Dell PowerProtect Data Manager Appliance

Deployed in up to
55% less time*

Backed up 500 VMs in
46% less time**

Completed 10 days of incremental backups in
69% less time**

Restored a large VM in
44% less time**

Used
53% less physical capacity**

*compared to Vendor Y solution
**compared to Vendor X solution with VADP and NBD

Save time completing backups and restores with a Dell PowerProtect Data Manager Appliance

The Dell Technologies solution also had the fastest time to day one activities among five data protection solutions

Backing up data bolsters the data protection of any organization, regardless of size. It provides a critical step in regaining business continuity should data become compromised. Faster backup solutions reduce the time to complete these data protection operations and can help organizations meet real-time business needs as well as service-level agreements (SLA).

We wanted to see how competing backup solutions compare when completing some critical processes. First, we timed the deployment of a Dell PowerProtect Data Manager Appliance and four competitors. The Dell Technologies solution achieved the fastest deployment time to day one activities among the five solutions. One other competitor, which we refer to as "Vendor X," shared the fastest time with the PowerProtect Data Manager Appliance.

Next, we ran a backup scenario and a restore scenario on two of the data protection solutions:

- The Dell PowerProtect Data Manager Appliance with Transparent Snapshots using the Light Weight Delta (LWD) service
- A similarly sized solution from 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 virtual machines (VMs) in less time than the Vendor X solution with NBD.

How we tested

Deploying the backup solutions

In addition to observing and timing the deployment of the PowerProtect Data Manager Appliance and the appliance software for the Vendor X solution, we observed and timed the deployment of three backup and recovery solutions from competitors that we refer to as "Vendor V," "Vendor W," and "Vendor Y." All solutions were physically located in an offsite data center lab.

The deployments included installing and configuring appliance software, installing GUIs, and configuring storage and networking. We considered deployment complete when a storage admin could log into the backup application and start using it for day one activities. This scenario shows what an organization might expect when preparing one of these backup and recovery solutions to start backing up VMs.

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 backup of 500 VMs, then simulated 10 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 and various VM sizes, with most VMs being 130 GB, 136 GB, or 139 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 an incremental backup and restore on a single large VM and five large VMs.

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.

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 general lifecycle to create backups:

Change monitoring
Transparent Snapshots monitors VMs and lists changes that have occurred since the previous snapshot

Snapshot processing
Transparent Snapshots sends the list of changes to the PowerProtect Data Manager Appliances

Snapshot release
Transparent Snapshots removes 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."[1]

Deploy a PowerProtect Data Manager Appliance faster

The deployment process for each of our five solutions was different. We captured the time an IT admin needed to perform each task in each deployment process.

Figure 1 shows the total deployment time for each solution. Deployment time for the PowerProtect Data Manager Appliance was 55 percent less than the deployment time for the Vendor Y solution, the largest difference between the Data Manager Appliance and any of the competing solutions. Compared to the Vendor V solution, the Data Manager Appliance needed 18 fewer minutes (or 54 percent less time) for deployment. Compared to the Vendor W solution, the Data Manager Appliance needed 9 fewer minutes (or 37 percent less time) for deployment. The Data Manager Appliance shared the fastest deployment time distinction with the Vendor X solution.

