

# Dell EMC PowerProtect DD Series Appliances: Hardware Assisted Compression

## Abstract

This white paper explains the improved hardware assisted compression in Dell EMC PowerProtect DD series appliances DD6900, DD9400, and DD9900.

April 2021

## Revisions

Date	Description
June 2020	Initial release
April 2021	Updated white paper with new DD series performance improvement details

## Acknowledgments

Author: Vinod Kumar Kumaresan

The information in this publication is provided “as is.” Dell Inc. makes no representations or warranties of any kind with respect to the information in this publication, and specifically disclaims implied warranties of merchantability or fitness for a particular purpose.

Use, copying, and distribution of any software described in this publication requires an applicable software license.

This document may contain certain words that are not consistent with Dell's current language guidelines. Dell plans to update the document over subsequent future releases to revise these words accordingly.

This document may contain language from third party content that is not under Dell's control and is not consistent with Dell's current guidelines for Dell's own content. When such third-party content is updated by the relevant third parties, this document will be revised accordingly.

Copyright © 2021 Dell Inc. or its subsidiaries. All Rights Reserved. Dell Technologies, Dell, EMC, Dell EMC and other trademarks are trademarks of Dell Inc. or its subsidiaries. Other trademarks may be trademarks of their respective owners. [4/11/2021] [Technical White Paper] [H18734.1]

# Table of contents

Revisions.....	2
Acknowledgments.....	2
Table of contents .....	3
Executive summary.....	4
Audience .....	4
1 Introduction.....	5
1.1 Technology Overview .....	5
2 Benefits.....	6
2.1 Comprehensive DD series Portfolio .....	7
2.2 Improved Compression with DD series .....	7
3 Compatibility .....	8
3.1 DDBoost .....	8
3.2 Replication .....	8
3.3 Cloud Tier .....	8
3.4 Controller upgrade to DD6900/DD9400/DD9900 appliances.....	8
4 DD series Hardware .....	9
4.1 Configuration .....	9
5 DDOS Installation, Upgrade and Licenses.....	10
5.1 DD6900/DD9400/DD9900 .....	10
5.2 Previous generation appliances with latest version of DDOS .....	10
A Technical support and resources .....	11
A.1 Related resources.....	11

## Executive summary

Dell EMC PowerProtect DD series appliances reduce the amount of data stored by the process of deduplication and compression. Prior generation 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 at the cost of higher CPU load thereby providing a trade-off between performance and space utilization.

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

## Audience

This technical white paper is intended for Dell EMC customers, partners and employees who would like to understand the improved hardware assisted compression available with PowerProtect DD series appliances.

