Lab Validation Report

Symantec NetBackup 7.6 for VMware

Robust Data Protection Solutions for VMware Environments

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ESG Lab Reports

The goal of ESG Lab reports is to educate IT professionals about data center technology products for companies of all types and sizes. ESG Lab reports are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objective is to go over some of the more valuable feature/functions of products, show how they can be used to solve real customer problems and identify any areas needing improvement. ESG Lab's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments. This ESG Lab report was sponsored by Symantec.

Introduction

This ESG Lab Validation report documents remote testing of Symantec NetBackup 7.6, with a focus on new integration with VMware. Chapters are included on fast and efficient data protection, backup-managed storage snapshots, and integrated vCenter management.

Background

According to ESG Research, improving backup and recovery, increasing server virtualization, and managing data growth remain high on the list of the most important IT priorities reported by respondent organizations (see Figure 1), continuing a multi-year trend.[1] IT professionals continue to be challenged by these same problems, at least in part because they intersect. Virtualization complicates the protection landscape, and is part of the data growth challenge. IT organizations are faced with numerous questions, such as: Should we back up virtual and physical servers separately, or together? How will virtualization impact backup times? Restore times? As virtualization moves to tier-1, mission-critical servers, how long will productivity be impacted if we have to do a restore?

Figure 1. Top 13 Most Important IT Priorities for 2013

Source: Enterprise Strategy Group, 2013.

In addition, the continuing growth of data volumes means more data, longer backup windows, and lengthy times to restore. For many organizations, this leads to a constant juggling act between the critical effort to ensure that data is fully protected, and the need to remain in operation. Restore sounds easy, but depending on circumstances, it can take hours or even days to fully restore after a failure or outage.

[1] Source: ESG Research Report, *2013 IT Spending Intentions Survey*, January 2013.

Symantec NetBackup 7.6 for VMware

NetBackup is Symantec's flagship, enterprise-focused data protection solution for physical and virtual environments. With a single platform and management console, NetBackup provides backup and recovery from disk, tape, snapshots, and the cloud, and includes global deduplication and replication. Offered as software only or as an appliance, NetBackup supports both VMware and Hyper-V virtual machines (VMs).

This report focuses on VMware integration and several features that make NetBackup and VMware "better together." NetBackup for VMware delivers faster VMware backup and restore, uses less storage hardware, and offers instant recovery. It protects a vast array of common business applications such as Microsoft Exchange, SQL Server, and SharePoint, as well as VMware vCloud environments. New features include:

- *VMware Accelerator*. This helps to reduce the impact of backup processes on VMware environments by combining "incremental forever" backups with deduplication. After the initial full backup, only changed blocks are transferred to the backup target, leveraging VMware Changed Block Tracking (CBT) and NetBackup OpenStorage optimized synthetics. NetBackup global deduplication further reduces data volumes. These features reduce backup windows by more than 90% and keep backup hardware needs low, while maintaining full and granular restore functionality. VMware Accelerator is easy to integrate: No changes are needed in the VMware environment, and the functionality is enabled by simply checking a box in the GUI.