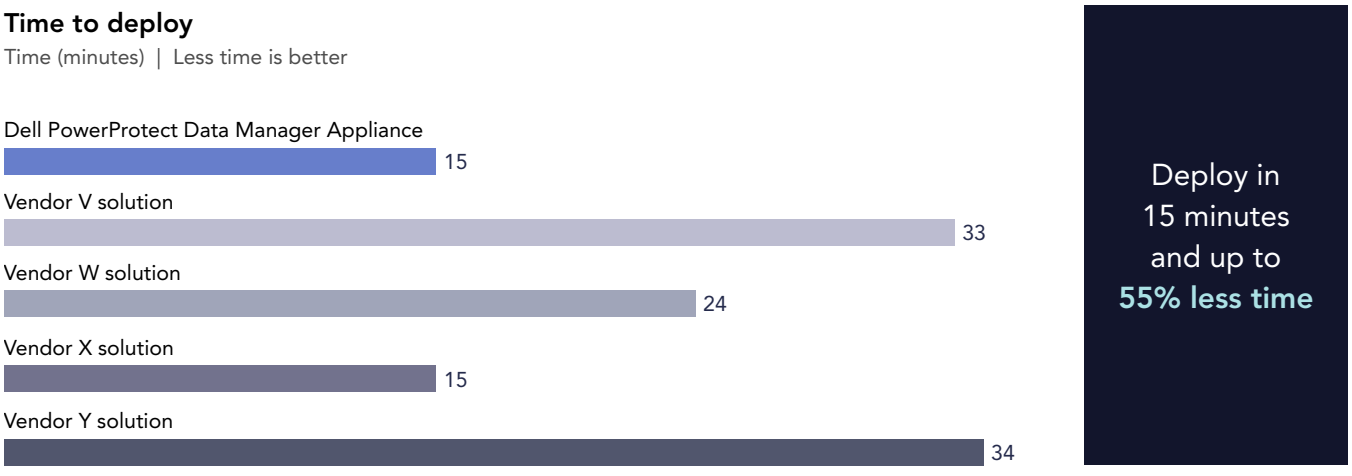


Figure 1: Time, in minutes, to deploy each storage solution. Lower is better. Source: Principled Technologies.

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 65 TB) faster. As Figure 2 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 was not. The PowerProtect Data Manager Appliance with Transparent Snapshots completed the 500-VM backup in 46 percent less time than the Vendor X solution.

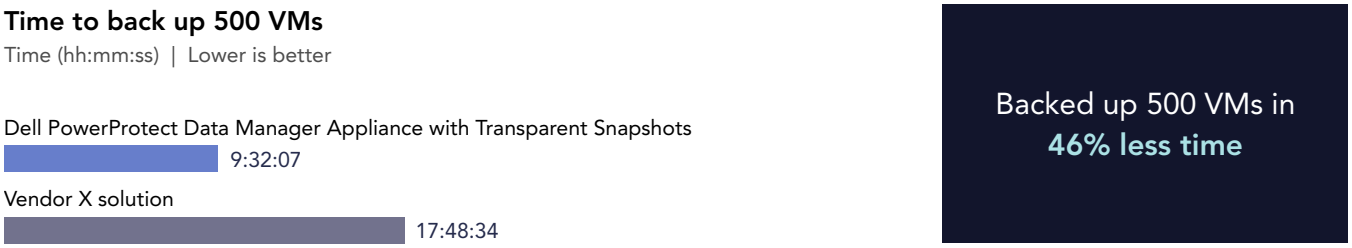


Figure 2: Time required for each solution to complete an initial backup of 500 VMs of various sizes. Lower is better.
Source: Principled Technologies.

About Dell PowerProtect Data Manager

We managed the PowerProtect Appliance with PowerProtect Data Manager. In addition to offering the VM backup capabilities that we tested, Dell claims that PowerProtect Data Manager "provides software defined data protection, automated discovery, deduplication, operational agility, self-service and IT governance for physical, virtual and cloud environments."[2] To learn more about the PowerProtect Data Manager Appliance, visit https://www.dell.com/PowerProtectDataManagerAppliance.

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 10 days of incremental backups and measured the time to complete them. As Figure 3 shows, when we used the PowerProtect Data Manager Appliance with Transparent Snapshots, completing all incremental backups required 69 percent less total time than when we used the Vendor X solution with NBD.

Time to complete ten days of incremental backups

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

Completed 10 days of incremental backups in **69% less time**

Figure 3: Time required for both solutions to complete 10 days of incremental backups on 500 VMs of various sizes. Lower is better. Source: Principled Technologies.

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 used Perfmon running inside the Windows Server VM that was being backed up to capture disk performance metrics. This provides a view of how the VM is responding to the resource pressure from backup activities. We found that with the PowerProtect Data Manager Appliance with Transparent Snapshots, backups had a smaller impact on latency than they did with the Vendor X solution with NBD (see Table 1).

At the same time, workload throughput results, which we measured as IOPS within the VM running the open-source DISKSPD utility workload, 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 4 shows the IOPS activity we captured on the backup VM for both solutions over the 1 hour 9 minutes before, during, and after backup of the single 136GB VM and while running a DISKSPD workload. The PowerProtect Data Manager Appliance with Transparent Snapshots maintained consistent IOPS, even when completing backup activities. In contrast, the Vendor X solution with NBD was unable to maintain its workload performance while backing up the VM, as IOPS plummeted.

