Dell EMC PowerProtect DD Series Appliances: Hardware Assisted Compression

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White Paper

Abstract

This white paper describes the improved hardware assisted compression with DD series appliances. The models that take advantage of this improved compression are the DD6400, DD6900, DD9400, and DD9900.

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Executive summary

Introduction

Dell EMC PowerProtect DD series appliances reduce the amount of data stored by the process of deduplication and compression. The previous generation of appliances compressed data using the default lz algorithm. Other types of compression algorithms such as gzfast and gz were also available. These algorithms offered higher compression but at the cost of higher CPU load, thereby providing a trade-off between performance and space utilization.

The DD6400, DD6900, DD9400, and DD9900 are equipped with hardware assisted compression cards that allow for higher compression using gzfast as the default algorithm without trading off on performance.

Audience

This white paper is intended for Dell Technologies customers, partners, and employees who want to understand the improved hardware assisted compression available with DD series appliances.

Revisions

Table 1. Revisions

Date	Description
June 2020	Initial release
April 2021	Updated with new DD series performance improvement details
December 2021	Updated with DD6400 details; updated template

We value your feedback

Dell Technologies and the authors of this document welcome your feedback on this document. Contact the Dell Technologies team by email (subject line: Feedback for document: H18734.2).

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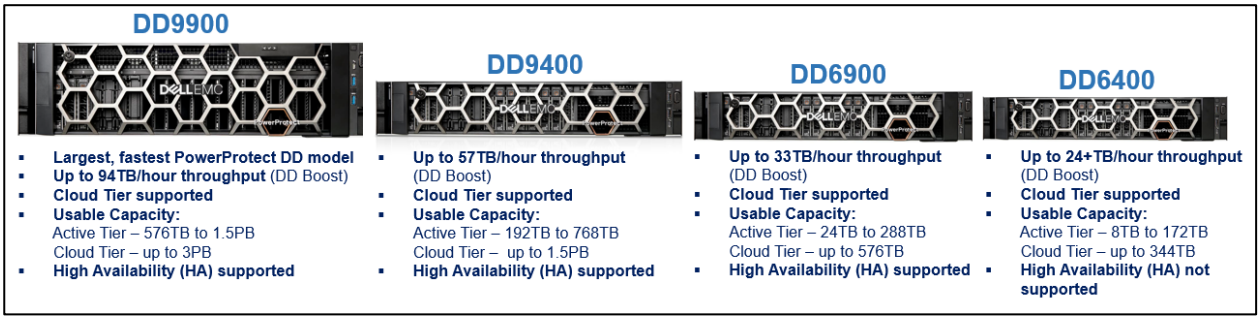
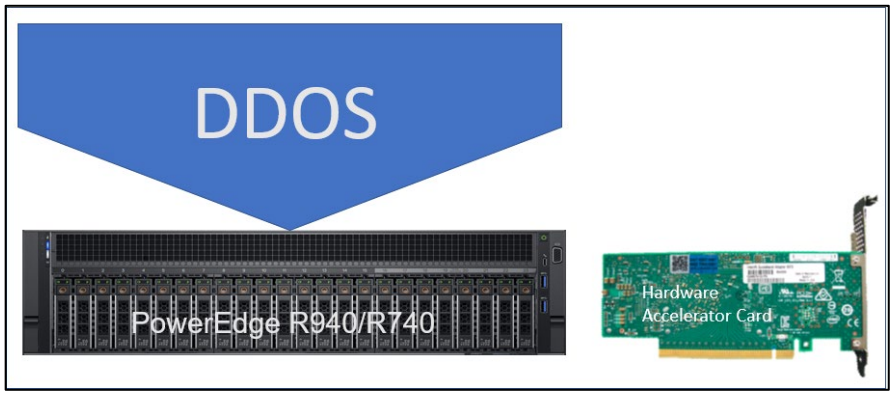
Note: For links to other documentation for this topic, see the Data Protection Info Hub.

Technical overview

DD series appliances use hardware assisted technology that delivers higher compression at higher performance than the previous generation of DD appliances. This new technology typically yields 30% more logical capacity per physical TB[1] and allows the system resources that would otherwise be used for compression/decompression operations to be used by the system to reduce customers' backup and restore windows.



The DD6400, DD6900, DD9400, and DD9900 are equipped with a hardware accelerator card that is used for compression.