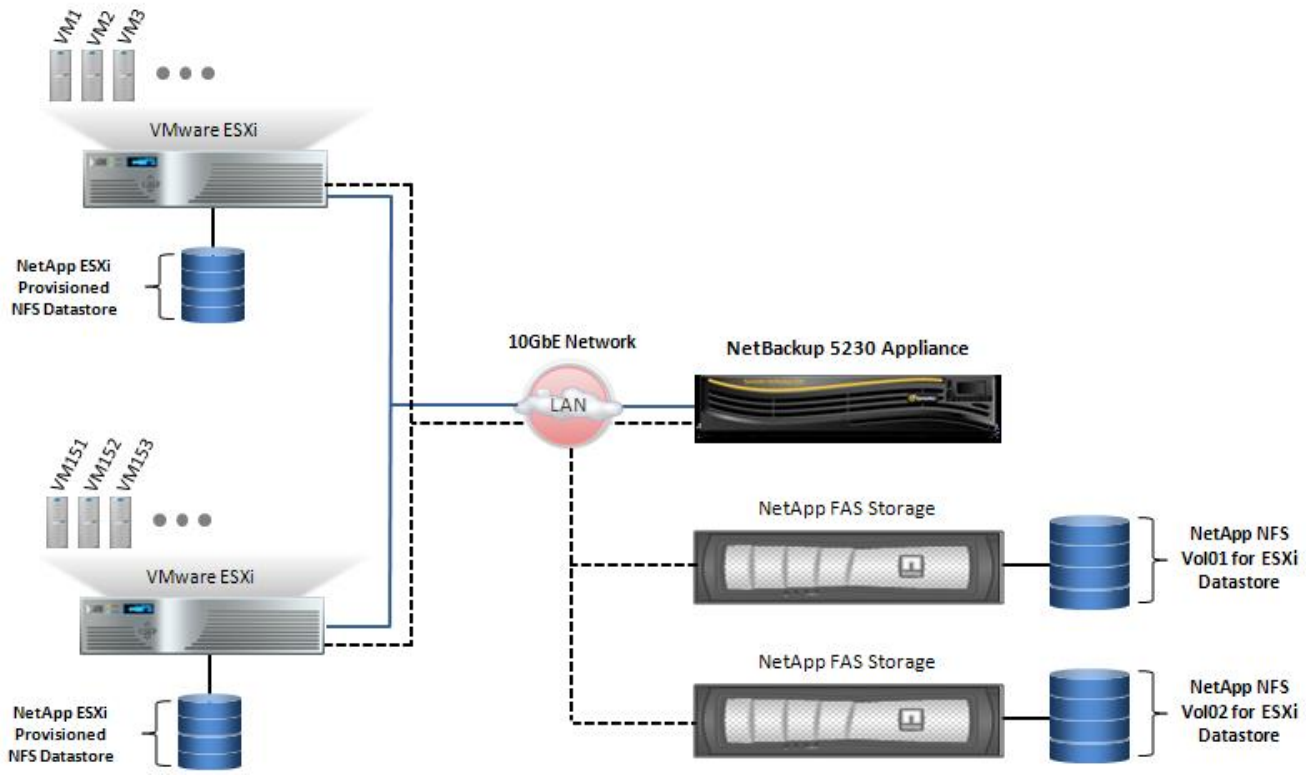
- *Instant Recovery for VMware.* With NetBackup, IT can instantly power on any protected virtual machine from a backup on standard disk or NetBackup deduplicated storage, transparent to the user. The user returns to productivity immediately, while in the background VMware Storage VMotion moves the VM from the backup disk to the production data store, retaining all changes. Also, with NetBackup Automatic Image Replication (AIR), NetBackup automatically replicates the backup image and metadata, enabling instant restores without having to recreate the catalog.

- *Replication Director for VMware*. This enables IT to leverage hardware-based snapshots and snapshot replicas for VMware backup and recovery. As a result, IT can back up hundreds of VMs in minutes with no impact on the production environment. NetBackup discovers and protects all VMs on the storage array in less than one second per VM. Integration with array-based snapshot and replication features (such as NetApp SnapMirror and SnapVault) enables NetBackup to back up and index VMs from array-based snapshots; each snapshot is treated as a separate copy of the VM data. All storage array functions can be managed by NetBackup, including data store and VM discovery, snapshot creation, snapshot replication, and NetBackup catalog indexing. IT can restore a file or the entire VM from any backup image.

- *vSphere Client Plug-in*. While NetBackup alone offers basic reporting (such as the last backup date) in the vSphere client, this plug-in enables NetBackup to log events in vCenter so that IT can view historical data on VM backups and statuses for data stores or resource pools. Both text and graphs are available from a "Symantec NetBackup" tab in vSphere, as well as drill-down for additional detail, search, reporting, and export. In addition, the Recovery Wizard allows VM administrators to execute full VM restore to the original or alternate location, without assistance from backup staff.

The ESG Lab test bed for this project is depicted in Figure 2. On the left is a VMware ESXi server, hosting several virtual machines. On the right, connected to the ESXi host via the LAN, is a NetBackup 5230 appliance running NetBackup 7.6 for VMware, and a NetApp FAS2240 storage array. A NetApp NFS volume was carved out as the datastore, and that volume was then provisioned to the ESXi host.