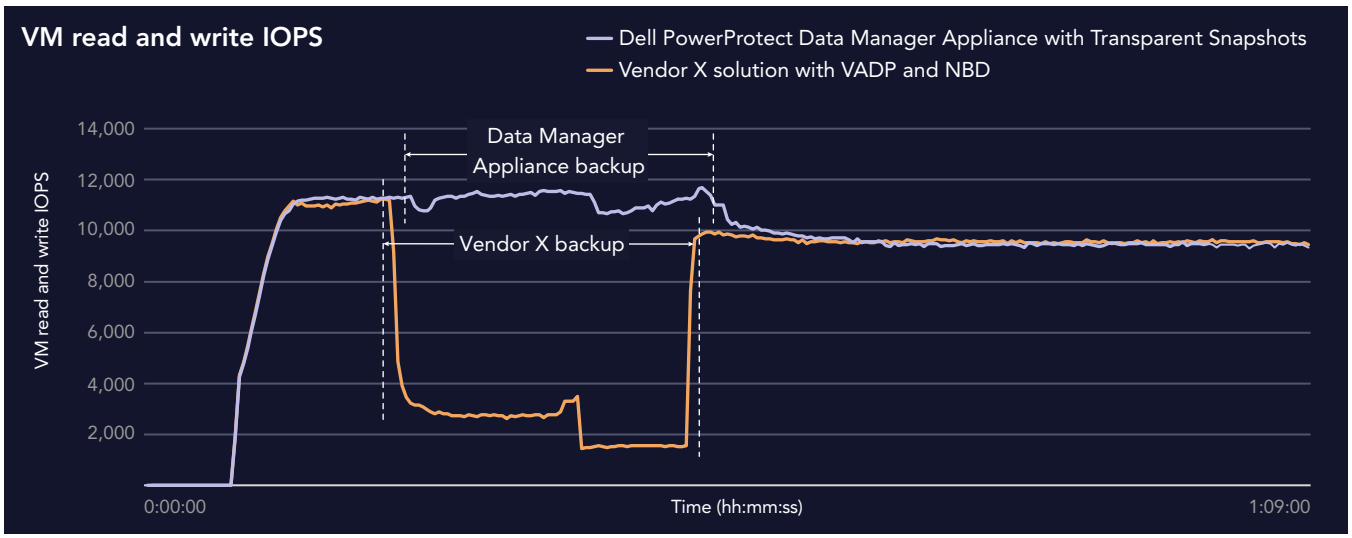


Figure 4: IOPS on the single VM for both solutions, before, during, and after a backup and while running a DISKSPD workload. Note: These backups did not run concurrently, but we plotted them on the same graph for ease of comparison. Higher is better. Source: Principled Technologies.

Table 1 shows the average IOPS and latency 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 latency and IOPS, for each solution during backup of a single 136GB VM. Higher is better for IOPS, and lower is better for latency. Source: Principled Technologies.

	Dell PowerProtect Data Manager Appliance with Transparent Snapshots	Vendor X solution	Percentage win for Dell Technologies solution	Dell Technologies solution provided:
Average latency (ms) during backup window	0.346	1.791	80.6	Better VM disk response time during backup
Average read IOPS during backup window	8,434.79	1,933.08	336.2	Better continued VM read performance during backup
Average write IOPS during backup window	2,813.61	645.66	335.7	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 (530 GB) and five large VMs (530 GB each) with each solution to a Dell PowerStore array. When we restored the single VM, the PowerProtect Data Manager Appliance with Transparent Snapshots required only 12 minutes and 7 seconds—44 percent less time than NBD on the Vendor X solution (see Figure 5).

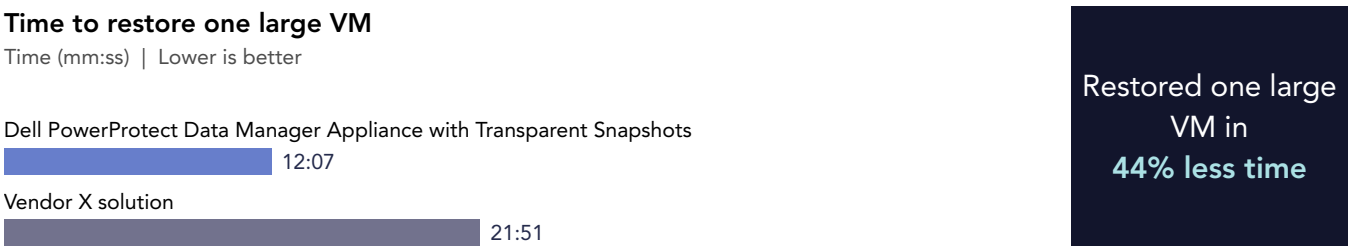


Figure 5: Time required for each solution to restore a single 530GB VM to a Dell PowerStore array. Lower is better.
Source: Principled Technologies.

