DCIG

2018

DEDUPLICATION BACKUP TARGET APPLIANCE BUYER'S GUIDE

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DEDUPLICATION BACKUP
2018
DCIG
BUYER'S
GUIDE
TARGET APPLIANCE

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Introduction

To view the current generation of deduplication backup target appliances solely in the context of a backup target is so ten years ago. Originally a godsend to organizations of all sizes agonizing over how to control costs, shorten backup windows and improve backup success rates, deduplication backup target appliances now have higher goals. They are moving up the stack to address larger, more strategic objectives than simply ensuring backups complete successfully.

Backup speeds and feeds still matter as evidenced by every vendor continuing to publish backup throughput rates. Granted, organizations should view these published benchmarks as optimal and often only achieved using the vendor's client software that does source-side acceleration and/or deduplication.

That disclaimer made, published maximum backup throughput rates continue to impress. Appliances targeted at SME shops (ranked as *Good* or *Excellent* in this Guide) can theoretically achieve backup throughput rates of up to 29TB/hour while those targeted at enterprise shops (ranked as *Excellent* or *Recommended* in this Guide) can theoretically achieve up to 200TB/hour.

Closely behind the statistics around speeds and vendors, vendors also allege that enterprises can achieve extremely high deduplication rates using their appliances. Here again, enterprises should view any claims with some degree of skepticism. While some may achieve 100:1 or higher deduplication rates, most organizations find their real deduplication rates fall in the range of 7:1 – 20:1 depending on the data types they protect and their length of retention.

But even as vendors beat their proverbial chests and blow their proverbial horns over their ever-increasing speeds, feeds, and deduplication ratios, more vendors are turning their attention to more strategic enterprise initiatives. Having largely solved the immediate tactical issues of successfully completing backups within backup windows, they must now address a new generation of challenges. These include:

1. Faster recoveries of data and virtual machines (VMs)

2. Implementing data retention policies

3. Indexing and/or searching data on the appliance

4. Provide virtual appliances for deployment in the cloud or remote and branch offices

5. Recovering data and VMs on the appliance itself

6. Replicating data to other sites and/or to cloud providers

In short, enterprises increasing want these appliances to do more than function as backup targets that efficiently and effectively deduplicate data. Deduplicating backup target appliances need to address one or more of these aforementioned strategic objectives.

The good news is that the current generation of deduplication backup target appliances deliver on many of these requirements. All offer data replication options. All take steps to more quickly recover data and/or VMs and make it simpler and faster to perform those tasks. Many offer virtual appliances and some provide options to archive data.

To satisfy these new use cases, some of the technologies found on these appliances or available from these providers include:

- *Interfacing directly with storage arrays.* Rather than requiring data to first go through a server with backup software, some providers are creating interfaces that directly connect storage arrays to these appliances. Then as snapshots are taken on the storage array, these snapshots are sent directly to the deduplicating backup target appliance. This process of creating snapshots, and then managing their movement to and from the deduplication backup target appliance, may be done by third party software or backup software which no longer resides in the data path.

- *Non-disruptive upgrades.* Enterprises want to eliminate issues around data migrations along with the flexibility to pay as they grow. Two providers offer scale-out architectures to facilitate expansion and upgrades with minimal or no service expansion.

- *Support for multiple clouds from multiple providers.* Most appliances now support connectivity to multiple public cloud storage providers such as Amazon S3, Google Cloud, and Microsoft Azure as well as smaller private cloud storage providers.

- *Virtual appliances.* All providers save one now offer virtual appliances to protect virtualized remote and branch offices as well as store data in the cloud.

These features and many others are examined as part of this *DCIG 2018 Deduplication Backup Target Appliance Buyer's Guide.* This Buyer's Guide helps enterprises assess the deduplication backup target appliance marketplace so they may identify which appliance is the best fit for their environment. This Buyer's Guide includes data sheets for 22 deduplication backup target appliances that achieved rankings of *Recommended, Excellent,* or *Good*. These products are available from six vendors including Dell EMC, ExaGrid, HPE, NEC, Quantum, and Quest,

As in the development of all prior DCIG Buyer's Guides, DCIG's analysts have already done the heavy lifting for enterprise technology buyers by:

- Identifying a common technology need with many competing solutions

- 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 the rapid comparisons of various product features

The *DCIG 2018 Deduplication Backup Target Appliance Buyer's Guide* drives time and cost out of the product selection process by enabling prospective buyers to more quickly identify a shortlist of products that meet their specific needs. Thus, prospective purchasers can focus their product evaluation energies and move more quickly to buying the best solution for them.

Each DCIG Buyer's Guide provides a valuable point-in-time published snapshot of a marketplace. Since vendors continuously release new products and feature enhancements to existing products, DCIG routinely incorporates these product updates into its bodies of research that is made available through subscription to the DCIG Competitive Intelligence Portal.

Note that this Buyer's Guide is not intended to be a substitute for bringing individual products in-house for testing nor should readers assume that DCIG has done any hands-on testing of these products. Many end user license agreements associated with these products prohibit the publishing of testing results without first getting vendor approval. In-house testing or proof-of-concept implementations should still be done, if possible, since each product will perform differently under different application workloads and data center environments. We hope you find that this Buyer's Guide meets its intended purpose in your environment.

Charley and Jerome

Executive Summary

Buyers of today's deduplication backup target appliances face a new set of challenges. No longer should they wonder if a product's underlying deduplication technology works as advertised nor do they need to worry about the viability of the company selling the product. The deduplication backup target appliances included in this Buyer's Guide and the vendors who provide them have long since crossed those thresholds. The new challenge for today's buyers is identifying the right product on the market to best match the requirements of their environment.

On one hand, this job of identifying a product that works is easier than ever before. Any of the products included in this Buyer's Guide will *"do the job,"* so to speak, in terms of functioning as a deduplication backup target that shortens backup windows, ensures successful backups, and effectively deduplicates data. On the other hand, how efficiently and effectively any of these appliances will perform their job in one's specific environment can and will vary significantly.

One of the primary changes going on with these appliances in the background is the architectural direction that they are pursuing to ensure a *"best fit"* in today's enterprise IT environments. All these vendors seek to provide products that: simplify management; more quickly and easily restore data; replicate data in multiple ways; and, continually ensure data integrity. A number also offer options to archive data, encrypt it, perform tape emulation, do chargeback billing, and provide pay as you grow options.

But as deduplication as a technology has become commonplace, these same vendors also want to avoid the stigma of their product becoming classified as a commodity. To do so, they are each taking steps to provide specific value-adds to differentiate their product from the competition. Here are how some providers are evolving their products.

- **Dell EMC Data Domain.** The newest features on its appliances reflect needs by enterprises to store and manage ever more data for ever longer periods of time as well as identify ways to backup data more quickly. To manage more data, it has added a Cloud Tier offering that gives enterprises the option to store up to 2 PB of data with various public cloud providers. It has also introduced features such as BoostFS, Data Domain Oracle, and ProtectPoint that, respectively, accelerate backups of data residing on file systems, Oracle Database, and Dell EMC storage arrays.

- **ExaGrid.** ExaGrid is currently the only deduplication backup target appliance provider that uses a landing zone. This landing zone holds a copy of data in its original state to facilitate very fast backups and restores. Its partnership with multiple backup software providers enables the seamless deployment and management of its appliances in most environments. Further, its scale-out architecture offers the non-disruptive upgrades and data migrations that enterprises want as part of managing their IT infrastructure.

- **HPE StoreOnce.** HPE addresses enterprise needs for faster backups and restores and longer data retention periods in a yet a different way. It is creating more hooks between its StoreOnce and 3PAR storage arrays to facilitate the movement of protected data between them without the need for that data to pass through a backup software server. HPE is also taking steps to accelerate and simplify backup data sent to it from various backup software products. By using its Catalyst software, protected data can be simultaneously distributed across multiple StoreOnce nodes to accelerate backups and recoveries.

Yet as vendors evolve their deduplication backup target appliances to better align with enterprise requirements for faster backups, longer term data retention, and offsite replication, enterprises have also made known their need for faster, less disruptive recoveries. This presents both a challenge and an opportunity for vendors and it also helps to explain some of the design decisions that they are making in their products.

On the surface, ExaGrid appears best positioned to solve this recovery challenge. By keeping data of the most recent backup in a raw or undeduplicated state, recoveries can occur very quickly and can potentially even occur on an ExaGrid appliance in its landing zone. However, vendors such as Dell EMC and HPE are taking steps to more closely tie their deduplication backup target appliances to their respective storage arrays. Using their solutions, they encourage enterprises to recover data from snapshots still residing on their storage arrays rather than retrieving data from their deduplicating backup target appliance.

Using storage arrays snapshots versus using a deduplication backup target appliance as the initial go-to source to recover data highlights the real battle going on behind the scenes. The flagship products from all the major providers are sufficiently mature with the features that enterprises need. But to pick the right appliance for their environment, enterprises need to quantify how they want to manage the most recent backup copy of their data. Do they want to use snapshots as the initial target and source of this copy of data or do they want to use the deduplicating backup target appliance to perform this function?