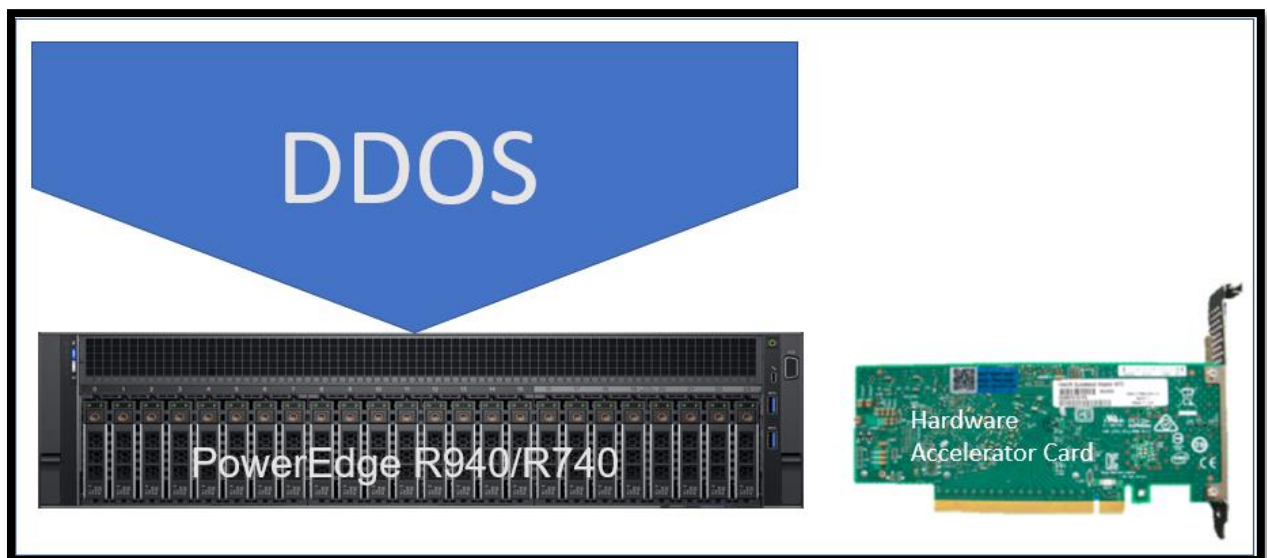
# 1 Introduction

## 1.1 Technology Overview

DD series appliances use hardware assisted technology that delivers higher compression at higher performance than previous generation appliances. This new technology results in increases in logical capacity stored by up to 30% and reduces customers backup and restore windows.

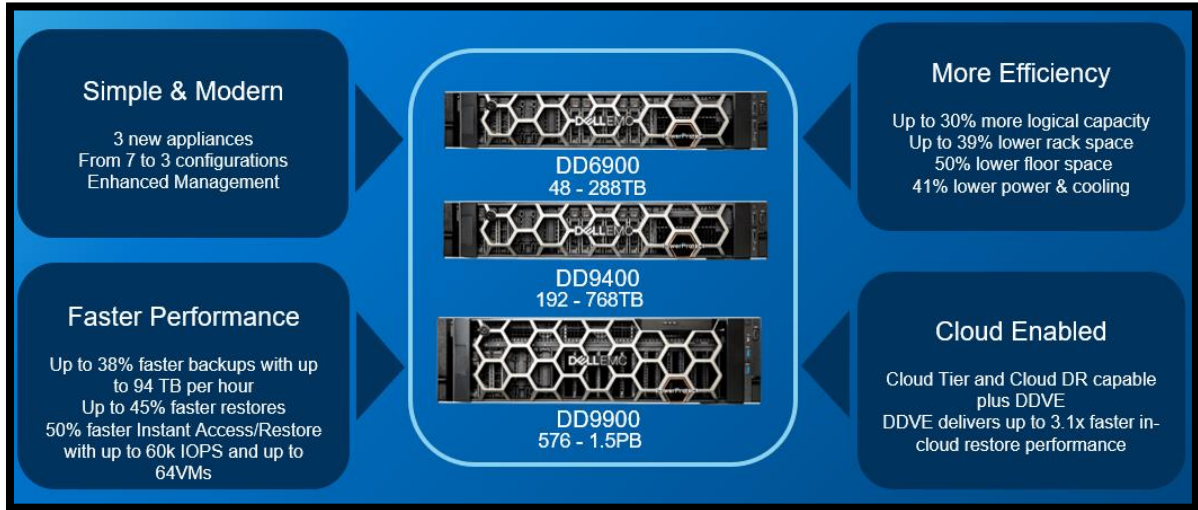
DD9900	DD9400	DD6900
		
<ul style="list-style-type: none"> <li>▪ Largest, fastest PowerProtect DD model</li> <li>▪ Up to 94TB/hour throughput</li> <li>▪ Up to 228PB logical capacity support with Dell EMC Cloud Tier</li> </ul>	<ul style="list-style-type: none"> <li>▪ Up to 57TB/hour throughput</li> <li>▪ Up to 149.8PB logical capacity support with Dell EMC Cloud Tier</li> <li>▪ High availability option</li> </ul>	<ul style="list-style-type: none"> <li>▪ Up to 33TB/hour throughput</li> <li>▪ Up to 56.1PB of logical capacity support with Dell EMC Cloud Tier</li> <li>▪ High-availability configurations</li> </ul>

DD series appliances DD6900, DD9400, and DD9900 are equipped with a hardware accelerator card that is used for compression.



This allows the DDOS to offload compression and decompression processes to the hardware accelerator and free up CPU resources to improve appliance performance. The gzfast compression algorithm is the default local compression method used on all DD6900, DD9400, and DD9900 appliances. No additional configuration is required. This algorithm yields higher compression compared to the previous generation of Data Domain which by default uses the lz algorithm. To obtain this benefit, no additional configuration is required.

