash capacity and scale to 7.3TB of usable flash capacity.

A Flash Launch Pad

As important as hardware is to experiencing success with flash on the 8000 series, HP made a strategic decision to ensure its converged flash and all-flash 8000 series models deliver the same mature set of data services that it has offered on its all-HDD HP 3PAR StoreServ systems. This frees organizations to move forward in their consolidation initiatives knowing that they can meet enterprise resiliency, performance, and high availability expectations even as the 8000 series scales over time to meet future requirements.

For instance, as organizations consolidate applications and their data on the 8000 series, they will typically consume less storage capacity using the 8000 series' native thin provisioning and deduplication features. While storage savings vary, HP finds these features usually result in about 4:1 data reduction ratio which helps to drive down the effective price of flash on an 8000 series array to as low as $1.50/GB.

Maybe more importantly, organizations will see minimal to no slowdown in application performance even as they implement these features, as they may be turned on even when running mixed production workloads. The 8000 series compacts data and accelerates application performance by again leveraging its Gen5 ASICs to do system-wide striping and optimize flash media

for performance.

Having addressed these initial business concerns around cost and performance, the 8000 series also brings along the HP 3PAR StoreServ's existing data management services that enable organizations to effectively manage and protect mission-critical applications and data. Some of these options include:

- ***Accelerated data protection and recovery.*** Using HP's Recovery Manager Central (RMC), organizations may accelerate and centralize application data protection and recovery. RMC can schedule and manage snapshots on the 8000 series and then directly copy those snapshots to and from HP StoreOnce without the use of a third-party backup application.
- ***Continuous application availability***. The HP 3PAR Remote Copy software either asynchronously or synchronously replicates data to another location. This provides recovery point objectives (RPOS) of minutes, seconds, or even non-disruptive application failover.
- ***Delivering on service level agreements (SLAs).*** The 8000 series' Quality of Service (QoS) feature ensures high priority applications get access to the resources they need over lower priority ones to include setting sub-millisecond response times for these applications. However QoS also ensures lower priority applications are serviced and not crowded out by higher priority applications.
- ***Data mobility.*** HP 3PAR StoreServ creates a federated storage pool to facilitate non-disruptive, bi-directional data movement between any of up to four (4) midrange or high end HP 3PAR arrays.

Onboarding Made Fast and Easy

Despite the benefits that flash technology offers and the various hardware and software features that the 8000 series provides to deliver on flash's promise, migrating data to the

8000 series is sometimes viewed as the biggest obstacle to its adoption. As organizations may already have a storage array in their environment, moving its data to the 8000 series can be both complicated and time-consuming. To deal with these concerns, HP provides a relatively fast and easy process for organizations to migrate data to the 8000 series.

In as few as five steps, existing hosts may discover the 8000 series and then access their existing data on their old array through the 8000 series without requiring the use of any external appliance. As hosts switch to using the 8000 series as their primary array, Online Import non-disruptively copies data from the old array to the 8000 series in the background. As it migrates the data, the 8000 series also reduces the storage footprint by as much as 75 percent using its thin-aware functionality which only copies blocks which contain data as opposed to copying all blocks in a particular volume.

Maybe most importantly, data migrations from EMC, HDS or HP EVA arrays (*and others to come*) to the 8000 series may occur in real time Hosts read data from volumes on either the old array or the new 8000 series with hosts only writing to the 8000 series. Once all data is migrated, access to volumes on the old array is discontinued.

Achieve Flash Lift-off Using the HP 3PAR StoreServ 8000 Series

Organizations want to introduce flash into their environment but they want to do so in a manner that lays a foundation for their broader use of flash going forward without creating a new storage silo that they need to manage in the near term.

The HP 3PAR StoreServ 8000 series delivers on these competing requirements. Its robust hardware and mature data services work hand-in-hand to provide both the high levels of performance and Tier-1 resiliency that organizations need to reliably and confidently use flash now and then expand its use in the future. Further, they can achieve lift-off with flash

as they can proceed without worrying about how they will either keep their mission-critical apps online or cost-effectively migrate, protect or manage their data once it is hosted on flash.

DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide Now Available

DCIG is pleased to announce the release of the **DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide** that weights, scores and ranks more than 90 features of twenty-seven (27) different storage arrays or array series from twelve (12) different storage providers.

