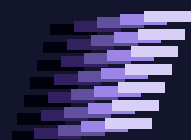




## Dell PowerProtect Data Manager Appliance



Backed up 500 VMs  
in **49% less time\***



Completed 6 days of  
incremental backups  
in **59% less time\***



Restored a large VM  
in **54% less time\***



Used **51% less**  
physical capacity\*



Consumed up to  
**65% less power**  
during restore\*

\*compared to Vendor X solution

## Back up and restore data faster with a Dell PowerProtect Data Manager Appliance

Compared to a competitor, the faster Dell Technologies solution also consumed significantly less power during backup and restore processes

Backing up and restoring data plays a pivotal role in ensuring business continuity in the event of data compromise. Using fast backup and recovery solutions can minimize the duration of these essential data protection processes, which can help organizations align with real-time business demands and meet service-level agreements (SLAs) effectively.

We wanted to see how competing backup solutions compare when completing some critical processes. We ran a backup scenario and a restore scenario on two data protection solutions:

- The Dell™ PowerProtect™ Data Manager Appliance with Transparent Snapshots using the Light Weight Delta (LWD) service
- A similarly sized solution from a competitor, which we refer to as “Vendor X,” using their management software and the VMware® vStorage API for Data Protection (VADP) using the network block device (NBD) transport mode

We found that the Data Manager Appliance backed up and restored VMs in less time than the Vendor X solution and consumed less power while doing so. We captured each appliance’s power consumption during the backup and restore scenarios.

## How we tested

### Performing backups and restoring data

Both the PowerProtect Data Manager Appliance and the Vendor X solution were physically located in an offsite data center lab. During this phase of testing, we ran all tests remotely and had full control over the testbeds.

On each solution, we captured an initial full backup of 500 VMs, then simulated six days of typical operations on those 500 VMs, including data changes such as file system and database updates and backup operations. We used a mix of operating systems, with VMs sized approximately 130 GB. This scenario mirrors an organization that performs incremental backups every weekday, copying only the data that users have changed or created since the previous backup. We also performed full backups and restores on a single large 530GB VM and five large VMs (each 530 GB). Those VMs included a 30GB operating system and a 500GB data disk. We turned on encryption for all backup and recovery jobs. Even with encryption enabled on both platforms for in-flight and at-rest data, the DM5500 outperformed the Vendor X solution in the use cases we tested.

We first ran this scenario on the PowerProtect Data Manager Appliance with Transparent Snapshots and LWD, and then we ran the scenario on the Vendor X solution, which uses the VADP framework with the NBD transport mode.

### Measuring power consumption

We measured power consumption by connecting each solution to a pair of redundant intelligent power distribution units (iPDUs) and isolating those iPDUs from any other devices. We configured the iPDUs to send power consumption data to a centralized server for data collection. We captured power consumption metrics for both idle states and during test execution.

### About Transparent Snapshots

The Transparent Snapshots feature creates consistent VM backup copies and sends them to the backup storage in conjunction with the PowerProtect Data Manager Appliance. Transparent Snapshots follows this lifecycle to create backups:

#### Change monitoring

Monitoring VMs and listing changes that have occurred since the previous snapshot

#### Snapshot processing

Sending the list of changes to the PowerProtect Data Manager Appliances directly

#### Snapshot release

Removing temporary data blocks and the list of changes it created

According to Dell, "Transparent Snapshots simplifies VM image backups for near-zero impact to your VM or VM resources – and it works with any VMware-supported storage. Transparent Snapshots innovation increases backup performance, lowers costs and simplifies management and reduces the risk of data loss."<sup>1</sup>

# What we found

## Back up 500 VMs faster

Multi-VM backups are vital for any organization. They all begin with an initial backup, or ingest, of the hosted VMs. The less time a solution needs to back up many VMs, the sooner the organization can protect its data and production workloads can resume after suffering an outage.

We completed an ingest of 500 VMs on the PowerProtect Data Manager Appliance and Vendor X backup solutions to see which completed a large initial backup (logically 65TB) faster. As Figure 1 shows, the PowerProtect Data Manager Appliance with Transparent Snapshots was able to complete the ingestion within a single overnight backup window, while the Vendor X solution with NBD was not. The PowerProtect Data Manager Appliance with Transparent Snapshots completed the 500-VM backup in 49 percent less time than the Vendor X solution.