Restoring five large VMs also produced differences in performance. As Figure 6 shows, when restoring to the array, the PowerProtect Data Manager Appliance with Transparent Snapshots took 30 percent less time than the Vendor X solution.

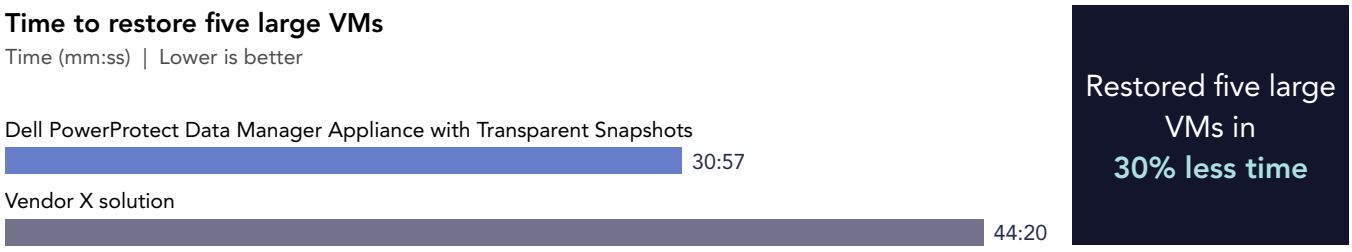


Figure 6: Time required for each solution to complete a restore of five 530GB VMs to a Dell PowerStore array. Lower is better.
Source: Principled Technologies.

About Dell PowerProtect Data Manager Appliances

According to Dell, their Dell PowerProtect Data Manager software and PowerProtect Appliances are purpose-built backup solutions designed to be "your one stop for proven and modern data protection."[3]

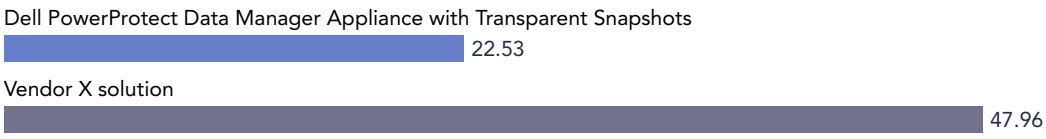
Increase storage efficiency

After the initial ingest of 500 VMs, we viewed the storage efficiency information for the Dell Technologies and Vendor X solutions. Using data reduction technology, the PowerProtect Power Manager Appliance needed 17.88 TB of physical capacity while the Vendor X solution needed 32.46 TB of physical capacity to store the same 65 TB of logical data. Then after all 10 days of incremental backups and the solutions continued to use their data reduction technology, the PowerProtect Power Manager Appliance needed 25.83 TB of physical capacity while the Vendor X solution needed 48.48 TB of physical capacity to store the same 771 TB of logical data.

We looked again after two weeks of retention and no new backups, which allowed the solutions to do any required garbage collection and maintenance. As Figure 7 shows, the PowerProtect Data Manager Appliance needed only 22.53 TB of physical capacity for the data whereas the Vendor X solution needed 47.96 TB.