Hybrid storage arrays promise to deliver the dramatic performance of all-flash storage arrays, but at a lower cost because hybrid storage uses both flash memory and hard disk drives. The "*secret sauce*" varies from vendor to vendor; but in every case, it involves sophisticated caching and/or automated storage tiering software.

Due to the large number of hybrid storage array products offered, DCIG segmented the products by maximum capacity. This Buyer's Guide evaluates products which scale to <1 PB.

DCIG's goal in preparing this guide is to evaluate, score and rank each solution based upon a comprehensive list of features that reflects the needs of the widest range of organizations. Scoring and ranking tables enable end users to do "*at-a-glance*" comparisons between many different array models; and our standardized data sheets facilitate side-by-side comparisons which enable organizations to quickly get to a short list of products that may meet their requirements.

These hybrid storage arrays are especially well-suited for midsize organizations as the arrays:

- Deliver performance and functionality at an attractive price when compared to traditional arrays
- Scale to a storage capacity suitable for many midsize organizations
- Provide simplified management interfaces to minimize installation and on-going administration costs

The DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide Top 11 solutions include (in alphabetical order):

- HP 3PAR StoreServ 7200c
- iXsystems TrueNAS Z20
- iXsystems TrueNAS Z30
- NexGen N5-1000 Hybrid Flash Array
- NexGen N5-200 Hybrid Flash Array
- NexGen N5-300 Hybrid Flash Array
- NexGen N5-500 Hybrid Flash Array
- Tegile T3100
- Tegile T3200
- Tegile T3300
- Tegile T3400

The **HP 3PAR StoreServ 7200c** earned the *Best-in-Class* ranking among all Midsize Enterprise Hybrid Storage Arrays in this Buyer's Guide. The StoreServ 7200c stood out by offering all of the following capabilities:

- The **best balance of strengths** across all the scoring categories
- Scored *Excellent* or betterin all scoring categories

About the DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide

DCIG creates Buyer's Guides in order to help end users accelerate the product research and selection process–driving cost out of the research process while simultaneously increasing confidence in the results.

The DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide achieves the following objectives:

- Provides an objective, third party evaluation of products that evaluates and scores their features *from an end user's perspective*
- Ranks each array in each scoring category and then presenting these results in an *easy to understand* table
- Provides a *standardized data sheet* for each of the arrays so users may do quick side-by-side comparisons of products
- Provides insights into what features the arrays offer to optimize integration into virtualized environments
- Provides insight into which features will result in improved performance
- Gives any organization a solid foundation for getting competitive bids from different providers that are based on "*apples-to-apples*" comparisons

The DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide is available immediately to subscribing users of the DCIG Analysis Portal. All DCIG Buyer's Guides are

available for download at no charge to any end-user who registers for the DCIG Analysis Portal.

The Performance of a $500K Hybrid Storage Array Goes Toe-to-Toe with Million Dollar All-Flash and High End Storage Arrays

On March 17, 2015, the Storage Performance Council (SPC) **updated** its "Top Ten" list of SPC-2 results that includes performance metrics going back almost three (3) years to May 2012. Noteworthy in these updated results is that the three storage arrays ranked at the top are, in order, a high end mainframe-centric, monolithic storage array (the HP XP7, OEMed from Hitachi), an all-flash storage array (from startup Kaminario, the K2 box) and a hybrid storage array (Oracle ZFS Storage ZS4-4 Appliance). Making these performance results particularly interesting is that the hybrid storage array, the Oracle ZFS Storage ZS4-4 Appliance, can essentially go toe-to-toe from a performance perspective with both the million dollar HP XP7 and Kaminario K2 arrays and do so at approximately half of their cost.

Right now there is a great deal of debate in the storage industry about which of these three types of arrays – all-flash, high end or hybrid – can provide the highest levels of performance. In recent years, all-flash and high end storage arrays have generally gone neck-and-neck though all-flash

arrays are generally now seen as taking the lead and pulling away.

However, when price becomes a factor (*and when isn't price a factor?*) such that enterprises have to look at price and performance, suddenly hybrid storage arrays surface as very attractive alternatives for many enterprises. Granted, hybrid storage arrays may not provide all of the performance of either all-flash or high end arrays, but they can certainly deliver superior performance at a much lower cost.