Complicating this decision, software-defined storage and hyper-converged infrastructure solutions have come on strong in the last two years that often offer their own snapshot technologies. While these technologies may eliminate the need for storage arrays, they rarely natively offer features that orchestrate the movement of data between their solution and an external appliance.

The bottom line is that for enterprises to make a choice between the available deduplication backup target appliances, they need to quantify the role that snapshots will play in their data protection scheme. Once the role of snapshots is defined and what product is going to orchestrate data protection, the decision as to what deduplication backup target appliance is a best fit for your environment becomes more straightforward to make. The end result should ideally be the backup software, deduplication backup target appliance, and snapshots all working together as one to provide a means for enterprises to easily and seamlessly backup and recover their data.

It is in this context that DCIG presents its *2018 Deduplicating Backup Target Appliance Buyer's Guide.* This Guide accomplishes the following objectives:

- Provides an objective, third-party evaluation of products that evaluates and ranks their features from an end user's viewpoint

- Includes recommendations on how to best use this Buyer's Guide and the products contained in it

- Evaluates the features of each product based upon criteria that matter most to help end users quickly identify which appliance is most appropriate for them

- Provides a standardized data sheet for each product so end users can do quick comparisons of the features supported and not supported on each product

- Gives any organization the ability to request competitive bids from different providers

DEDUPLICATION BACKUP TARGET APPLIANCE RANKINGS

OVERALL RANKINGS

RANKING	PRODUCT
RECOMMENDED	ExaGrid EX40000E*
	ExaGrid EX32000E*
	Dell EMC DD9800
	HPE StoreOnce 6600
	NEC HYDRAstor HS8-5000 Series
	Quantum DXi6900 Series
EXCELLENT	ExaGrid EX21000E*
	ExaGrid EX13000E*
	ExaGrid EX10000E*
	ExaGrid EX7000*
	ExaGrid EX5000*
	ExaGrid EX3000*
	HPE StoreOnce 5500
	HPE StoreOnce 5100
	NEC HYDRAstor HS3-510
	Quantum DXi4700 Series
GOOD	Dell EMC DD9300
	Dell EMC DD6800
	HPE StoreOnce 3540
	HPE StoreOnce 3520
	HPE StoreOnce 3100
	Quest DR6300

* The licensing vendor's products are listed first in each ranking category.

DCIG Observations for Each Ranking

General Observations

General observations on all products in the *DCIG 2018 Deduplication Backup Target Appliance Buyer's Guide* include the following:

- All support variable length block deduplication

- All support the backup of incoming data while concurrently replicating to another system

- All support bandwidth throttling from one appliance to another

- All support backup acceleration software (Symantec OST is the most prevalent, others include DD Boost, Accent, and HPE Catalyst)

- All recognize metadata of certain file formats to improve deduplication

- Nearly all support IPMI (Intelligent Platform Management Interface) for BIOS-level management

- All support the ability to configure network ports for certain tasks

- Most appliances have performance monitoring capabilities

- Most vendors support an all-inclusive pricing model where deduplication, encryption, and backup acceleration is included in the appliances base cost

Recommended Ranking

The following six (6) appliances earned the ranking of *Recommended:* Dell EMC DD9800; ExaGrid EX40000E and EX32000E; the HPE StoreOnce 6600; the NEC HYDRAstor HS8-5000 Series; and the Quantum DXI6900 Series. The products shared the following characteristics:

- All these appliances offer highly available configurations

- 85% of these appliances scale to support over 1PB of raw capacity

- Two-thirds of these appliances are available in a scale-out configuration

- Two-thirds of these appliances support HDDs of 6TB or larger

Since the release of the last Guide on this topic, Dell and EMC have become one company. It has introduced a new line-up of Data Domain appliances with the DD9800 model earning a Recommended ranking. Dell EMC made a number of significant enhancements to its Data Domain line-up in the past year to include a High Availability option, BoostFS and ProtectPoint features to accelerate backups, and a new Cloud Tier offering that can store and manage up to 2TBs of data with public cloud storage providers. The DD9800 itself scales up to 1PB of usable capacity with an estimated raw capacity of 1.2 PB.

Dell EMC added SSD flash to its Data Domain systems which they use to accelerate metadata access and lookup. Dell EMC also enhanced their ability to operate VMs on the appliance for data recovery. Instead of needing to restore VMs directly to primary storage, they can now host up to 32 VMs which can boot directly on the appliance.

ExaGrid's scale-out architecture, newly announced cloud offering, along with ongoing virtualization enhancements helped the EX40000E and EX32000E, respectively, earn the ranking of *Recommended*. The ExaGrid EX40000E ships with up to 96TB of raw capacity per node or 78TB of usable capacity. Key new announcements from ExaGrid since the release of the last Guide are its 33% increase in raw capacity per node of the EX40000E and its increases in the number of nodes available in its scale-out GRID to 25 nodes. This expanded capacity and larger number of nodes allows the EX40000E to scale to 1PB of usable capacity in a full 25 node scale-out configuration.

ExaGrid's appliances are the only ones to keep a full, initial copy of backup data *(not deduplicated)* on its Landing Zone. ExaGrid's Adaptive Deduplication technology starts to dedupli-cate data only after the data lands on the appliance. However, the Adaptive Deduplication technology does not need to wait to deduplicate data until a backup job completes.

Keeping full initial copies of backups in an undeduplicated state has some additional benefits. Unlike appliances that only deduplicate inline, an ExaGrid system can restore from the most recent backup without going through the rehydra-tion process. This accelerates data recovery and enables rapid virtual machine (VM) boots.

HPE introduced a refreshed lineup of deduplication appli-ances ranging from the enterprise down to the small and remote offices. HPE made enhancements in integration and

appliance management and performance features. HPE appliances now include flexible connectivity options and direct integration with 3PAR for snapshot offloading capabilities and performance enhancements using its Recovery Manager Central (RMC) software. HPE expects to extend this functionality to its recently acquired line of Nimble storage in the very near future.

The HPE StoreOnce 6600 is one of the few appliances that scales to multiple petabytes. HPE utilizes both scale-up and scale-out options in the StoreOnce architecture. The cluster can be scaled out to eight nodes grouped as four couplets and each couplet may be scaled up by adding up to five expansion upgrades.

HPE also offers a virtual appliance edition of its deduplication appliance. HPE's virtual appliance can be used in small office and remote settings to perform deduplication at a lower cost than selecting a hardware appliance. While most virtual appliances scale in the single to low-double-digit TB range HPE's virtual appliance scales to as much as 50 TB in raw capacity.

The Quantum DXi6900 Series rounds out the list of products ranked as *Recommended*. Three features specifically contributed to it achieving this ranking. First, it uses Quantum's StorNext file system for data integrity checking, metadata management, and storage optimization to balance performance across the system. Second, it offers a "pay as you grow" feature to enable enterprises to license additional capacity as they need it in 17TB increments. Finally, it offers its own backup software, vmPRO, to enable enterprises to natively protect VMs without the need to acquire other 3rd party backup software to protect this part of their environment.

Excellent Ranking

The ten (10) products that achieved an *Excellent* ranking in the *DCIG 2018 Deduplicating Backup Appliance Buyer's Guide* include the ExaGrid EX21000E, EX13000E, EX10000E, EX7000, EX5000, and EX3000 models; the HPE StoreOnce 5500 and 5100 models; the NEC HYDRAstor HS3-510; and, the Quantum DXi4700. These products have the following characteristics in common:

- 90% have metering capabilities (compared to 70% in the *Good* ranking)

- 80% support raw capacities of at least 300TBs

- 50% support 500TBs or more of raw capacity

- 30% support more than 1PB of raw capacity

- 100% support cloud backup (compared to 85% in the *Good* ranking)

- All support WAN acceleration to the cloud storage provider

- 100% support WAN acceleration to a cloud storage provider (compared to 50% in the *Good* Ranking)

The ExaGrid products ranked as *Excellent* complement the ExaGrid products ranked as *Recommended*. While these appliances scale to lower levels of raw capacity to meet the specific needs of small and midsized enterprises, enterprises have the option to mix and match any ExaGrid appliances in its scale-out GRID architecture. These lower capacity appliances give enterprises the option to scale-out at a more granular level or, optionally, start with these smaller appliances and then introduce larger capacity appliances should the need arise. Regardless of how an enterprise starts with ExaGrid or which direction it takes longer term, these appliances give them the flexibility to grow as they need and then seamlessly move into a larger solution.

The appliances from the other vendors resemble ExaGrid's appliances in that they offer the same software features as their *Recommended* counterpart(s) though they provide fewer hardware resources and, in the case of the HPE StoreOnce appliances, only do scale-up as opposed to scale-out. In every case, the appliances from these vendors will offer amounts of storage capacity, memory, and networking ports more appropriate for small to midsized enterprise environments.