Figure 2. ESG Lab Test Bed



ESG Lab Validation

ESG Lab performed remote testing of NetBackup 7.6 for VMware at a Symantec facility in Mountain View, California. Testing was designed to demonstrate fast and efficient VM protection, the integration of NetBackup and NetApp storage for managing the data protection lifecycle, and integration between NetBackup and VMware vCenter for easier management.

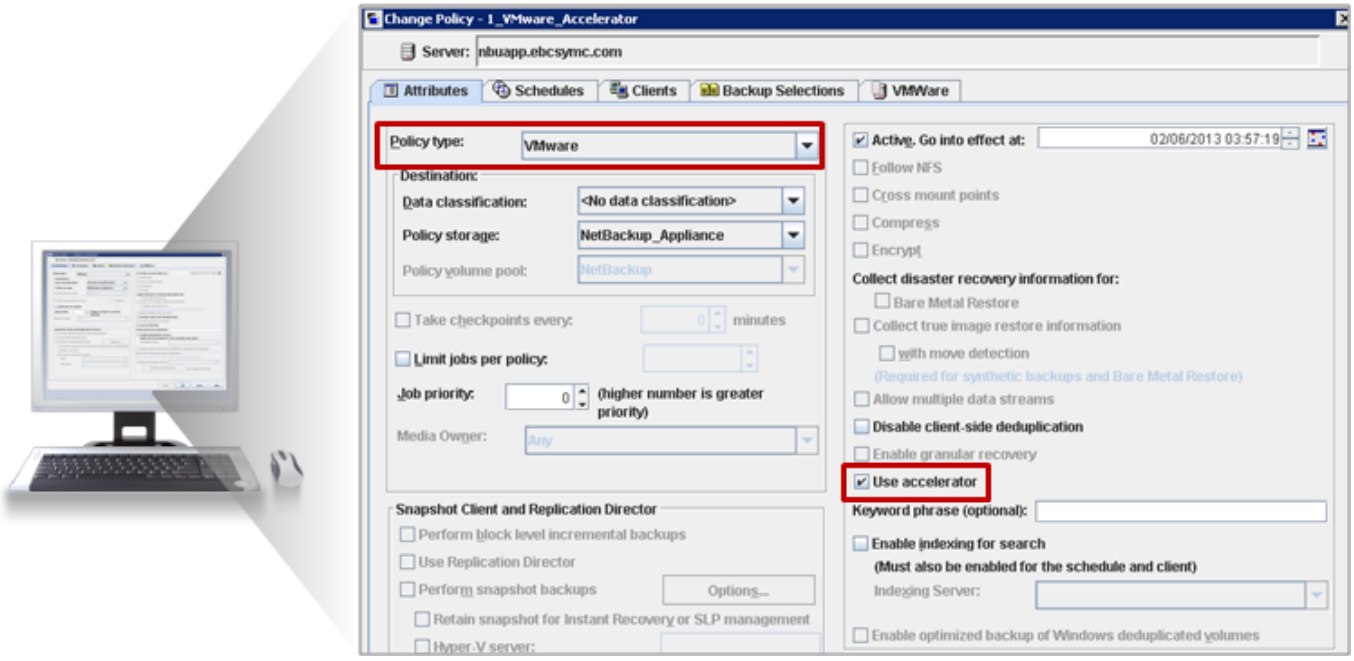
Fast, Efficient VMware Data Protection

This section of the validation report is an exploration of how NetBackup 7.6 integrates with VMware's vStorage APIs for Data Protection (VADP). It is intended to demonstrate how easy it is to configure data protection features and to confirm efficient backup and restore operations.