This is what makes the recently updated Top Ten results on the SPC website so interesting. While the breadth of arrays covered in the published SPC results by no means cover every storage array on the market, they do provide enterprises with some valuable insight into:

- How well hybrid storage arrays can potentially perform
- How comparable their storage capacity is to high-end and all-flash arrays
- How much more economical hybrid storage arrays are

In looking at these three arrays that currently sit atop the SPC-2 Top Ten list and how they were configured for this test, they were comparable in one of the ways that enterprises examine when making a buying decision. For instance, all three had comparable amounts of raw capacity.

		Raw Capacity
High-End	HP XP7	230TB
All-Flash	Kaminario K2	179TB
Hybrid	Oracle ZFS Storage ZS4-4 Appliance	175TB

Despite using comparable amounts of raw capacity for testing purposes, they got to these raw capacity totals using decidedly different media. The high end, mainframe-centric HP XP7 used 768 300GB 15K SAS HDDs to get to its 230TB total while the all-flash Kaminario K2 used 224 solid state drives (SSDs) to get to its 179TB total. The Oracle ZS4-4 stood out from these other two storage arrays in two ways. First, it used 576 300GB ***10K*** SAS HDDs. Second, its storage media costs were a fraction of the other two. Comparing strictly list prices, its media costs were only about 16% of the cost of the HP XP7 and 27% of the cost of the Kaminario K2.

These arrays also differed in terms of how many and what types of storage networking ports they each used. Both the HP XP7 and the Kaminario K2 used a total of 64 and 56 8Gb FC ports respectively for connectivity between the servers and their storage arrays. The Oracle ZS4-4 only needed 16 ports for connectivity though it used Infiniband for server-storage connectivity as opposed to 8Gb FC. The HP XP7 and Oracle ZS4-4 also used cache (512GB and ~3TB respectively) while the Kaminario K2 used no cache at all. It instead used a total of 224 solid state drives (SSDs) packaged in 28 flash nodes (8-800GB SSDs in each flash node.)

This is not meant to disparage the configuration or architecture of any of these three different storage arrays as each one uses proven technologies in the design of their arrays. Yet what is notable is the end results when these three arrays in these configurations are subjected to the same SPC2 performance benchmarking tests.

While the HP XP7 and Kaminario K2 came out on top from an overall performance perspective, it is interesting to note how well the Oracle ZS4-4 performs and what its price/performance ratio is when compared to the high end HP XP7 and the all-flash Kaminario K2. It provides 75% to over 90% of the performance of these other arrays at a cost per MB that is up to 46% less.

SPC-2 Top 10 Performance Results					
Vendor	Date	GB/s	$/MB/s	TBs	Price
HP XP7	2014	43.01	$28.30	192.76	$1,217,462
Kaminario K2	2013	33.47	$29.79	60.12	$997,348
Oracle ZS4-4	2015	31.48	$17.09	30.96	$538,050
Oracle ZS3-4	2013	17.24	$22.53	31.61	$388,472
Oracle ZS3-2	2014	16.20	$12.08	24.20	$195,916
Fujitsu Eternus DX8700	2013	16.04	$79.40	71.40	$1,275,163
IBM DS8870	2012	15.42	$131.21	30.92	$2,023,742
IBM Storwize V7000	2012	14.58	$129.14	74.49	$1,883,036
NEC M700	2013	14.41	$25.10	53.55	$361,612
Hitachi VSP	2012	13.15	$95.38	129.11	$1,254,093
HP P9500 XP	2012	13.15	$88.34	129.11	$1,161,504
Hitachi HUS VM	2014	11.27	$32.64	193.67	$368,065

Source: "Top Ten" SPC-2 Results, https://www.storageperformance.org/results/benchmark_results_spc2_top-ten

It is easy for enterprises to become enamored with all-flash arrays or remain transfixed on high-end arrays because of their proven and perceived performance characteristics and benefits. But these recent SPC-2 performance benchmarks illustrate that hybrid storage arrays such as the Oracle ZFS Storage ZS4-4 Appliance can deliver levels of performance that are comparable to million-dollar all-flash and high-end arrays at half of their cost which are numbers that any enterprise can take to the bank.