### Time to back up 500 VMs

Time (hh:mm:ss) | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots

9:05:44

Vendor X solution with NBD

17:51:31

Backed up  
500 VMs in  
49% less time

Figure 1: Time required for each solution to complete an initial backup of 500 VMs of various sizes. Lower is better. Source: Principled Technologies.

## Complete incremental backups faster

The geographic spread of a hybrid workforce can make planning backup windows challenging. Many organizations choose to perform incremental backups, which back up only data that has changed since the last backup. Organizations can complete incremental backups more quickly than larger, full-size backups and thus minimize the risk of downtime around backup windows. In the case of an event such as a power loss, incremental backups also allow IT to recover data from closer to the time of the outage, helping to get up and running with less business disruption. With incremental backups, as with any backup, faster is better.

After the initial full backup of 500 VMs, we simulated six days of incremental backups and measured the total time to complete them. As Figure 2 shows, when we used the PowerProtect Data Manager Appliance with Transparent Snapshots, completing all incremental backups required 59 percent less time than when we used the Vendor X solution with NBD.

### Time to complete six days of incremental backups

Time (hh:mm:ss) | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots

6:02:46

Vendor X solution with NBD

14:57:57

Completed 6 days  
of incremental  
backups in  
59% less time

Figure 2: Time required for both solutions to complete six days of incremental backups on 500 VMs of various sizes. Lower is better. Source: Principled Technologies.

**Note:** The graphs in this report use different y-axis scales to keep a consistent size. Please be mindful of each graph's data range as you compare.

## Less performance impact during backups

Even though VADP-based backups use snapshots, these activities running on the virtualized server host inevitably require some storage resources. This means that during backup windows, the backup process could tie up key disk resources in use by your workloads, increasing disk latency and hurting performance. Thus, the shorter the backup window and the lower the overall performance impact, the better.

During the backup of the single VM, we captured disk performance by running Perfmon inside the Windows Server VM that the solutions were backing up. This provided a view of how the VM responded to the resource pressure from backup activities. We also ran the open-source DISKSPD utility workload within the VM to capture workload throughput results in the form of input/output operations per second (IOPS).

IOPS were higher for the VM simultaneously backing up data with the PowerProtect Data Manager Appliance with Transparent Snapshots. This was because the resources the backup used did not excessively inhibit workload performance.

Figure 3 shows the IOPS activity we captured on the backup VM for both solutions over the hour and 9 minutes before, during, and after backup of the single 136GB VM and while running a DISKSPD workload. The VM under test maintained consistently higher IOPS while the PowerProtect Data Manager Appliance with Transparent Snapshots backed it up. In contrast, the VM suffered a significant IOPS performance hit when the Vendor X solution with NBD backed it up.