ESG Lab Testing

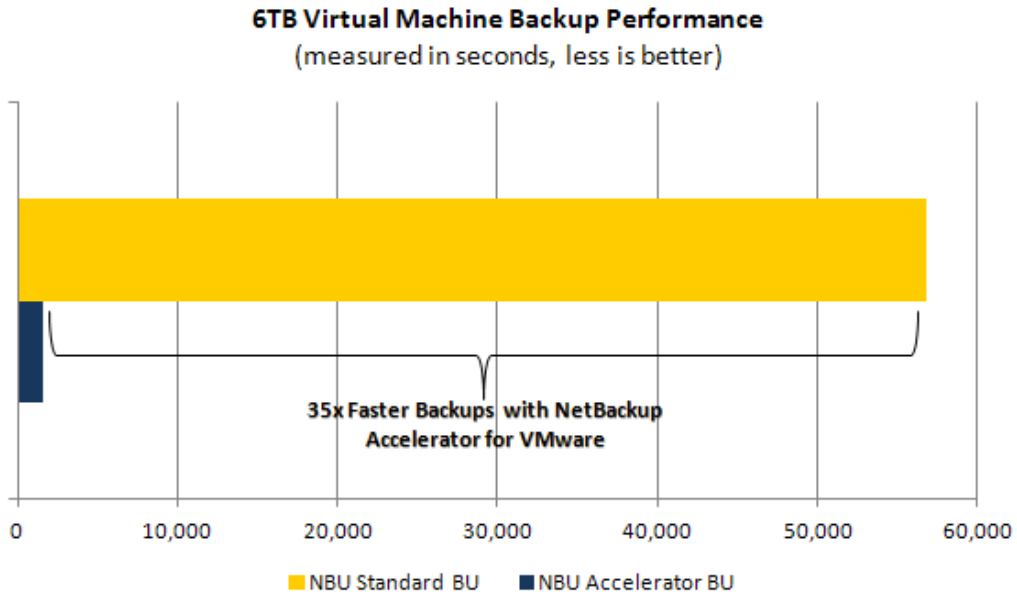
ESG Lab started its testing for this section of the report by working to configure communication between the NBU master server and the vCenter server. The Lab launched the NBU management interface and selected the credentials tab located on the left side of the interface. From this tab, a new vCenter server with root credentials was added and communication was confirmed. This was all that was needed to perform backup and recovery of the test bed virtual machines; no additional software was required. Next, the Lab navigated to the policy creation section of the GUI. As shown in Figure 3, we created a new policy for subsequent backup and recovery testing. The red callout box in the upper left side of the figure shows that the policy type selected was VMware. The red callout box in the lower right of the figure shows that acceleration is enabled for the policy. A second VMware policy without acceleration enabled was also created.

Figure 3. VMware Policy with Accelerator



The Lab then used the two VMware policies, one with acceleration and one without acceleration, to run a number of backups for VMs in the test environment. Figure 4 shows the performance results of both accelerated and non-accelerated backups.

Figure 4. Backup Performance Results

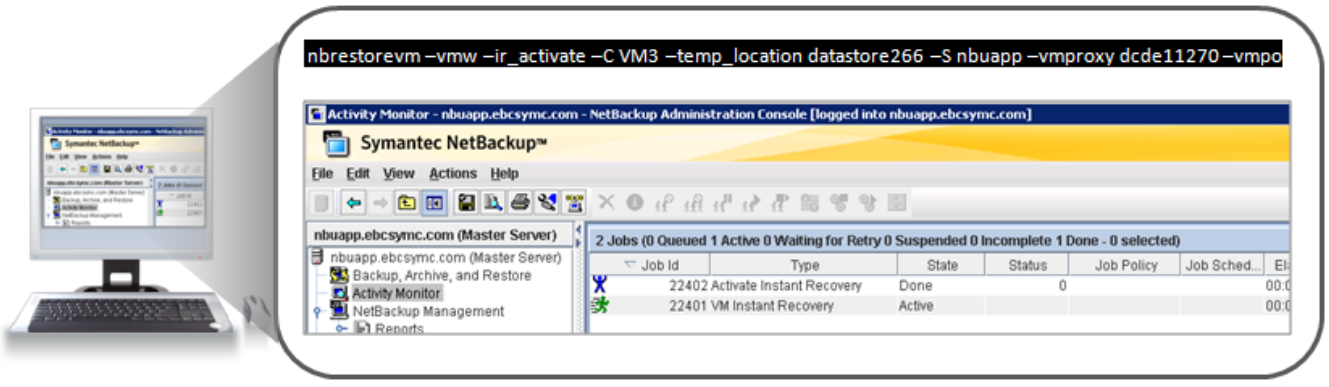


What the Numbers Mean

- Backups run with NBU Accelerator for VMware were 35 times faster than those run without acceleration.
- With Accelerator, the backup of a 6TB VM took a little less than 30 minutes.
- Without Accelerator, the same 6TB VM backup took almost 16 hours.
- Effective backup rates increased from 105MB/sec to 17,920MB/sec (17.5GB) while using Accelerator.
- Accelerator's use of the NBD protocol is a key component of the increased throughput.