DCIG 2015-16 Small/Midsize

Enterprise (SME) Hybrid Storage Array Buyer's Guide Now Available

DCIG is pleased to announce the March 27 release of the *DCIG 2015-16 Small/Midsize Enterprise (SME) Hybrid Storage Array Buyer's Guide* that weights, scores and ranks more than 90 features of twenty-two (22) hybrid storage arrays from nine (9) different storage providers.

Hybrid storage arrays promise to deliver the dramatic performance of all-flash storage arrays, but at a lower cost because hybrid storage uses both flash memory and hard disk drives. The "secret sauce" varies from vendor to vendor; but in every case, it involves sophisticated caching and/or automated storage tiering software.

The SME designation is based on limiting this Buyer's Guide to products which scale to less than 500 TB maximum raw capacity. In many cases this capacity limit correlates to other functionality important to smaller enterprises, including simplified management that minimizes installation and on-going administration costs.

DCIG's goal in preparing this guide is to evaluate, score and

rank each solution based upon a comprehensive list of features. Scoring and ranking tables enable end users to do "at-a-glance" comparisons between many different array models; and standardized one-page data sheets facilitate side-by-side comparisons that enable organizations to quickly get to a short list of products that may meet their requirements.

The DCIG 2015-16 SME Hybrid Storage Array Buyer's Guide Top 9 solutions include (in alphabetical order):

- iXsystems TrueNAS Z20
- NexGen N5-1000 Hybrid Flash Array
- NexGen N5-200 Hybrid Flash Array
- NexGen N5-300 Hybrid Flash Array
- NexGen N5-500 Hybrid Flash Array
- Tegile T3100
- Tegile T3200
- Tegile T3300
- Tegile T3400

The **Tegile T3400** earned the *Best-in-Class* ranking among all hybrid storage arrays in this buyer's guide. The T3400 stood out by offering the **best balance of strengths** across all the scoring categories. The T3400 array incorporates 28.2 TB of raw flash capacity in a 2U form factor. The T3400 can function either as a hybrid array or as an all-flash array depending on which shelves are used for expanded storage.

We continue to be impressed by not only the quality of features in Tegile's products but also the breadth of offerings they have produced with their line of hybrid and flash storage arrays. Tegile consistently achieves high marks in our comparative analyses of various solutions from vendors throughout the industry. That they are able to achieve these high scores in not just one but multiple DCIG Buyer's Guides across various markets is a very impressive feat.

About the DCIG 2015-16 SME Hybrid Storage Array Buyer's Guide

DCIG creates Buyer's Guides in order to help end users accelerate the product research and selection process—driving cost out of the research process while simultaneously increasing confidence in the results.

The DCIG 2015-16 SME Hybrid Storage Array Buyer's Guide achieves the following objectives:

- Provides an objective, third party evaluation of products that evaluates and scores their features *from an end user's perspective*
- Ranks each array in each scoring category and then presenting these results in an *easy to understand*table
- Provides a *standardized data sheet*for each of the arrays so users may do quick side-by-side comparisons of products
- Provides insights into what features the arrays offer to optimize integration into virtualization environments
- Provides insight into which features will result in improved performance
- Gives any organization a solid foundation for getting competitive bids from different providers that are based on "apples-to-apples" comparisons

The DCIG 2015-16 SME Hybrid Storage Array Buyer's Guide is available immediately to subscribing users of the DCIG Analysis Portal. All DCIG Buyer's Guides are available for download at no charge to any end-user who registers for the DCIG Analysis Portal.

DCIG Announces Calendar of

Planned Buyer's Guide Releases in the First Half of 2015

At the beginning of 2014, I started the year with the theme: "*it's an exciting time to be part of the DCIG team*". This was due to the explosive growth we saw in website visits and popularity of our Buyer's Guides. That hasn't changed. DCIG Buyer's Guides continue to grow in popularity, but what's even more exciting is the diversity of our new products and services. This year's theme is diversity: a range of different things. DCIG is expanding…again…in different directions.

In the past year, we have added a number of offerings to our repertoire of products and services. In addition to producing our popular Buyer's Guides and well known blogs, we now offer Competitive Research Services, Executive Interviews, Executive White papers, Lead Generation, Special Reports and Webinars. Even more unique, DCIG now offers an RFP/RFI Analysis Software Suite. This suite gives anyone (vendor, end-user or technology reseller) the ability to license the same software that DCIG uses internally to develop its Buyer's Guide. In this way, you may use the software to do your internal technology assessments with your own scores and rankings so that the results align more closely with your specific business needs.