Good Ranking

Six (6) products achieved a *Good* ranking in the *2018 Deduplication Backup Target Appliance Buyer's Guide* include the following: the Dell EMC DD6800 and DD9300 models; the HPE StoreOnce 3100, 3520, and 3540 models; and, the Quest DR6300. These products generally shared the following characteristics:

- All support concurrent restore and backup

- 70% include reporting mechanisms to show forecasted

capacity based on historical utilization

- 85% provide performance thresholds alerts

- 70% support 400 or more concurrent streams

- 50% scale to less than 100TBs

The first and only product from Quest in this Guide, the DR6300 deduplication backup target appliance shows up with a *Good* ranking. Quest specifically targets the small and midsized enterprise (SME) with this model. This product was originally part of Dell before its acquisition of EMC and was then spun out as part of Dell's divestiture of Dell Software which has now become Quest.

The Quest DR6300 possesses a few key attributes that make it stand out from competitive products. For instance, it is one of the few to offer a standard 3-year warranty versus many of its competitors which only offer a 1-year warranty or less. It is also the only product to offer backup acceleration software that is based on CIFS and NFS protocols which it appropriately names Rapid CIFS and Rapid NFS. Finally, it has an all-inclusive software licensing model which includes key features most SMEs need such as backup acceleration, encryption, and replication.

The five products from the other two vendors, Dell EMC and HPE, possess the same software attributes as their more highly ranked models. However, these again have more limited hardware features to make them more cost-effective and space efficient for the SME environments in which they are often deployed.

DEDUPLICATION BACKUP TARGET APPLIANCE PRODUCTS

ExaGrid EX40000E

OVERALL RANK   RECOMMENDED

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	32
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	500

Public Cloud Providers *TOTAL #*	3
Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	3
Bypass	✓
Inline	●
Post Process	Adaptive

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	●
Concurrent NAS/VTL	●

Instant VM Recovery on Appliance	✓

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	2

Path to Tape	●

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

MANAGEMENT

Bandwidth Throttling *TOTAL #*	1
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	3
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	●
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	●

HARDWARE

Cache *MAX*	1,600GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	●
Ethernet Ports 1/10/40 GbE *MAX*	4 / 2 / 2
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	6
Raw Storage Capacity *MIN/MAX*	96TB / 2.4PB
Scale-out	✓
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	3
Hardware Warranty	90 Days

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

ExaGrid EX32000E

OVERALL RANK **RECOMMENDED**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	32
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	500
Public Cloud Providers *TOTAL #*	3
Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	3
Bypass	✓
Inline	●
Post Process	Adaptive

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	●
Concurrent NAS/VTL	●
Instant VM Recovery on Appliance	✓

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	2
Path to Tape	●

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

MANAGEMENT

Bandwidth Throttling *TOTAL #*	1
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	3
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	●
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	●

HARDWARE

Cache *MAX*	800GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	●
Ethernet Ports 1/10/40 GbE *MAX*	6 / 2 / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	4
Raw Storage Capacity *MIN/MAX*	84TB / 2.1PB
Scale-out	✓
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	3
Hardware Warranty	90 Days

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

ExaGrid EX21000E

OVERALL RANK EXCELLENT

2018 DCIG BUYER'S GUIDE — DEDUPLICATION BACKUP TARGET APPLIANCE

SOFTWARE

Backup Software	
Backup Software Streams Recognized **TOTAL #**	32
Concurrent Backup & Replication	✓
Concurrent Streams **MAX**	500
Public Cloud Providers **TOTAL #**	3
Cloud Tiering	⬤

Deduplication	
Acceleration Software **TOTAL #**	2
Algorithms **TOTAL #**	3
Bypass	✓
Inline	⬤
Post Process	Adaptive

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	⬤

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	⬤
Concurrent NAS/VTL	⬤
Instant VM Recovery on Appliance	✓

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	⬤
Fan-in/Fan-out **TOTAL #**	2
Path to Tape	⬤

MANAGEMENT

Bandwidth Throttling **TOTAL #**	1
Forecasted Capacity Reporting	✓
Hypervisors **TOTAL #**	⬤
IPMI – Remote Management	✓
Management Interfaces **TOTAL #**	3
Network Port Configuration	✓
Notification Options **TOTAL #**	3
Partitions **TOTAL #**	⬤
Performance Monitoring	✓
Report Types **TOTAL #**	3
Threshold Alerts	✓
Virtual Appliance	⬤

HARDWARE

Cache **MAX**	800GB
Controllers **MAX/SYSTEM**	1
Controller Configurations **TOTAL #**	2
Erasure Coding	RAID 6
Ethernet/FC Mix	⬤
Ethernet Ports 1/10/40 GbE **MAX**	6 / 2 / ⬤
FC Ports 4/8/16 Gb **MAX**	⬤ / ⬤ / ⬤
Processor Cores **MAX**	4
Raw Storage Capacity **MIN/MAX**	60TB / 1.5PB
Scale-out	✓
Storage Networking Protocols **TOTAL #**	4
SSD Capacity **MAX**	⬤

SUPPORT

Automated Support Alerts **TOTAL #**	3
Standard Support Availability	Business Day
Support Contact Methods **TOTAL #**	3
Hardware Warranty	90 Days

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✓ SUPPORTED ⬤ UNDETERMINED / UNSUPPORTED

ExaGrid EX13000E

SOFTWARE

Backup Software

Backup Software Streams Recognized *TOTAL #*	32
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	500

Public Cloud Providers *TOTAL #*	3
Cloud Tiering	●

Deduplication

Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	3
Bypass	✓
Inline	●
Post Process	Adaptive

Display Real-time Dedupe Ratio

Entire Appliance	✓
By Backup Job	●

Encryption

Algorithms	AES-256
Types	In-flight/At rest

Interfaces

CIFS/SMB	✓
NFS	✓
VTL	●
Concurrent NAS/VTL	●

Instant VM Recovery on Appliance	✓

Replication

Continuous	✓
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	2

Path to Tape	●

MANAGEMENT

Bandwidth Throttling *TOTAL #*	1
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	3
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	●
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	●

HARDWARE

Cache *MAX*	400GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	●
Ethernet Ports 1/10/40 GbE *MAX*	6 / 2 / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	4
Raw Storage Capacity *MIN/MAX*	40TB / 1,000TB
Scale-out	✓
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	3
Hardware Warranty	90 Days

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

ExaGrid EX10000E

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	32
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	500
Public Cloud Providers *TOTAL #*	3
Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	3
Bypass	✓
Inline	●
Post Process	Adaptive

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	●
Concurrent NAS/VTL	●
Instant VM Recovery on Appliance	✓

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	2
Path to Tape	●

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

MANAGEMENT

Bandwidth Throttling *TOTAL #*	1
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	3
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	●
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	●

HARDWARE

Cache *MAX*	400GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	●
Ethernet Ports 1/10/40 GbE *MAX*	6 / 2 / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	4
Raw Storage Capacity *MIN/MAX*	32TB / 800TB
Scale-out	✓
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	3
Hardware Warranty	90 Days

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

ExaGrid EX7000

OVERALL RANK **EXCELLENT**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	32
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	500
Public Cloud Providers *TOTAL #*	3
Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	3
Bypass	✓
Inline	●
Post Process	Adaptive

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	●
Concurrent NAS/VTL	●
Instant VM Recovery on Appliance	✓

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	2
Path to Tape	●

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

MANAGEMENT

Bandwidth Throttling *TOTAL #*	1
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	3
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	●
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	●

HARDWARE

Cache *MAX*	200GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	●
Ethernet Ports 1/10/40 GbE *MAX*	4 / 2 / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	4
Raw Storage Capacity *MIN/MAX*	20TB / 500TB
Scale-out	✓
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	3
Hardware Warranty	90 Days

✓ SUPPORTED ● UNDETERMINED / UNSUPPORTED

ExaGrid EX5000

OVERALL RANK   EXCELLENT

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	32
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	500

Public Cloud Providers *TOTAL #*	3
Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	3
Bypass	✓
Inline	●
Post Process	Adaptive

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	●
Concurrent NAS/VTL	●

Instant VM Recovery on Appliance	✓

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	2

Path to Tape	●

MANAGEMENT

Bandwidth Throttling *TOTAL #*	1
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	3
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	●
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	●

HARDWARE

Cache *MAX*	200GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	●
Ethernet Ports 1/10/40 GbE *MAX*	4 / 2 / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	4
Raw Storage Capacity *MIN/MAX*	16TB / 400TB
Scale-out	✓
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	3
Hardware Warranty	90 Days

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

ExaGrid EX3000

SOFTWARE

Backup Software

Backup Software	
Backup Software Streams Recognized *TOTAL #*	32
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	500
Public Cloud Providers *TOTAL #*	3
Cloud Tiering	●

Deduplication

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	3
Bypass	✓
Inline	●
Post Process	Adaptive

Display Real-time Dedupe Ratio

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	●
Concurrent NAS/VTL	●
Instant VM Recovery on Appliance	✓

Replication

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	2
Path to Tape	●

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

MANAGEMENT

Management	
Bandwidth Throttling *TOTAL #*	1
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	3
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	●
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	●

HARDWARE

Hardware	
Cache *MAX*	200GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	●
Ethernet Ports 1/10/40 GbE *MAX*	4 / 2 / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	4
Raw Storage Capacity *MIN/MAX*	12TB / 300TB
Scale-out	✓
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	●

SUPPORT

Support	
Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	3
Hardware Warranty	90 Days

✓ SUPPORTED ● UNDETERMINED / UNSUPPORTED

Dell EMC DD6800

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	15
Concurrent Backup & Replication	✔
Concurrent Streams *MAX*	1,080
Public Cloud Providers *TOTAL #*	5
Cloud Tiering	✔

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	1
Bypass	⬤
Inline	✔
Post Process	⬤

Display Real-time Dedupe Ratio	
Entire Appliance	✔
By Backup Job	✔

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✔
NFS	✔
VTL	✔
Concurrent NAS/VTL	✔

Instant VM Recovery on Appliance	✔

Replication	
Continuous	✔
Periodic/Scheduled	✔
Synchronous	✔
Fan-in/Fan-out *TOTAL #*	4

Path to Tape	⬤

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.
NO FEEDBACK WAS RECEIVED FROM DELL EMC.