The card allows the DDOS to offload compression and decompression processes to the hardware accelerator and free up CPU resources to improve appliance performance (only for gzfast and gz, lz continues to use the system CPUs). The gzfast compression algorithm is the default local compression method used on the DD6400, DD6900, DD9400, and DD9900. No additional configuration is required. This algorithm yields higher compression compared to the previous generation of Data Domain appliances which by default use the lz algorithm.

[1] https://www.delltechnologies.com/asset/en-in/products/data-protection/technical-support/h17926-dellemc-powerprotect-dd-ds.pdf

Benefits

Benefits overview

The following figure shows the different DD series appliance features and benefits:

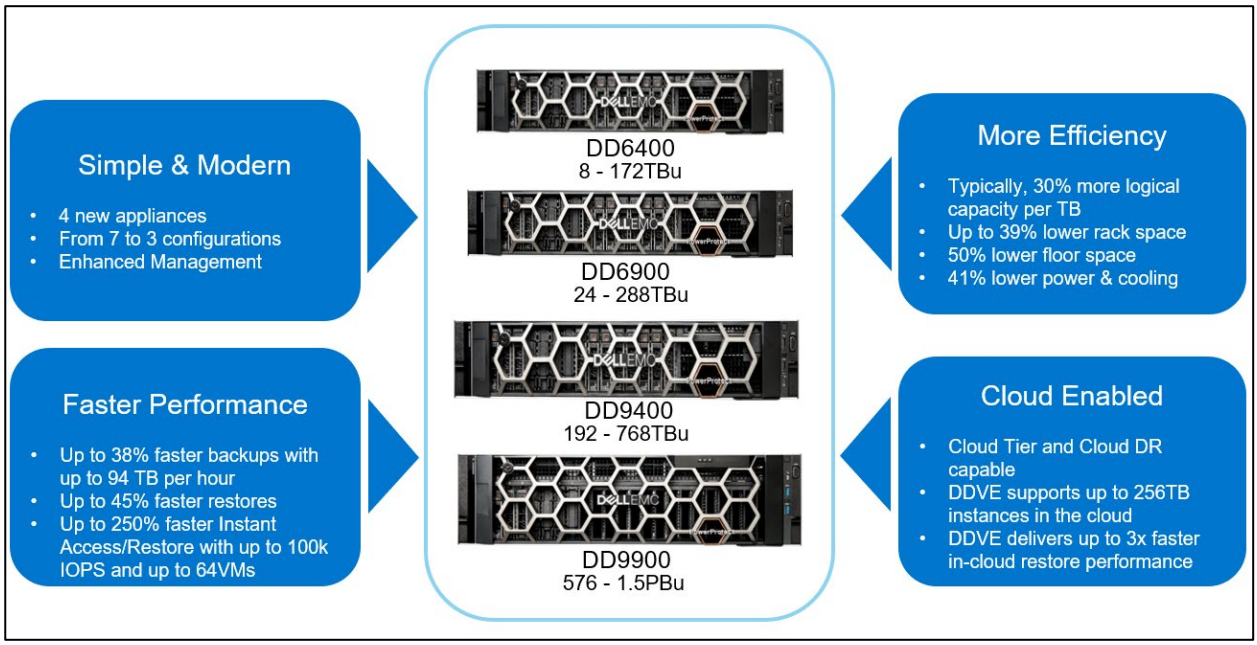


Figure 3. DD series appliance features and benefits

- Typically, 30% more logical capacity per TB compared to previous Data Domain appliances[2]
  - Previous Data Domain appliances used lz as the default local compression algorithm
  - DD6400/DD6900/DD9400/DD9900 use gzfast by default – typically delivering a 30% better compression ratio than lz. This allows the default configuration of the latest DD products to store more customer data on the same amount of physical DD capacity when compared to the previous generation of Data Domain appliances.
- Performance improvement
  - 5% ~ 25% performance improvement, depending on workload on restore and NFS/CIFS/VTL ingest
  - No performance regression for other workloads—pure DD Boost ingest, Garbage Collection (GC), and replication workloads
- Product usage
  - Enabled by default on all supported models DD6400/DD6900/DD9400/DD9900

[2] https://www.delltechnologies.com/asset/en-in/products/data-protection/technical-support/h17926-dellemc-powerprotect-dd-ds.pdf

- DD series appliances: faster networking options
  - Up to 10x the throughput of the previous generation
  - More backup streams can be aggregated with fewer network connections

The following figure shows the DD series appliance models with faster networking options.