While we diversify our portfolio, it's important to note that we also increased our Buyer's Guide publication output by nearly 40% to thirteen (13) over our 2013 publications. We also contracted for over 30 Competitive Advantage reports in 2014. This success is largely due the well-planned timeline, more clearly defined processes, and the addition of new analysts. The team is busy and here is a sneak peek at the Buyer's Guides that they are currently working on during the

first half of 2015 (in order of target release date):

Hybrid Storage Array: Hybrid Storage Array is a physical storage appliance that dynamically places data in a storage pool that combines flash memory and HDD storage (and in some cases NVRAM and/or DRAM) resources by intelligently caching data and metadata and/or by automatically moving data from one performance tier to another. The design goal of a hybrid storage array is to typically provide sub-2-millisecond response times associated with flash memory storage arrays with capacity and cost similar to HDD-based arrays.

SDS Server SAN: A new Buyer's Guide for DCIG, the SDS Server SAN is a collection of servers combining compute, memory and internal DAS storage, which enables organizations to remove the need to for external storage in a virtualized environment. The SDS Server SAN software provides the glue between the compute and storage portions of the environment allowing for clustering of not only the virtual host but the underlying file system as well. SDS Server SAN's typically bundle compute, storage and hypervisors and employ the usage of SSD as a tier for storage caching; SAS and/or SATA HDDs for data storage; and, support of one or more hypervisors.

Hybrid Cloud Backup Appliance: A Hybrid Cloud Backup Appliance is a physical appliance that comes prepackaged with server, storage and backup software. What makes this Buyer's Guide stand apart from the Integrated Backup Appliances is that the Hybrid Cloud Backup Appliance must support backup both locally and to cloud providers. In this new Buyer's Guide for DCIG, DCIG evaluates which cloud provider or providers that the appliance natively supports, the options it offers to backup to the cloud and even what options are available to recover data and/or applications with a cloud provider.

Private Cloud Storage Array: Private Cloud Storage Array is a physical storage appliance located behind an organization's firewall that enables the delivery of storage as a service to

end users within an enterprise. Private cloud storage brings the benefits of public cloud storage to the enterprise—rapid provisioning/de-provisioning on storage resources through self-service tools and automated management, scalability, and REST API support for cloud-native apps—while still meeting corporate data protection, security and compliance requirements

Flash Memory Storage Array: The Flash Memory Buyer's Guide is a refresh from 2014. The flash array is a solid state storage disk system that contains multiple flash memory drives instead of hard disk drives.

Unified Communications: Another new guide for DCIG, Unified communications (UC) is any system that integrates real-time and non-real-time enterprise communication services such as voice, messaging, instant messaging, presence, audio and video conferencing and mobility features. The purpose of UC is to provide a consistent user-interface and experience across multiple devices and media-types.

Watch the latter half of the year as DCIG plans to refresh Buyer's Guides on the following topics:

- Big Data Tape Library
- Deduplicating Backup Appliance
- High End Storage Array
- Integrated Backup Appliance
- Midrange Unified Storage
- SDS Storage Virtualization
- Virtual Server Backup Software

We also have other topics that we are evaluating as the basis for new Buyer's Guides so look for announcements on their availability in the latter half of this year.

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A Modern Day Check List for Evaluating Today's Flash Memory Storage Arrays

Flash arrays from all providers have matured significantly in the last few years. As such, most if not all flash arrays meet or exceed the capacity and performance requirements of the application or applications attached to it. Further, flash arrays have matured to the point where questions about their stability in these small environments is less of an issue than even a few years ago.

This changes the objective of what enterprises should look to accomplish when they bring in a flash array to evaluate. Rather than simply trying to confirm if it performs well and/or its software is stable, enterprises need to perform a more thorough evaluation of any flash storage array under consideration to ensure the evaluation produces results pertinent to the enterprise's longer term objectives. To achieve this outcome, enterprises should only evaluate those flash arrays positioned to meet their short as well as their long term objectives.