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✔
Hypervisors *TOTAL #*	1
IPMI – Remote Management	✔
Management Interfaces *TOTAL #*	7
Network Port Configuration	✔
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	100
Performance Monitoring	✔
Report Types *TOTAL #*	3
Threshold Alerts	✔
Virtual Appliance	✔

HARDWARE

Cache *MAX*	192GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	1
Erasure Coding	RAID 6
Ethernet/FC Mix	✔
Ethernet Ports 1/10/40 GbE *MAX*	4 / 16 / ⬤
FC Ports 4/8/16 Gb *MAX*	⬤ / 8 / ⬤
Processor Cores *MAX*	12
Raw Storage Capacity *MIN/MAX*	172TB / 345TB
Scale-out	⬤
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	6.4TB

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	4
Hardware Warranty	1 Year

✔ SUPPORTED   ⬤ UNDETERMINED / UNSUPPORTED

Dell EMC DD9300

SOFTWARE

Backup Software

Backup Software Streams Recognized *TOTAL #*	15
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	1,080

Public Cloud Providers *TOTAL #*	5
Cloud Tiering	✓

Deduplication

Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	1
Bypass	●
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio

Entire Appliance	✓
By Backup Job	✓

Encryption

Algorithms	AES-256
Types	In-flight/At rest

Interfaces

CIFS/SMB	✓
NFS	✓
VTL	✓
Concurrent NAS/VTL	✓

Instant VM Recovery on Appliance	✓

Replication

Continuous	✓
Periodic/Scheduled	✓
Synchronous	✓
Fan-in/Fan-out *TOTAL #*	4

Path to Tape	●

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

NO FEEDBACK WAS RECEIVED FROM DELL EMC.

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	1
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	7
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	100
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	✓

HARDWARE

Cache *MAX*	384GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	1
Erasure Coding	RAID 6
Ethernet/FC Mix	✓
Ethernet Ports 1/10/40 GbE *MAX*	4 / 16 / ●
FC Ports 4/8/16 Gb *MAX*	● / 8 / ●
Processor Cores *MAX*	12
Raw Storage Capacity *MIN/MAX*	460TB / 864TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	12TB

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	4
Hardware Warranty	1 Year

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

Dell EMC DD9800

OVERALL RANK **RECOMMENDED**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	15
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	1,080

Public Cloud Providers *TOTAL #*	5

Cloud Tiering	✓

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	1
Bypass	●
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	✓

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	✓
Concurrent NAS/VTL	✓

Instant VM Recovery on Appliance	✓

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	✓
Fan-in/Fan-out *TOTAL #*	4

Path to Tape	●

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	1
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	7
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	100
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	✓

HARDWARE

Cache *MAX*	768GB
Controllers *MAX/SYSTEM*	2
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	✓
Ethernet Ports 1/10/40 GbE *MAX*	4 / 16 / ●
FC Ports 4/8/16 Gb *MAX*	● / 8 / ●
Processor Cores *MAX*	16
Raw Storage Capacity *MIN/MAX*	206TB / 1.2PB
Scale-out	●
Storage Networking Protocols *TOTAL #*	4
SSD Capacity *MAX*	12TB

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	Business Day
Support Contact Methods *TOTAL #*	4
Hardware Warranty	1 Year

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.
NO FEEDBACK WAS RECEIVED FROM DELL EMC.

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

HPE StoreOnce 3100

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	18
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	32
Public Cloud Providers *TOTAL #*	4
Cloud Tiering	✓

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	5
Bypass	✓
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-128/AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	✓
Concurrent NAS/VTL	✓
Instant VM Recovery on Appliance	✓

Replication	
Continuous	●
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	5
Path to Tape	✓

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	3
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	8
Network Port Configuration	✓
Notification Options *TOTAL #*	2
Partitions *TOTAL #*	8
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	✓

HARDWARE

Cache *MAX*	32GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	1
Erasure Coding	●
Ethernet/FC Mix	✓
Ethernet Ports 1/10/40 GbE *MAX*	4 / ● / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	6
Raw Storage Capacity *MIN/MAX*	8TB / 8TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	6
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	2
Standard Support Availability	24X7X365
Support Contact Methods *TOTAL #*	4
Hardware Warranty	1 Year

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✓ SUPPORTED ● UNDETERMINED / UNSUPPORTED

HPE StoreOnce 3520

OVERALL RANK **GOOD**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	18
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	96

Public Cloud Providers *TOTAL #*	4
Cloud Tiering	✓

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	5
Bypass	✓
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-128/AES-256
Types	At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	✓
Concurrent NAS/VTL	✓

Instant VM Recovery on Appliance	✓

Replication	
Continuous	●
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	5

Path to Tape	✓

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	3
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	8
Network Port Configuration	✓
Notification Options *TOTAL #*	2
Partitions *TOTAL #*	12
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	✓

HARDWARE

Cache *MAX*	64GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	1
Erasure Coding	RAID 6
Ethernet/FC Mix	✓
Ethernet Ports 1/10/40 GbE *MAX*	4 / 8 / ●
FC Ports 4/8/16 Gb *MAX*	● / 8 / ●
Processor Cores *MAX*	12
Raw Storage Capacity *MIN/MAX*	12TB / 24TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	7
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	2
Standard Support Availability	24X7X365
Support Contact Methods *TOTAL #*	4
Hardware Warranty	1 Year

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✓ SUPPORTED ● UNDETERMINED / UNSUPPORTED

HPE StoreOnce 3540

OVERALL RANK **GOOD**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	18
Concurrent Backup & Replication	✔
Concurrent Streams *MAX*	96
Public Cloud Providers *TOTAL #*	4
Cloud Tiering	✔

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	5
Bypass	✔
Inline	✔
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✔
By Backup Job	●

Encryption	
Algorithms	AES-128/AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✔
NFS	✔
VTL	✔
Concurrent NAS/VTL	✔
Instant VM Recovery on Appliance	✔

Replication	
Continuous	●
Periodic/Scheduled	✔
Synchronous	●
Fan-in/Fan-out *TOTAL #*	5
Path to Tape	✔

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✔
Hypervisors *TOTAL #*	3
IPMI – Remote Management	✔
Management Interfaces *TOTAL #*	8
Network Port Configuration	✔
Notification Options *TOTAL #*	2
Partitions *TOTAL #*	24
Performance Monitoring	✔
Report Types *TOTAL #*	3
Threshold Alerts	✔
Virtual Appliance	✔

HARDWARE

Cache *MAX*	64GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	1
Erasure Coding	RAID 6
Ethernet/FC Mix	✔
Ethernet Ports 1/10/40 GbE *MAX*	4 / 8 / ●
FC Ports 4/8/16 Gb *MAX*	● / 8 / ●
Processor Cores *MAX*	12
Raw Storage Capacity *MIN/MAX*	24TB / 48TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	7
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	2
Standard Support Availability	24X7X365
Support Contact Methods *TOTAL #*	4
Hardware Warranty	1 Year

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✔ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

HPE StoreOnce 5100

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	18
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	256
Public Cloud Providers *TOTAL #*	4
Cloud Tiering	✓

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	5
Bypass	✓
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-128/AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	✓
Concurrent NAS/VTL	✓
Instant VM Recovery on Appliance	✓

Replication	
Continuous	●
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	5
Path to Tape	✓

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	3
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	8
Network Port Configuration	✓
Notification Options *TOTAL #*	2
Partitions *TOTAL #*	50
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	✓

HARDWARE

Cache *MAX*	128GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	1
Erasure Coding	RAID 6
Ethernet/FC Mix	✓
Ethernet Ports 1/10/40 GbE *MAX*	4 / 8 / ●
FC Ports 4/8/16 Gb *MAX*	● / 8 / ●
Processor Cores *MAX*	16
Raw Storage Capacity *MIN/MAX*	48TB / 288TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	7
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	2
Standard Support Availability	24X7X365
Support Contact Methods *TOTAL #*	4
Hardware Warranty	1 Year