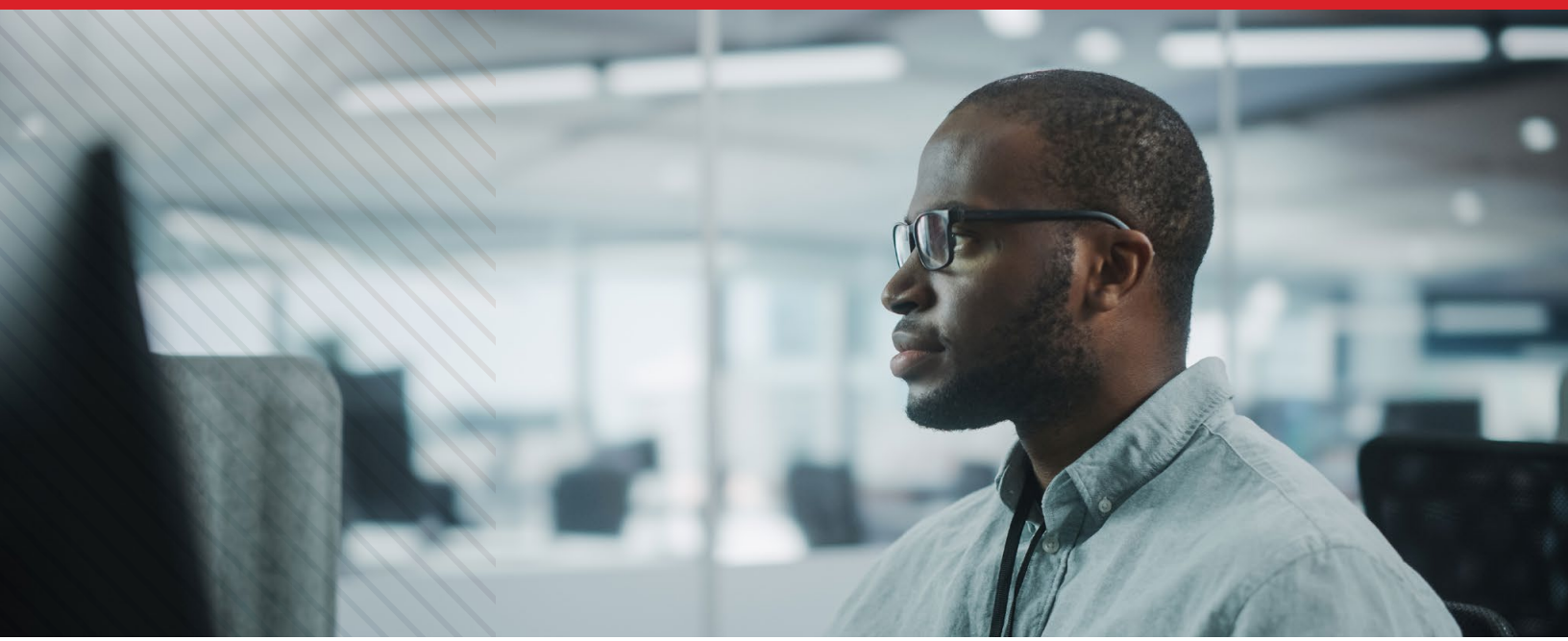
Used physical capacity after processing 771 TB of logical data

TB | Lower is better



Used **53% less physical capacity**

Figure 7: Physical capacity needed to store 771 TB of logical data two weeks after testing. Lower is better. Source: Principled Technologies.



Conclusion

Protecting valuable data is an essential part of ensuring business continuity and meeting business outcomes. Choosing a faster backup and recovery solution enables organizations to minimize downtime and backup windows, and allows for more frequent backups, which can improve your ability to recover quickly and closer to a given point in time.

In our testing, we saw the Dell PowerProtect Data Manager Appliance achieve the fastest deployment time to day 1 activities among five data protection solutions, with Vendor X also achieving that fastest time. The Dell Technologies solution with Transparent Snapshots also delivered a faster initial backup of 500 VMs than the Vendor X solution, and backed up the VMs within an overnight backup window—something the Vendor X solution did not do. The PowerProtect Data Manager Appliance also delivered faster incremental backups and a faster VM restore than the solution from Vendor X using a traditional transport mode (NBD). In an ideal world, you'd never have to rely on your backups—but if you do, these results indicate that the Dell PowerProtect Data Manager Appliance with Transparent Snapshots could help your business recover more quickly.

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1. PowerProtect Data Manager, accessed November 2, 2022, https://www.dell.com/en-us/dt/data-protection/powerprotect-data-manager.htm.
2. PowerProtect Data Manager, accessed November 2, 2022.
3. Dell Technologies, "Dell PowerProtect Appliances," accessed November 2, 2022, https://www.dell.com/en-us/dt/data-protection/powerprotect-backup-appliances.htm.

Read the science behind this report at https://facts.pt/7ZFQAa3 ►

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