While enterprises still need to validate and test a flash storage array's performance and stability, the time has arrived for them to expand their evaluation to ensure that the flash storage array offers the other capabilities that they will also need in their environment. Eight other flash storage array features that should now be part of their modern day flash memory storage array check list include:

1. Application integration. Every enterprise uses databases with 97 percent of Global Fortune 500 companies using Oracle Database in some fashion. While enterprises can certainly place an Oracle Database on any flash storage array, the vast majority of these flash storage arrays cannot leverage the native data storage and data transmission optimization features that have been available since the release of Oracle Database 12c.

2. VMware ESX integration. Even more widely used than Oracle Database among Fortune 500 companies is the VMware ESX hypervisor as 100 percent of them use it. This makes it incumbent for the flash storage array to support VMware APIs for both array management and data protection. Since the software on many of these flash storage arrays is still relatively immature, the level of integration that these flash storage arrays may have with the VMware APIs can vary significantly.

3. HDD and flash storage tiering. HDDs may no longer be the future of storage media but they are not going away any time soon either. The upfront cost of HDDs is still a fraction of flash and provides adequate levels of performance for many applications. This makes having HDDs available as a storage tier desirable.

Even all flash is not created the same. For example, SLC is the most expensive tier of flash and is best suited for applications that generate large amounts of write I/Os but do not need as much storage capacity. Others such as cMLC and eMLC offer higher capacities than SLC and similar performance in terms of read I/Os but are not as well suited for write I/O. One emerging form of flash even offers ultra-high levels of capacity (over 20 TBs) in a very small form factor at a low cost per GB but only supports very few writes to each cell.

These different tiers of flash and HDDs and their respective

application use cases make it almost a necessity that a flash storage array intended for broad enterprise use support and manage these different tiers of both flash and disk.

4. Array controller architecture. The superior read and write performance that flash offers over HDDs is well known and documented. However for a flash storage array to fully deliver on that improvement in performance, the controllers in front of the flash media have to be sufficiently robust to deliver on the high levels of read and write performance that flash offers.

Flash completely flips the equation in terms of where the performance bottleneck resides on storage arrays. In the past, HDDs were the performance bottleneck as storage array controllers used to wait on responses from the HDDs before they could continue processing data.

Using flash the storage array controllers often become the bottleneck as the flash media is now waiting on read and write requests. Overcome this bottleneck requires that the hardware and software on the controllers along with the interface between the controllers and backend flash be properly architected to fully harness and deliver on the full potential of flash’s performance characteristics.

5. Servicing mixed application workloads. Aggregating the data and corresponding workloads of applications puts a demand on the flash storage array to appropriately service their collective I/Os. Even though enterprises prioritize applications differently, many arrays manage all application I/O in the same way by servicing application I/Os in the order in which they arrive. A better way to handle this task is to prioritize I/O from mission and business critical applications above those designated as business internal or test and development and service those with a higher priority first.

6. Segregating applications and workloads. As enterprises consolidate and virtualize applications, they also want the flexibility to segregate the applications and their associated workloads by business unit, department or company using partitioning. In this way, the business unit, department or company may be assigned dedicated storage array resources, grant its administrators secure logins to access and manage their data and keep application data and their workloads separate so they do not impact nor are impacted by other application data and workloads running elsewhere on the same array.

7. Product road map and viability. In cases where an emerging or an existing storage provider is shipping a new flash memory storage array, there are always questions regarding the long term roadmap and viability of the product itself. If offered by an emerging flash provider, questions that immediately surface include "*Will the provider stay in business?*"; "*What proof points are available to demonstrate its flash storage array works as claimed?*"; and, if working as designed, "*Will the provider eventually be acquired and, if so, by whom?*"

Net new flash storage array models from existing storage providers are not immune from scrutiny either. While they may now offer a flash storage array, their level of commitment to it may be commensurate with how well it sells in the field. Even assuming it does well, if a smaller flash competitor starts to do well and achieves a market leading position, it is conceivable they may abandon their existing product in favor of acquiring one that puts them a position of market leadership.

8. Scalability. The first flash storage array that many enterprises bring in-house rarely has more than 10 TBs of flash storage capacity. However, longer term very few enterprises want to cap flash capacity at 10TBs. Yet very few flash storage arrays have demonstrated their ability to

scale beyond 10 TBs and still deliver the same levels of performance that can be achieved when 10 TBs or less of capacity is used. As enterprises evaluate flash storage arrays, they should identify models that give them the flexibility to scale up and scale out both capacity and performance to meet their longer term requirements.

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