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

HPE StoreOnce 5500

OVERALL RANK   EXCELLENT

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	18
Concurrent Backup & Replication	✔
Concurrent Streams *MAX*	256

Public Cloud Providers *TOTAL #*	4

Cloud Tiering	✔

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	5
Bypass	✔
Inline	✔
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✔
By Backup Job	●

Encryption	
Algorithms	AES-128/AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✔
NFS	✔
VTL	✔
Concurrent NAS/VTL	✔

Instant VM Recovery on Appliance	✔

Replication	
Continuous	●
Periodic/Scheduled	✔
Synchronous	●
Fan-in/Fan-out *TOTAL #*	5

Path to Tape	✔

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✔
Hypervisors *TOTAL #*	3
IPMI – Remote Management	✔
Management Interfaces *TOTAL #*	8
Network Port Configuration	✔
Notification Options *TOTAL #*	2
Partitions *TOTAL #*	50
Performance Monitoring	✔
Report Types *TOTAL #*	3
Threshold Alerts	✔
Virtual Appliance	✔

HARDWARE

Cache *MAX*	384GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	✔
Ethernet Ports 1/10/40 GbE *MAX*	4 / 8 / ●
FC Ports 4/8/16 Gb *MAX*	● / 8 / 8
Processor Cores *MAX*	24
Raw Storage Capacity *MIN/MAX*	60TB / 1,120TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	7
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	2
Standard Support Availability	24X7X365
Support Contact Methods *TOTAL #*	4
Hardware Warranty	3 Years

✔ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

HPE StoreOnce 6600

OVERALL RANK **RECOMMENDED**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	18
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	4,096
Public Cloud Providers *TOTAL #*	4
Cloud Tiering	✓

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	5
Bypass	✓
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-128/AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	✓
Concurrent NAS/VTL	✓
Instant VM Recovery on Appliance	✓

Replication	
Continuous	●
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	5
Path to Tape	✓

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	3
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	8
Network Port Configuration	✓
Notification Options *TOTAL #*	2
Partitions *TOTAL #*	384
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	✓

HARDWARE

Cache *MAX*	2,048GB
Controllers *MAX/SYSTEM*	8
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	✓
Ethernet Ports 1/10/40 GbE *MAX*	32 / 64 / ●
FC Ports 4/8/16 Gb *MAX*	● / 32 / 32
Processor Cores *MAX*	24
Raw Storage Capacity *MIN/MAX*	120TB / 2,240TB
Scale-out	✓
Storage Networking Protocols *TOTAL #*	7
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	2
Standard Support Availability	24X7X365
Support Contact Methods *TOTAL #*	4
Hardware Warranty	3 Years

✓ **SUPPORTED**   ● **UNDETERMINED / UNSUPPORTED**

NEC HYDRAstor HS3-510

OVERALL RANK **EXCELLENT**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	8
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	30

Public Cloud Providers *TOTAL #*	2
Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	1
Bypass	●
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	✓

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	●
Concurrent NAS/VTL	●

Instant VM Recovery on Appliance	✓

Replication	
Continuous	●
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	3

Path to Tape	●

MANAGEMENT

Bandwidth Throttling *TOTAL #*	1
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	5
Network Port Configuration	✓
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	250
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	●

HARDWARE

Cache *MAX*	48GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	1
Erasure Coding	✓
Ethernet/FC Mix	●
Ethernet Ports 1/10/40 GbE *MAX*	10 / 4 / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	12
Raw Storage Capacity *MIN/MAX*	8TB / 24TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	5
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	2
Standard Support Availability	8am EST to 8pm PST
Support Contact Methods *TOTAL #*	3
Hardware Warranty	3 Years

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✓ SUPPORTED ● UNDETERMINED / UNSUPPORTED

NEC HYDRAstor HS8-5000 Series

OVERALL RANK **RECOMMENDED**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	8
Concurrent Backup & Replication	✔
Concurrent Streams *MAX*	1,000

Public Cloud Providers *TOTAL #*	2

Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	1
Bypass	●
Inline	✔
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✔
By Backup Job	✔

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✔
NFS	✔
VTL	●
Concurrent NAS/VTL	●

Instant VM Recovery on Appliance	✔

Replication	
Continuous	●
Periodic/Scheduled	✔
Synchronous	●
Fan-in/Fan-out *TOTAL #*	3

Path to Tape	●

MANAGEMENT

Bandwidth Throttling *TOTAL #*	3
Forecasted Capacity Reporting	✔
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✔
Management Interfaces *TOTAL #*	2
Network Port Configuration	✔
Notification Options *TOTAL #*	3
Partitions *TOTAL #*	250
Performance Monitoring	✔
Report Types *TOTAL #*	3
Threshold Alerts	●
Virtual Appliance	✔

HARDWARE

Cache *MAX*	21,120GB
Controllers *MAX/SYSTEM*	165
Controller Configurations *TOTAL #*	2
Erasure Coding	✔
Ethernet/FC Mix	●
Ethernet Ports 1/10/40 GbE *MAX*	6 / 2 / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / ●
Processor Cores *MAX*	20
Raw Storage Capacity *MIN/MAX*	18TB / 11,880TB
Scale-out	✔
Storage Networking Protocols *TOTAL #*	5
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	2
Standard Support Availability	8am EST to 8pm PST
Support Contact Methods *TOTAL #*	3
Hardware Warranty	3 Years

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✔ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

Quantum DXi4700 Series

OVERALL RANK **EXCELLENT**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	10
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	100
Public Cloud Providers *TOTAL #*	1
Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	1
Bypass	✓
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	✓

Encryption	
Algorithms	AES-256, AES-128
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	✓
Concurrent NAS/VTL	✓

Instant VM Recovery on Appliance	✓

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	✓
Fan-in/Fan-out *TOTAL #*	3

Path to Tape	✓

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	2
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	2
Network Port Configuration	✓
Notification Options *TOTAL #*	2
Partitions *TOTAL #*	64
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	✓

HARDWARE

Cache *MAX*	96GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	1
Erasure Coding	RAID 6
Ethernet/FC Mix	✓
Ethernet Ports 1/10/40 GbE *MAX*	3 / 2 / ●
FC Ports 4/8/16 Gb *MAX*	● / 4 / ●
Processor Cores *MAX*	12
Raw Storage Capacity *MIN/MAX*	6TB / 160TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	3
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	24X7X365
Support Contact Methods *TOTAL #*	4
Hardware Warranty	1 Year

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

Quantum DXi6900 Series

OVERALL RANK **RECOMMENDED**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	10
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	1,024
Public Cloud Providers *TOTAL #*	1
Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	2
Algorithms *TOTAL #*	1
Bypass	✓
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	✓

Encryption	
Algorithms	AES-256, AES-128
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	✓
Concurrent NAS/VTL	✓
Instant VM Recovery on Appliance	✓

Replication	
Continuous	✓
Periodic/Scheduled	✓
Synchronous	✓
Fan-in/Fan-out *TOTAL #*	3
Path to Tape	✓

MANAGEMENT

Bandwidth Throttling *TOTAL #*	2
Forecasted Capacity Reporting	✓
Hypervisors *TOTAL #*	2
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	2
Network Port Configuration	✓
Notification Options *TOTAL #*	2
Partitions *TOTAL #*	64
Performance Monitoring	✓
Report Types *TOTAL #*	3
Threshold Alerts	✓
Virtual Appliance	✓

HARDWARE

Cache *MAX*	256GB
Controllers *MAX/SYSTEM*	2
Controller Configurations *TOTAL #*	2
Erasure Coding	RAID 6
Ethernet/FC Mix	✓
Ethernet Ports 1/10/40 GbE *MAX*	3 / 6 / ●
FC Ports 4/8/16 Gb *MAX*	● / ● / 6
Processor Cores *MAX*	16
Raw Storage Capacity *MIN/MAX*	24TB / 720TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	3
SSD Capacity *MAX*	10.4TB

SUPPORT

Automated Support Alerts *TOTAL #*	3
Standard Support Availability	24X7X365
Support Contact Methods *TOTAL #*	4
Hardware Warranty	1 Year

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✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

Quest DR6300

OVERALL RANK   **GOOD**

SOFTWARE

Backup Software	
Backup Software Streams Recognized *TOTAL #*	22
Concurrent Backup & Replication	✓
Concurrent Streams *MAX*	512

Public Cloud Providers *TOTAL #*	●
Cloud Tiering	●

Deduplication	
Acceleration Software *TOTAL #*	3
Algorithms *TOTAL #*	1
Bypass	✓
Inline	✓
Post Process	●

Display Real-time Dedupe Ratio	
Entire Appliance	✓
By Backup Job	●

Encryption	
Algorithms	AES-256
Types	In-flight/At rest

Interfaces	
CIFS/SMB	✓
NFS	✓
VTL	✓
Concurrent NAS/VTL	✓

Instant VM Recovery on Appliance	●

Replication	
Continuous	●
Periodic/Scheduled	✓
Synchronous	●
Fan-in/Fan-out *TOTAL #*	3

Path to Tape	●

MANAGEMENT

Bandwidth Throttling *TOTAL #*	1
Forecasted Capacity Reporting	●
Hypervisors *TOTAL #*	●
IPMI – Remote Management	✓
Management Interfaces *TOTAL #*	5
Network Port Configuration	✓
Notification Options *TOTAL #*	4
Partitions *TOTAL #*	128
Performance Monitoring	●
Report Types *TOTAL #*	3
Threshold Alerts	●
Virtual Appliance	✓

HARDWARE

Cache *MAX*	128GB
Controllers *MAX/SYSTEM*	1
Controller Configurations *TOTAL #*	1
Erasure Coding	RAID 6
Ethernet/FC Mix	✓
Ethernet Ports 1/10/40 GbE *MAX*	8 / 6 / ●
FC Ports 4/8/16 Gb *MAX*	● / 2 / 2
Processor Cores *MAX*	28
Raw Storage Capacity *MIN/MAX*	48TB / 480TB
Scale-out	●
Storage Networking Protocols *TOTAL #*	5
SSD Capacity *MAX*	●

SUPPORT

Automated Support Alerts *TOTAL #*	2
Standard Support Availability	24X7X365
Support Contact Methods *TOTAL #*	4
Hardware Warranty	3 Years

The DCIG Competitive Intelligence Portal contains additional data elements that are reflected in the overall ranking, but which are not shown on this data sheet.