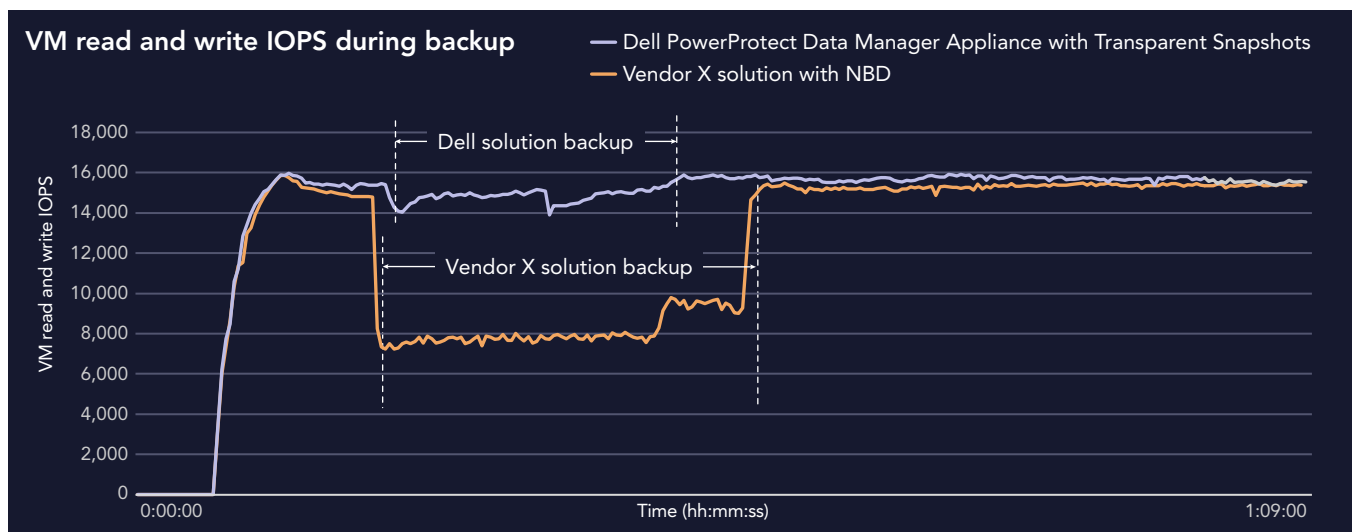


Figure 3: IOPS on the single VM for both solutions before, during, and after a backup and while running a DISKSPD workload. Note: These backups did not run concurrently, but we plotted them on the same graph for ease of comparison. Higher is better. Source: Principled Technologies.

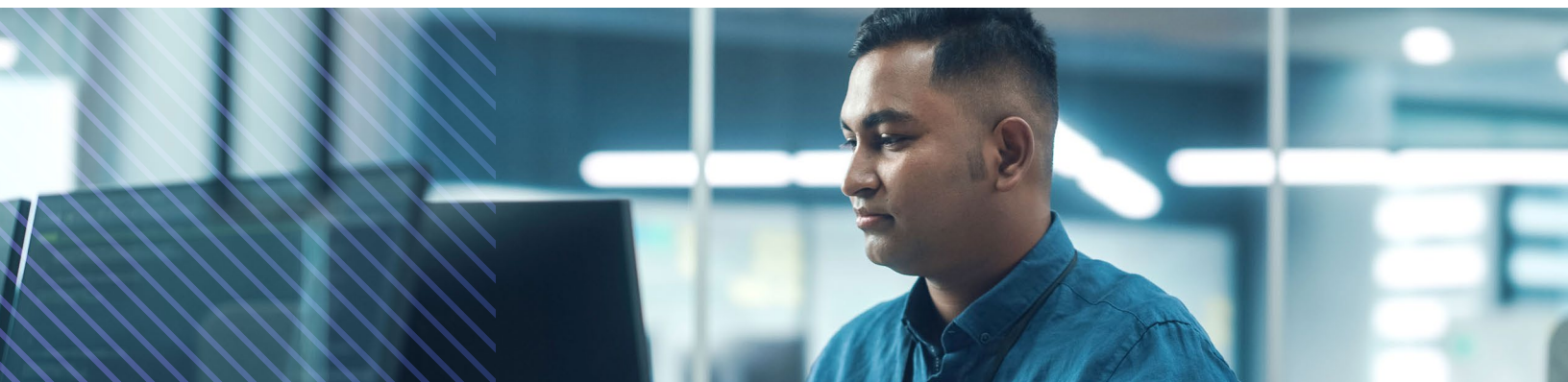


Table 1 shows the average IOPS results during the backup window for the VM running the workload that each solution backed. For full results, including the minimum and maximum IOPS and latency during each solution’s backup window, see the [science behind the report](#).

Table 1: Average disk activity, in IOPS, for each solution during backup of a single 532GB VM. Higher is better. Source: Principled Technologies.

	Dell PowerProtect Data Manager Appliance with Transparent Snapshots	Vendor X solution with NBD	Percentage win for Dell Technologies solution	Dell Technologies solution provided:
Average read IOPS during backup window	11,238.89	7,106.69	58.14	Better continued VM read performance during backup
Average write IOPS during backup window	3,749.53	2,494.24	50.32	Better continued VM write performance during backup

### Restore data faster after an incident

Recovery is the other side of the backup coin—when disaster strikes, how quickly can you use your backups to get your systems up and running? The loss of access to data and applications can quickly turn into the loss of customers and revenue.