## 2 Benefits



- **Up to 30% more logical capacity compared to previous Data Domain appliances**
  - ✓ Previous Data Domain appliances use lz as the default local compression algorithms
  - ✓ DD6900/DD9400/DD9900 use gzfast by default – delivering up to 30% better compression ratio than lz when compared to the previous generation of Data Domain
- **Performance improvement**
  - ✓ 5% ~ 25% performance improvement depending on workload – restore, NFS/CIFS/VTL ingest
  - ✓ No performance regression for other workloads -- pure DDBoost ingest, GC, and replication workload
- **Product usage**
  - ✓ Enabled by default on all DD series appliances- DD6900/DD9400/DD9900
- **DD series: Faster Networking Options**
  - ✓ Up to 10x the throughput of the previous generation
  - ✓ Allows more backup streams to be aggregated with fewer network connections

	16Gb FC	10GbE	25GbE	100GbE
DD6900	✓	✓	✓	✗
DD9400	✓	✓	✓	✗
DD9900	✓	✓	✓	✓

*Note: 25GbE and 100GbE are marked as 'New' in the original image.*

## 2.1 Comprehensive DD series Portfolio

	DD6900	DD9400	DD9900
<b>Max Throughput</b>	Up to 15 TB/hr	Up to 26 TB/hr	Up to 41 TB/hr
<b>Max Throughput (DD Boost)</b>	Up to 33 TB/hr	Up to 57 TB/hr	Up to 94 TB/hr
<b>Logical Capacity<sup>1</sup></b>	Up to 18.7PB	Up to 49.9PB	Up to 97.5PB
<b>Logical Capacity with Cloud Tier</b>	Up to 56.1PB	Up to 149.8PB	Up to 228PB
<b>Usable Capacity</b>	48TB – 288TB	192TB – 768TB	576TB – 1.5PB
<b>Usable Capacity with Cloud Tier</b>	Up to 864TB	Up to 2.3PB	Up to 3.5PB
<b>ES40 Shelf</b>	4TB 7.2K SAS	8TB 7.2K SAS <sup>3</sup>	8TB 7.2K SAS <sup>3</sup>
<b>DS60 Shelf</b>	4TB 7.2K SAS <sup>3</sup>	8TB 7.2K SAS	8TB 7.2K SAS
<b>FS25 Shelf</b>	3.84TB SSD <sup>2</sup>	3.84TB SSD <sup>2</sup>	3.84TB SSD <sup>2</sup>

## 2.2 Improved Compression with DD series

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

Workload	Average Improvement
Non-database (Filesystem, email, etc)	30%
MS SQL	31%
Oracle	26%

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

## 3 Compatibility

### 3.1 DDBoost

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

### 3.2 Replication

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

### 3.3 Cloud Tier




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

### 3.4 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. Note that 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.



## 4 DD series Hardware

<p>DD6900 - Based on PE R740 Comes with 2 SSD Cache in the controller</p>	
<p>DD9400 – Based on PE R740 Comes with 5 SSD Cache in the controller</p>	
<p>DD9900 – Based on PE R940 Comes with 10 SSD in external shelf</p>	

### 4.1 Configuration

No manual configuration procedures required.

Appliance	Hardware Assist Card Slot Number	PCIe LnkSta
DD6900	4	LnkSta: Speed 8GT/s, Width x16
DD9400	4	LnkSta: Speed 8GT/s, Width x16
DD9900	2 & 7	LnkSta: Speed 8GT/s, Width x16

## 5 DDOS Installation, Upgrade and Licenses

### 5.1 DD6900/DD9400/DD9900

- No license required
- By default, installed/enabled for all newer DD series (DD6900/DD9400/DD9900)

### 5.2 Previous generation appliances with latest version of DDOS

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

## A Technical support and resources

[Dell.com/support](https://dell.com/support) is focused on meeting customer needs with proven services and support.

### A.1 Related resources

#### **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 with DDOS 7.5](#)
- [Dell EMC PowerProtect DD Series Appliances the Next Generation of Data Domain Blog](#)
- [Dell EMC PowerProtect DD Series Appliances Spec Sheet](#)

#### **Dell EMC PowerProtect DDOS**

- [Dell EMC DDOS Administration Guide](#)