✓ SUPPORTED   ● UNDETERMINED / UNSUPPORTED

How to Use this Buyer's Guide

This Buyer's Guide is intended to help users accelerate their product research and selection process—driving cost out of the research process while simultaneously increasing confidence in the results. The purpose of this Buyer's Guide is NOT intended to tell users exactly which product(s) to purchase. Rather, it is to guide them in coming up with a list of competitive products that have comparable features that meet their specific needs.

Features, as displayed on each product data sheet, represent the opinion of DCIG. DCIG encourages and strongly recommends every organization to verify the functionality of the features that are of interest to them before making a buying decision. To help in that decision, this Buyer's Guide gives organizations a sense of how products compare with each other, as well as providing additional insight into what other product offerings are available on the market and the specific features they offer.

DCIG recommends that companies use this Buyer's Guide in the following seven ways:

1. *Eliminate the painstaking research normally associated with identifying a shortlist of products that meet their needs.* This Buyer's Guide evaluates products from 22 different products from six different vendors. Each product is ranked *Recommended*, *Excellent,* or *Good*. More than 100 different features were evaluated, so organizations only need to look at the rankings and features to come up with a shortlist for consideration.

2. *Do apples-to-apples comparisons of products from different vendors.* It behooves an organization to get competitive bids from multiple vendors. But that tactic only works well when organizations know that they are receiving competitive bids on products that are roughly comparable. Using this Buyer's Guide, organizations can do a better job of accomplishing that objective.

3. *Separate the apples from the oranges.* Just as important as doing apples-to-apples comparisons is identifying when an orange is thrown into the mix. Sometimes it is very difficult for an organization to know if it is truly getting a good deal when bids come in from vendors that include different products. Now organizations can refer to the rankings and features of each product in this guide so they can determine if they are evaluating comparable products.

4. *Gain perspective on how products from less well-known vendors compare against established and better-known brands.* There's a built-in level of comfort when buying products from well-known vendors. There's also a built-in resistance to buying products from vendors that are perceived as unknown quantities. This Buyer's Guide helps to remove some of that apprehension about buying products from less well known vendors. Using this Buyer's Guide, organizations can see how these products stack up.

5. *Normalize complex terminology.* Every segment across industries has a proclivity to adopt acronyms and jargon that is specific to it. This Buyer's Guide sifts through the acronyms and jargon and then normalizes these terms, providing a foundation for meaningful comparisons. Definitions for these normalized terms are provided in the Glossary in this Guide.

6. *Take advantage of standardized data sheets to quickly compare products side-by-side.* Product data sheets that vendors make available are rarely laid out in the same way or contain the same information. Some vendors even have data sheet formats that vary from product to product within their own portfolio. This Buyer's Guide tackles this problem by creating a standard, easy-to-read data sheet for every product. In this way, product data sheets for individual products can be referenced and the features on them quickly compared.

7. *Help justify buying recommendations to business teams.* An overall ranking of *Recommended*, *Excellent,* or *Good* is included at the top of every product data sheet. This overall ranking summarizes in a single word how feature rich a product is compared to the other products in the Buyer's Guide.

Disclosures

Over the last few years the general trend in the US has been for both large and boutique analyst firms to receive some or all their revenue from vendors.

DCIG is no different in this respect as it also receives payment for the different services it performs for vendors. The services that DCIG provides include blogging, battle cards, competitive advantage reports, customer validations, pocket analyst reports, executive white papers, white papers, and special reports.

In the interest of transparency, some vendors included in this DCIG Buyer's Guide are or have been DCIG clients. This is not to imply that their products were given preferential treatment in the Buyer's Guide. All it means is that DCIG had more knowledge of their products so that DCIG could consider their product for inclusion in this Buyer's Guide.

In that vein, there are some points to keep in mind when considering the information contained in this Buyer's Guide and its merit.

- No vendor paid DCIG any fee to research this topic or arrive at predetermined conclusions

- DCIG did not guarantee any vendor that its product(s) would be included in this Guide

- DCIG did not imply or guarantee that a specific product would receive a preferential ranking in this Buyer's Guide, before or after completion of research

- All research was based upon publicly available information, information provided by the vendor, and/or the expertise of those evaluating the information

- No negative inferences should be drawn against any vendor or product not covered in this Buyer's Guide

- It is a misuse of this Buyer's Guide to compare products included in it against products not included

DCIG wants to emphasize that no vendor was privy to how DCIG weighed individual features. In every case the vendor only found out the rankings of its product(s) after the analysis was complete.

Inclusion Criteria

The *DCIG 2018 Deduplication Backup Target Appliance Buyer's Guide* was derived from DCIG's Cloud Data Protection Body of Research that examined more than 180 products that do data protection. The following criteria were used when determining whether to include a specific product in this Buyer's Guide:

- Appliance specifically designed to function as a backup target that deduplicates backup data

- Product is available as a physical appliance

- Product compresses and deduplicates data

- Provider offers and supports the appliance

- Sufficient information available to reach meaningful conclusions

- Product generally available by October 1, 2017

Ultimately, it is the professional judgment of the analysts working on each DCIG Buyer's Guide whether a model met the inclusion criteria.

The Eight-Step Process Used to Rank the Products

To rank each product included in this Buyer's Guide, DCIG went through an eight-step process to come to the most objective conclusion possible.

1. ***DCIG established which features would be evaluated and which ones would not.*** Prior to selecting the features which would be evaluated, DCIG quantified, then "normalized" the list of available features such that a common name for each feature was established. In cases where a feature could not be objectively defined or understood, it was excluded from consideration.

2. ***The features were grouped into four (4) general categories.*** These categories were: Hardware, Management, Software, and Support.

3. ***DCIG developed a survey to capture the feature data and completed a survey for each vendor's product(s).*** DCIG sent the completed survey(s) to each vendor for verification. Each vendor was invited to review their data and respond with any comments, corrections, or edits to the DCIG-completed survey(s). In every case, every vendor had the opportunity to review and respond to any DCIG-completed survey.

4. ***DCIG identified a list of products that met the DCIG definition for an "Deduplication Backup Target Appliance" based on the inclusion criteria.***

5. ***DCIG weighted each feature to establish a scoring rubric.*** The weighting of each feature was done by DCIG analysts. The weightings were used to reflect if a feature was supported and potentially how useful and/or important the feature was to end users.

6. ***Each product's features were scored based on information gathered in the surveys.*** Features were marked as either *"supported"* or

"unsupported/undetermined." Rankings were finalized after any updates from vendors had been entered and the review period expired.

7. ***Products were ranked using standard scoring techniques.*** One of the goals of this Buyer's Guide is to establish clear lines of differentiation with conclusions that are arrived at objectively. To accomplish this goal, the mean score for all products was first determined and then a standard deviation. DCIG developed an overall ranking for each product based on where that product's overall internal score fit into the various standard deviation ranges.

8. ***Product feature data review worksheets were created and sent to the vendors for review before publication.*** Each data sheet included in this published version of the Buyer's Guide is derived from a feature data review worksheet that was sent to the vendor for its review and feedback. In every case, each vendor had an opportunity to review and update the content included on its respective data sheet(s).

Due to the large number of product features that DCIG evaluated, only a subset of the collected data could be included on the data sheets. The feature data on the data sheets was selected, in part, based on the following criteria: 1) the most variability between answers to the features, 2) the greatest scoring weight associated with each feature, and 3) the greatest interest in the feature to prospective purchasers. The full set of product feature data may be accessed with a subscription to the DCIG Competitive Intelligence Portal available at **portal.dcig.com**.

DCIG Comments and Thoughts

Appliance Architecture: Scale-up versus Scale-out

Two methods for adding storage capacity to a deduplicating backup target appliance exist: scale-up and scale-out. Appliances from one vendor are even capable of both. This gives enterprises the flexibility to add more storage capacity by either adding more internal storage capacity or adding more nodes.