We tested how long it took to restore a single large VM and five large VMs to a Dell PowerStore™ array with each solution. When we restored the single VM, the PowerProtect Data Manager Appliance with Transparent Snapshots required only 9 minutes and 44 seconds—54 percent less time than the Vendor X solution with NBD (see Figure 4).

#### Time to restore one large VM

Time (mm:ss) | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots

9:44

Vendor X solution with NBD

21:31

Restored one large VM in 54% less time

Figure 4: Time required for each solution to restore a single 530GB VM to a Dell PowerStore array. Lower is better. Source: Principled Technologies.

Restoring five large VMs also produced differences in performance. As Figure 5 shows, when restoring to the array, the PowerProtect Data Manager Appliance with Transparent Snapshots took 26 percent less time than the Vendor X solution.

#### Time to restore five large VMs

Time (mm:ss) | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots

33:59

Vendor X solution with NBD

45:57

Restored five large VMs in 26% less time

Figure 5: Time required for each solution to restore five 530GB VMs to a Dell PowerStore array. Lower is better. Source: Principled Technologies.

## Increase storage efficiency

Two weeks after the sixth incremental backup and without additional backups, we viewed the storage efficiency information for the Dell and Vendor X solutions. This two-week period allowed the solutions to do any required garbage collection and maintenance. Using data reduction technology, the PowerProtect Data Manager Appliance needed only 20.17 TB of physical capacity while the Vendor X solution needed 41.45 TB of physical capacity to store the same 504 TB of logical data (see Figure 6).

### Used physical capacity after processing 504 TB of logical data

TB | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots

20.17

Vendor X solution with NBD

41.45

Used 51%  
less physical  
capacity

Figure 6: Physical capacity needed to store 504TB of logical data two weeks after testing. Lower is better. Source: Principled Technologies.

### About the Dell PowerProtect Data Manager Appliance

According to Dell, the Data Manager Appliance is “[e]asy to configure and manage” and “protects existing and modern workloads, delivers operational and cyber resilience and simplifies operations through a unified user experience.”<sup>2</sup> To learn more about the PowerProtect Data Manager Appliance, visit <https://www.dell.com/en-us/dt/data-protection/powerprotect-data-manager/powerprotect-data-manager-appliance.htm>.

## Consume less power

Many organizations seek to control and minimize data center power consumption as a cost-saving measure as well to reduce the organization's carbon footprint. The less power that data center hardware consumes, the lower the cost for the organization and the smaller its environmental impact will be. As Figures 7 through 9 show, the PowerProtect Data Manager Appliance consumed up to 65 percent less power during restores and 61 percent less power during the 500-VM incremental backup than the Vendor X solution.

### Total watts consumption while restoring one large VM

Watts | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots

6,366

Vendor X solution with NBD

18,257

Consumed  
65% less power

Figure 7: Watts consumed during our large VM restore testing. Lower is better. Source: Principled Technologies.

### Total watts consumption while restoring five large VMs

Watts | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots

22,258

Vendor X solution with NBD

37,973

Consumed  
41% less power

Figure 8: Watts consumed during our large five-VM restore testing. Lower is better. Source: Principled Technologies.

