

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 with DDOS 7.2.

June 2020

Revisions

Date	Description
June 2020	Initial release

Acknowledgements

This paper was produced by the following:

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Table of Contents

- Revisions 2
- Acknowledgements 2
- Executive Summary 4
- Audience 4
- Technology Overview 4
- Benefits 5
- Compatibility 7
- Dell EMC PowerProtect DD Hardware 8
- Configuration 8
- DDOS Installation, Upgrade and Licenses 8
- Conclusion 9
- References 9

DD9900



- Largest, fastest PowerProtect DD model
- Up to 94TB/hour throughput
- Up to 228PB logical capacity support with Dell EMC Cloud Tier

DD9400



- Up to 57TB/hour throughput
- Up to 149.8PB logical capacity support with Dell EMC Cloud Tier
- High availability option

DD6900



- Up to 33TB/hour throughput
- Up to 56.1PB of logical capacity support with Dell EMC Cloud Tier
- High-availability configurations

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.

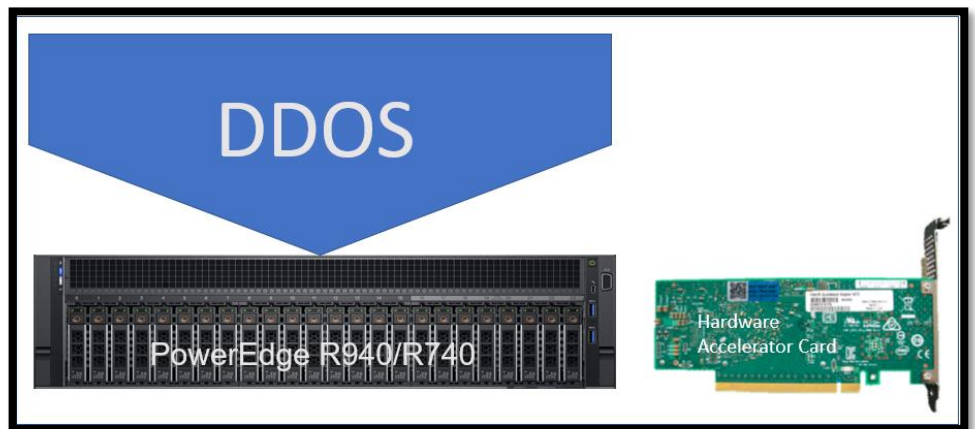
The DD6900, DD9400 and DD9900 are equipped with hardware assisted compression that allows for higher compression using gzfast as the default algorithm without trading off on performance.

Audience

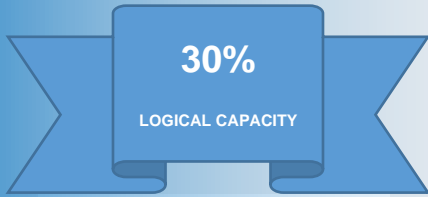
This technical white paper is intended for Dell EMC customers, partners and employees who would like to understand the improved hardware assisted compression available with Dell EMC PowerProtect DD series appliances.

Technology Overview

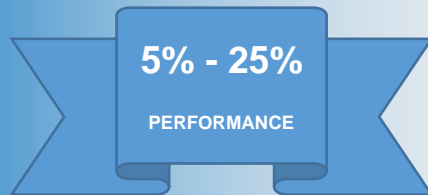
PowerProtect DD series appliances use hardware assisted technology that delivers higher compression at higher performance than previous generation appliances. This new technology results in increases in logical capacity stored by up to 30% and reduces customers backup and restore windows. PowerProtect DD6900, DD9400, and DD9900 appliances are equipped with a hardware accelerator card that is used for compression.



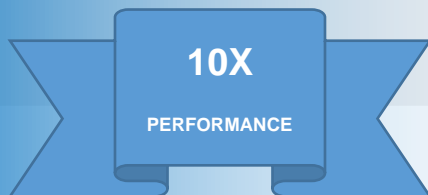
This allows the DDOS to offload compression and decompression processes to the hardware accelerator and free up CPU resources to improve appliance performance. The gzfast compression algorithm is the default local compression method used on all DD6900, DD9400, and DD9900 appliances. No additional configuration 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.



65x Data Reduction



Ingest Speed



Network Throughput

Simple & Modern
3 new appliances
From 7 to 3 configurations
Enhanced Management

More Efficiency
Up to 30% more logical capacity
Up to 39% lower rack space
50% lower floor space
41% lower power & cooling

Faster Performance
Up to 38% faster backups with up to 94 TB per hour
Up to 45% faster restores
50% faster Instant Access/Restore with up to 60k IOPS and up to 64VMs

Cloud Enabled
Cloud Tier and Cloud DR capable plus DDVE
DDVE delivers up to 3.1x faster in-cloud restore performance

DD6900
48 - 288TB

DD9400
192 - 768TB

DD9900
576 - 1.5PB

Benefits

- **Up to 30% more logical capacity compared to previous Data Domain appliances**
 - ✓ Previous DD 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 PowerProtect DD series appliances- DD6900/DD9400/DD9900
- **PowerProtect DD: 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'.

Comprehensive Dell EMC PowerProtect DD Series Portfolio

	DD6900	DD9400	DD9900
Max Throughput	Up to 15 TB/hr	Up to 26 TB/hr	Up to 41 TB/hr
Max Throughput (DD Boost)	Up to 33 TB/hr	Up to 57 TB/hr	Up to 94 TB/hr
Logical Capacity¹	Up to 18.7PB	Up to 49.9PB	Up to 97.5PB
Logical Capacity with Cloud Tier	Up to 56.1PB	Up to 149.8PB	Up to 228PB
Usable Capacity	48TB – 288TB	192TB – 768TB	576TB – 1.5PB
Usable Capacity with Cloud Tier	Up to 864TB	Up to 2.3PB	Up to 3.5PB
ES40 Shelf	4TB 7.2K SAS	8TB 7.2K SAS ³	8TB 7.2K SAS ³
DS60 Shelf	4TB 7.2K SAS ³	8TB 7.2K SAS	8TB 7.2K SAS
FS25 Shelf	3.84TB SSD ²	3.84TB SSD ²	3.84TB SSD ²

Improved Compression with PowerProtect DD

Dell EMC telemetry data shows that customers with Data Domain appliances that move to PowerProtect DD 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 23% for non-database workloads and 15-16% for MS SQL and Oracle workloads. These figures assume workloads are not already pre-compressed or encrypted.

Workload	Average Improvement
Non-database (Filesystem, email, etc)	23%
MS SQL	15%
Oracle	16%

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. Note that the MS SQL and Oracle traditionally have seen higher compression ratios with lz, hence the relative benefit of gzfast over lz is not as high for these workloads. Actual results may vary.

Compatibility

DDBoost

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

Replication

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




Cloud Tier

- ✓ PowerProtect DD appliances use 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. 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

Dell EMC PowerProtect DD Hardware

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

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

DDOS Installation, Upgrade and Licenses

DD6900/DD9400/DD9900

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

Previous appliances with new version DDOS 7.2

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

Conclusion

In Summary, PowerProtect DD series appliances DD6900/DD9400/DD9900 with DDOS 7.2 provide improved compression (gzfast) by default with higher performance by offloading compression workloads from CPU to hardware accelerators.

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Dell EMC PowerProtect DDOS 7.2

Release Notes:

https://dl.dell.com/content/docu98358_DD_OS_PowerProtect_DDMC_and_PowerProtect_DDVE_7.2.0.5_Release_Notes.pdf?language=en_US&source=Coveo

Administration Guide:

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