Deduplicating backup appliances that only offer a scale-up architecture range from single or low double-digit terabytes of capacity to hundreds of terabytes. This compares to deduplicating backup appliances that offer a scale-out

architecture where it adds more nodes with preconfigured amounts of memory, processing, and storage capacity to an existing configuration.

Each architecture has its benefits and limitations. Using a scale-out architecture, enterprises can purchase nodes as they need them. Each time they add a node to the solution, it provides more storage capacity, network interfaces and processing power.

Scale-up configurations increase storage capacity by incrementally adding more shelves to the existing system. Hard disk drives may then be installed in these shelves for more capacity. In these systems the amount of memory and number of processors do not necessarily and probably will not increase as one adds more storage capacity.

One benefit of using a scale-out architecture is that individual nodes are managed as a single logical entity by the solution. However just because they are all managed as a single, logical solution does not always necessarily mean that all the nodes work together as one collective entity.

For instance, enterprises should verify that a deduplicating backup appliance that uses a scale-out architecture offers "global deduplication". This feature deduplicates data across all the nodes in the system regardless of on which node the data resides. If it does not offer this feature, data is still deduplicated but only on each individual node.

One potential drawback to using a scale-out architecture is the possibility of "node sprawl" where there are stranded resources. Adding nodes is easy to do but it may not provide the optimal way to grow the system. To counter this, enterprises may want to purchase a solution that facilitates the acquisition of individual nodes that offer either more capacity or more processing power.

ExaGrid, HPE, and NEC each offer scale-out architectures. ExaGrid increased the storage capacity of its top end EX40000E model to support up to 96TBs. It also increased the maximum number of nodes it supports in a single, logical system to 25 nodes. ExaGrid can now combine 25 EX40000E appliances to deliver 2.4PBs of raw capacity in a single system.

HPE makes one of its deduplication backup target appliances available in a configuration that both scales out and scales up. The HPE StoreOnce 6600 can scale out to allow for a maximum of eight appliances in a single logical configuration. The 6600 scales out by adding two nodes at

a time. Further, enterprises do have the option to scale up by introducing more capacity into individual nodes. The StoreOnce 3520, 3540, 5100, and 5500 models are each available in scale-up configurations while the 3100 model, primarily targeted at remote and branch offices, does not scale up or out.

NEC differs in that it offers hybrid and storage nodes that can be added as needed to its scale-out configuration. These two node types enable enterprises to more granularly scale performance and capacity. Its HYDRAstor HS8-5000 Series scales up to 11.9 petabytes of storage capacity.

Dell EMC, Quantum, and Quest each offer appliances that do scale-up. Dell EMC has three appliance families that were covered in this Guide: the DD9800, DD9300, and DD6800 families. This Guide also covers the Quantum DXi4700 and DXi6900 Series product lines as well as the Quest DR6300.

Virtual Appliances

All vendors in this Buyer's Guide offer virtual appliances. Though virtual appliance SKUs are not formally evaluated in this Buyer's Guide, deduplicating backup target appliances that are available as virtual appliances stand poised to play a more important role in data protection going forward whether enterprises use them on-premises, in the cloud, or both.

There are three drivers motivating enterprises to deploy virtual appliances on-premises:

1. Hyper-converged infrastructure

2. Software defined storage

3. Virtualized remote and branch offices

Using virtual appliances, enterprises can avoid the need to deploy additional physical appliances and lower their capital costs as virtual appliances can be as much one quarter the cost of a comparably sized physical appliance. This savings usually comes without sacrificing any of the software features as most vendors include full featured versions of their software as part of their virtual appliance. However, virtual appliances may not perform or wear the same as their physical appliance counterparts for a couple of reasons.

Physical appliances dedicate all their available physical resources to deduplicating and maximizing data efficiency. Virtual appliances must share and compete for physical resources with other virtual machines on the host. Further, deduplication puts extra wear and tear on the underlying physical resources—specifically on hard disk drives—that may cause them to degrade more quickly.

That said, virtual appliances provide a good option for those enterprises that need to protect remote and branch offices and/or those who are prepared to create an underlying infrastructure that can meet the specific demands that deduplication backup target virtual appliances place upon. The performance demands associated with deduplicating data in remote and branch offices as well as applications residing on the cloud are generally much lower than those in corporate data center. This contributes to making these virtual appliances well positioned to handle these environments.

Including the full set of software features as part of the virtual appliance adds to their appeal. This software provides an economical and easy means for enterprises to deploy these virtual appliances into these remote or branch offices. They can easily deploy the virtual appliance into these offices *(assuming the offices are virtualized and use VMware vSphere or Microsoft Hyper-V as their hypervisor),* reconfigure their existing backup software to use the virtual appliance as a backup target, and then centralize the protection of the data in the remote office by configuring the virtual appliance to replicate data back to the primary corporate data center.

Pricing and Performance

Two factors that strongly influence buying decisions are performance and cost. However, these two attributes are only referenced at a high level in this Buyer's Guide. There are two core reasons why performance and pricing information are not covered in-depth in this Buyer's Guide.

First, performance results vary according to data center environments, the data being stored, and implementation decisions. Introducing any type of performance metric would only result in the analysis in this Buyer's Guide becoming more subjective, not less.

Second, this Buyer's Guide is intended to provide a point-in-time snapshot of this marketplace. If DCIG had tried to test and establish performance benchmarks for all these products, the next generation of appliances could well be available before the testing was completed, making this Buyer's Guide obsolete before it ever saw the light of day.

As for pricing, many factors influence final price including capacity purchased, services, extended warranties, negotiations, etc. These factors differ for every vendor and for every organization.

DCIG recognizes that price and performance are relevant and often key considerations when making a buying decision. However, it is almost impossible for a third party like DCIG to obtain objective and accurate measures of these factors on a large scale. Therefore, evaluating performance and price is a part of the buying process that is best left to end users.

Maturing Product Lines and Features

The deduplication backup target appliance market has largely stabilized and matured in the last few years. While new features still come to market and vendors continue to refine existing ones, the core feature functionality that enterprises need today exist across all vendor product lines. With this product maturation in place, vendors also better understand how to refine their existing product lines and feature sets. This is reflected in a few ways.

First, this has led to a decrease in the number of product models that most vendors offer. By way of example, ExaGrid has reduced the number of models available in its product portfolio from twelve down to eight. Quantum had previously reduced its total number of products lines down to two as did NEC and Quest. Dell EMC and HPE continue to offer three product lines.

Second, vendors make less noise about deduplication ratios than they did years ago. Most enterprises have implemented deduplication technology at some level as part of their data protection process. As such, enterprises and vendors alike have a good grasp on what deduplication ratios to expect when protecting their data.

Further, most products use comparable algorithms to deduplicate data. While enterprises may experience some improvement in deduplication ratios when using one vendor's product versus another, it is unlikely that one solution will sufficiently move the needle just based on its reduction in storage consumption to justify a change in product solely based on that one feature.

Third, faster backup throughput rates remain a point of emphasis and enterprises will change products to shorten backup windows. While using disk-based backup targets and deduplication largely provide the success rates and cost reductions that enterprises want, the differences in throughput that the appliances from each vendor achieve can be striking. These differences in throughput are attributable to one or more of the following factors:

- Their underlying product architecture *(scale-up versus scale-out)*
- The source side software they offer to accelerate throughput
- Where the deduplication occurs *(inline or after it lands on the disk)*
- What networking interfaces *(Ethernet or FC)* and protocols *(CIFS, iSCSI, FC, and/or NFS)* they support

Time to Recovery for Applications, Data, and Virtual Machines

Time to recovery has taken on added importance in recent years. As enterprises reduce their IT staff while simultaneously seek to accelerate and simplify IT administration by granting users the ability to do their own recoveries, they have a decreasing amount of tolerance for products that require long, complicated recoveries of applications, data, and/or virtual machines (VMs).

Solutions that give administrators the flexibility to run a recovery directly on the deduplication backup target appliance is viewed as desirable by some. This option is most often used when recovering a VM as it negates the need to copy the VM from the appliance back to primary storage. In so doing, an enterprise can bring a VM back online much more quickly.

ExaGrid, for example, makes its landing zone available to enable administrators to access the most recent VM backups for these instant recoveries and it can even host applications on the appliance if required. The HPE StoreOnce Recovery Manager Central (RMC) software also enables fast recovery via synthetic full backups and the ability to directly mount the snapshot on the host in order to meet short recovery-time objective (RTO) service level agreements.

APPENDICES

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DCIG
2018 DEDUPLICATION BACKUP TARGET APPLIANCE BUYER'S GUIDE
The Insider's Guide to Evaluating Deduplication Backup Target Appliances

Appendix A—Definitions, Explanations and Terminology

Definitions, Explanations and Terminology

This section contains brief definitions and/or explanations of the terms used when developing the data sheets found in the *DCIG 2018 Deduplication Backup Target Appliance Buyer's Guide.*

SOFTWARE

Backup Software

Backup Software Streams Recognized *TOTAL #*
Deduplicating backup appliances integrate with various backup software products. The number of backup streams recognized indicates how many backup streams the appliance recognizes from the backup software. A higher number means it can deduplicate backup streams from a larger number of backup software products in a more optimal manner. For a detailed list of exactly which backup software streams the appliance recognizes, refer to the DCIG **Competitive Intelligence Portal**.