Figure 4. DD series appliance models with faster networking options

Improved compression

Dell EMC telemetry data shows that customers with Data Domain appliances that move to DD series appliances with hardware assisted compression using gzfast will experience higher compression ratios as compared to the previous generations of Data Domain that used the lz compression method. The data shows that the local compression ratio will improve by an average of 30% per TB for non-database workloads and 31% and 26% for MS SQL and Oracle workloads, respectively. These figures apply only to workloads are not already pre-compressed or encrypted.

Table 2. Average improvement noticed in customer workloads

Workload	Average improvement
Non-database (Filesystem, email, and so on)	30%
MS SQL	31%
Oracle	26%

Note: The improvement values mentioned in this table show the average improvement noticed in customer workloads and may be revised in the future as we aggregate more data. Actual individual customer results may vary.

Compatibility

DD Boost

- DD Boost clients can continue to operate without any changes or performance impact with both DD series appliances and previous generation Data Domain appliances.
- DD Boost clients are transparent to the compression process within DD series appliances. However, DD series appliances will benefit from the performance improvements during backup and restore.

Replication

- Replication between previous generation Data Domain appliances and DD series appliances continues to be supported.
- There is no performance impact due to the different compression algorithms used on Data Domain appliances without hardware assisted compression when replicating to or from a DD series appliance with hardware assisted compression.

Dell EMC Cloud tier

- DD series appliances use the same default compression (gzfast) for the long-term retention data in the cloud.

Controller upgrade to DD6900/DD9400/ DD9900 appliances

- All new data ingested is stored using the new default compression (gzfast) by leveraging the hardware assisted compression.
- All data previously ingested and stored using the previous default compression (lz) will be uncompressed using CPU during restore.
- All data previously compressed by lz will be converted to gzfast during the regularly scheduled cleaning cycle as part of the space reclamation process. The conversion of all the data compressed in lz will require multiple regular cleaning cycles before it is fully converted. Aggressive scheduling of cleaning cycles will not expedite the conversion as reclamation may not occur.
- All data tiered using the previous default compression will remain in that format until space is reclaimed in the cloud. No conversion will occur for the data in the cloud.

Note: Controller upgrade is not supported with the DD6400 appliance model due to the presence of data disks in the controller. Customers wanting to migrate data to or from a DD6400 can use the replication-based migration option.

PowerProtect DD series appliance hardware

Specifications

The following figure shows the DD series appliance hardware specifications:

DD6400 - Based on PowerEdge R740xd Comes with 2 SSD Cache in the controller (only 1 SSD Cache for base model)	
DD6900 - Based on PowerEdge R740 Comes with 2 SSD Cache in the controller	
DD9400 – Based on PowerEdge R740 Comes with 5 SSD Cache in the controller	
DD9900 – Based on PowerEdge R940 Comes with 10 SSD in external shelf	

Figure 5. DD series appliance hardware specifications

Configuration

No manual configuration procedures are required.

Table 3. Hardware Assist Card slot numbers

DD series appliance	Hardware Assist Card slot number
DD6400	4
DD6900	4
DD9400	4
DD9900	2 and 7

DDOS installation, upgrade, and licenses

- No additional license is required for hardware assisted compression.
- By default, installed/enabled for the DD6400, DD6900, DD9400, and DD9900.

Previous generation appliances with latest version of DDOS

- No hardware assist device is available/supported
- No impact to the DDOS upgrade process
- DDOS automatically detects the platform model number

Technical support and resources

Dell.com/support is focused on meeting customer needs with proven services and support.

The Data Protection Info Hub provide expertise that helps to ensure customer success with Dell EMC data protection products.

The following links provide additional information.

Dell EMC PowerProtect DD series appliances:

- Dell EMC PowerProtect DD series appliances
- Dell EMC PowerProtect DD series appliances solution brief
- Dell EMC PowerProtect DD series appliances data sheet
- Dell EMC PowerProtect DD series appliances and DDOS 7.7
- Dell EMC PowerProtect DD series appliances blog
- Dell EMC PowerProtect DD series appliances spec sheet

Dell EMC PowerProtect DDOS:

- Dell EMC DDOS Administration Guide