### Total watts consumption while backing up 500 VMs

Watts | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots

40,222

Vendor X solution with NBD

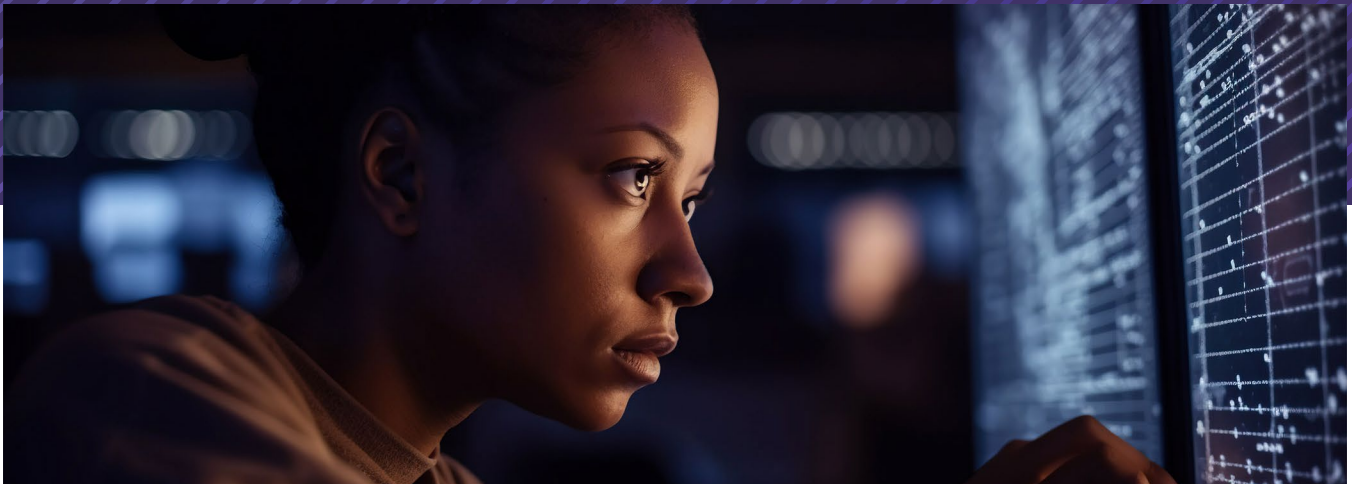
104,188

Consumed  
61% less power

Figure 9: Watts consumed during our 500-VM incremental backup testing. Lower is better. Source: Principled Technologies.

## About Dell PowerProtect Data Manager

Dell claims that PowerProtect Data Manager software offers "efficient data protection capabilities, leveraging the latest evolution of Dell's trusted protection storage architecture. With operational simplicity, agility and flexibility at its core, PowerProtect Data Manager enables the protection, management and recovery of your data, empowering you to rapidly evolve to meet future IT demands."<sup>3</sup>



Figures 10 through 12 show that even while idle during the restore and backup test scenarios, the PowerProtect Data Manager Appliance still consumed less power on average, up to 43 percent less in a restore test.

### Average watts consumption while idle during the single large VM restore scenario

Watts | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots



Vendor X solution with NBD



Consumed  
43% less power

Figure 10: Average Watts consumed while idle during our large VM restore testing. Lower is better. Source: Principled Technologies.

### Average watts consumption while idle during the five large VM restore scenario

Watts | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots



Vendor X solution with NBD



Consumed  
32% less power

Figure 11: Average Watts consumed while idle during our five large VM restore testing. Lower is better. Source: Principled Technologies.

### Average watts consumption while idle during the 500 large VM backup scenario

Watts | Lower is better

Dell PowerProtect Data Manager Appliance with Transparent Snapshots



Vendor X solution with NBD



Consumed  
32% less power

Figure 12: Average Watts consumed while idle during our large VM restore testing. Lower is better. Source: Principled Technologies.





## Conclusion

Safeguarding your data isn't just a business necessity; it's the turbocharger propelling you towards unwavering business continuity. When you choose a speedy backup and recovery solution, you could slash downtime and narrow backup windows while enabling data protection teams to schedule more frequent backups. This approach can help you bounce back quickly from a disruptive event, getting closer to the pre-corruption point in time with more precision.

The Dell PowerProtect Data Manager Appliance with Transparent Snapshots delivered a faster initial backup of 500 VMs than the Vendor X solution, backing up the VMs within an overnight backup window—something the Vendor X solution could not do. The PowerProtect Data Manager Appliance also delivered faster incremental backups and a faster VM restore than the solution from Vendor X, which used a traditional transport mode (NBD). The Dell solution consumed less power, too, during both backup and restore scenarios. Our results show that the Dell PowerProtect Data Manager Appliance with Transparent Snapshots backs up and restores data while also helping your bottom line and carbon footprint by consuming less power, making it a good solution for your data protection needs.

1. Dell, "PowerProtect Data Manager," accessed October 3, 2023, <https://www.dell.com/en-us/dt/data-protection/powerprotect-data-manager.htm>.
2. Dell, "PowerProtect Data Manager."
3. Dell, "Dell PowerProtect Appliances," accessed October 12, 2023, <https://www.dell.com/en-us/dt/data-protection/powerprotect-backup-appliances.htm>.

Read the science behind this report at <https://facts.pt/R9J7Hwu> ►



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