Concurrent Backup and Replication
Indicates if the appliance can simultaneously backup incoming data as it replicates it to a second location for storage.

Concurrent Streams (Max)
Indicates the maximum number of backup streams a target-based appliance can ingest at one time.

Public Cloud Providers *TOTAL #*
Indicates the total number of cloud providers supported by the appliance. For a detailed list of exactly which cloud providers are supported, refer to the DCIG **Competitive Intelligence Portal**.

Cloud Tiering
Indicates if the appliance supports automated tiering to the cloud.

Deduplication

Acceleration Software *TOTAL #*
Indicates if the appliance offers any software or option to accelerate the performance of backup software when doing backups. The total number of backup acceleration options is listed here. For a detailed list of exactly which backup accelerator options are supported, please access the refer to the DCIG **Competitive Intelligence Portal**.

Algorithms *TOTAL #*
These are the various deduplication algorithms used by the deduplicating backup appliance. Options include hashing, delta differencing, variable length block, fixed length block and sub-file. The total number of algorithms supported is listed here. For a detailed list of exactly which algorithms are supported, refer to the DCIG **Competitive Intelligence Portal**.

Bypass
Some data does not deduplicate well (videos, images, etc.). If this feature is supported and turned on, such data will bypass the deduplication process and be stored in its native format.

Inline
Indicates if the appliance deduplicates data as it is ingested into the deduplicating backup appliance and before it is stored to disk.

Post Process
Data is first stored to disk on the deduplicating backup appliance in its native or raw format and then deduplicated.

Display Real-time Deduplication Ratio
Indicates if the appliance displays the deduplication ratio it is achieving in real time. Ratios can be displayed by the Entire Appliance or By Backup Job.

Encryption

Algorithms
indicates the AES encryption level supported by the appliance. For additional details on supported access encryption types, refer to the DCIG **Competitive Intelligence Portal**.

Types
Indicates the type of encryption options supported by the appliance: in-flight and/or at-rest. For additional details on supported access encryption options, please access the DCIG **Competitive Intelligence Portal**.

Interfaces

Indicates the different types of interfaces supported by the appliance. These may include CIFS, NFS, virtual tape library (VTL), or concurrent NAS/VTL.

Instant VM Recovery on Appliance

If supported, indicates if the appliance supports a virtual machine recovery.

Replication

Indicates the replication types supported by the appliance. These include Continuous, Periodic/Scheduled, Synchronous, and Fan-in/Fan-out replication.

Continuous

A form of asynchronous replication that replicates data to the secondary location as soon as it is written to the primary location. However, the write does not wait until the data is replicated to the secondary location.

Periodic/Scheduled

A form of asynchronous replication that replicates data to the secondary location as pre-scheduled times (i.e. once every 15 minutes, once an hour, etc.) When the data is replicated, only the deltas are replicated.

Synchronous

Replicates all data to the secondary location as soon as it is written to the primary location. The write I/O only completes after the data is replicated to the secondary location.

Fan-in/Fan-out *TOTAL #*

Indicates how many "hops" across which the appliance can replicated data. Possible answer options are 1:1, 1:N, N:1, 1:N:N, and N:N:1. The total number of fan-in/fan-out options is displayed on the data sheet. To see which specific fan-in/fan-out replication options are supported, refer to the DCIG Competitive Intelligence Portal.

Path to Tape

Indicates if the appliance supports native storage and retrieval of data from a tape library.

MANAGEMENT

Bandwidth Throttling *TOTAL #*

Indicates the number of ways that the appliance offers to control or throttle data as it is replicated. To see which specific throttling options it offers, refer to the DCIG Competitive Intelligence Portal.

Forecasted Capacity Reporting

Indicates if the appliance has reporting mechanisms to show forecasted capacity based on historical utilization.

Hypervisors *TOTAL #*

Indicates the total number of hypervisors and/or virtual operating systems which may be installed on the deduplicating backup target appliance. For a detailed list of exactly which hypervisors the backup appliance supports, refer to the DCIG Competitive Intelligence Portal.

IPMI – Remote Management

Indicates if the model supports IPMI (Intelligence Platform Management Interface) for remote management at the BIOS-level.

Mgmt Interfaces *TOTAL #*

Indicates the total number of interfaces available to manage the appliance. These include command line interface (CLI), Client Application, and Web interface. For a detailed list of exactly which management interfaces are supported, refer to the DCIG Competitive Intelligence Portal.

Network Port Configuration

Indicates if individual network ports on the appliance can be configured for certain tasks including management or replication.

Notification Options *TOTAL #*

Indicates the alerting and notification options supported by the appliance. For a detailed list of which specific notification options the appliance supports, refer to the DCIG Competitive Intelligence Portal.

Partitions *MAX*

If supported, it indicates the maximum number of partitions supported by the appliance.

Performance Monitoring

Indicates whether the backup appliance includes application software that reports on how the deduplication appliance is performing, and what may be done to improve its performance.

Report Types *TOTAL #*

Indicates if the appliance provides real time and historical reports covering capacity performance, and replication. For a detailed list of which report types are supported, refer to the DCIG Competitive Intelligence Portal.

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Appendix A—Definitions, Explanations and Terminology (continued)

Threshold Alerts
Indicates whether the model automatically alerts users when storage performance thresholds are exceeded.

Virtual Appliance
Indicates whether the vendor offers a virtual appliance.

HARDWARE

Cache MAX
Indicates the maximum capacity of the appliance's cache storage.

Controllers MAX /SYSTEM
Lists the maximum number of controllers supported by the appliance.

Controller Configurations TOTAL
Lists the controller configurations offered by the appliance. Possible options include Active/Active, Active/Passive, Dual Active, Scale-out, and Single node. For a detailed list as to which options are supported, refer to the DCIG Competitive Intelligence Portal.

Erasure Coding
Indicates if the appliance supports erasure coding for data protection (apart from RAID 6). If RAID 6 is supported, it is noted here.

Ethernet/FC Mix
Indicates if the appliance supports a concurrent mix of Ethernet and FC ports.

Ethernet Ports 1/10/40 GbE PER NODE
Lists the maximum number of Ethernet ports (1, 10 or 40Gb) supported per node by the deduplicating backup appliance.

FC Ports 4/8/16 FC PER NODE
Lists the maximum number of Fibre Channel (FC) ports supported per node by the deduplicating backup appliance.

Processor Cores PER NODE
Indicates the maximum number of processor cores supported by the appliance. The appliances featured in this Buyer's Guide may contain multiple dual or quad core processors.

Raw Storage Capacity MIN/MAX
Lists the minimum and maximum raw storage capacity in terabytes supported by the deduplicating backup appliance.

Scale-out
Indicates if the appliance scales its capacity by adding more nodes as opposed to adding more shelves to increase its capacity.

Storage Networking Protocols TOTAL
Lists the storage networking protocols supported by the appliance. Possible answers include FC, iSCSI, CIFS, and NFS. For a detailed list of exactly which storage protocols the appliance supports, refer to the DCIG Competitive Intelligence Portal.

SSD Capacity MAX
This lists the maximum SSD capacity of the appliance if it supports SSDs.

SUPPORT

Automated Support Alerts TOTAL
This lists all the methods which the appliance provides alerts as to its conditions. The total number of automated alert options is listed here. For a detailed list of exactly which alert methods it supports, refer to the DCIG Competitive Intelligence Portal.

Standard Support Availability
This indicates that level of phone support included with the standard warranty, such as 24x7x365, 8 am – 8 pm, or Business Day.

Support Contact Methods TOTAL
This lists the number of the methods in which IT organizations can access support from the provider. For a detailed list of exactly which access methods are supported, refer to the DCIG Competitive Intelligence Portal.

Hardware Warranty
This indicates the standard hardware warranty that is offered with the appliance by the manufacturer.

Deduplication Backup Target Appliance Provider Vendor Contact Information

Dell EMC

1 Dell Way
Round Rock, TX 78682
Phone: +1.866.438.3622
Website: **www.dellemc.com**

ExaGrid

2000 West Park Drive
Westborough, MA 01581
Phone: +1 800.868.6985
Website: **www.exagrid.com**

Hewlett-Packard Enterprise (HPE)

3000 Hanover Street
Palo Alto, CA 94304
Phone: +1.800.786.7967
Website: **www.hpe.com**

NEC Corporation of America

Corporate Headquarters
6555 N State Highway 161
Irving, TX 75039
Phone: +1 866.632.3226
Website: **www.necam.com**

Quantum Corporation

224 Airport Parkway, Suite 550
San Jose, CA 95110
Phone: +1 800.677.6268
Website: **www.quantum.com**

Quest Software Inc.

4 Polaris Way
Aliso Viejo, CA 92656
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