Next, ESG Lab leveraged one of the previously conducted backups and performed an Instant Recovery for VMware (IRV) procedure. As shown in Figure 5, the Lab launched the recovery from the command prompt for ***VM3*** by issuing the command string at the top of the figure.

Figure 5. Instant Recovery Process



The job monitor detail from the NBU management interface, as shown in the bottom right of Figure 5, shows the status of two jobs related to the instant recovery process. The first job with the id of 22402 shows a successful IRV process as indicated by the blue person icon. This means that the VM is powered up and running on the ESXi host. The second job with the id of 22401 shows an active IRV as indicated by the green running person icon. The active job will remain running for as long as the VM stays in instant recovery mode.

Figure 6 shows the workflow behind the instant recovery process. On the left side of the figure we see the test bed ESXi server that hosts a number of VMs. The virtual machines include ***VM3*** highlighted by the red callout box. This VM was deleted from the configuration and then restored using the instant recovery process. To enable this procedure, the backup image stored on the NBU disk storage unit (STU) is presented to the ESXi host as a temporary datastore as shown on the right side of Figure 6. This allows data to be read directly from the backup image, while write data is stored in temporary space on the production datastore as shown in the lower left of the figure, represented as the smaller disk icon labeled temporary write space (TWS). This process allows a virtual machine to be recovered in approximately the same time it takes to power on and boot a VM. The VM can remain running in this state, while storage vMotion is used to move data from the temporary STU datastore to the production datastore in the background. Once the data is fully moved, the active instant recovery job can be terminated.

Figure 6. Instant Recovery Workflow

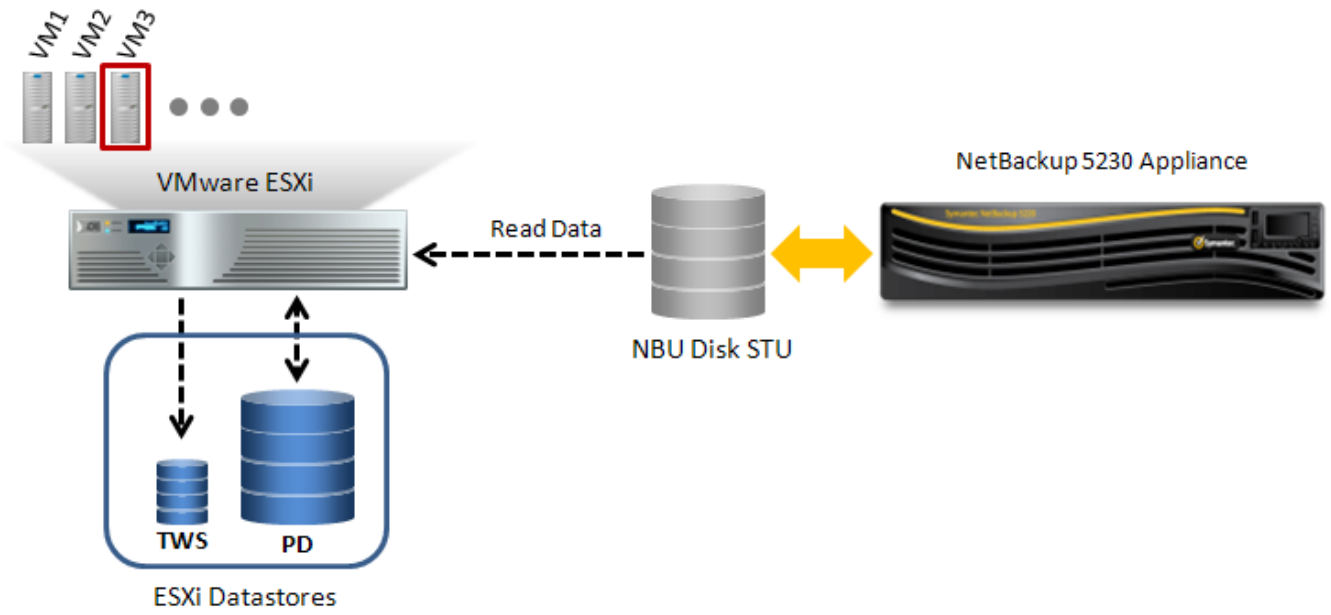
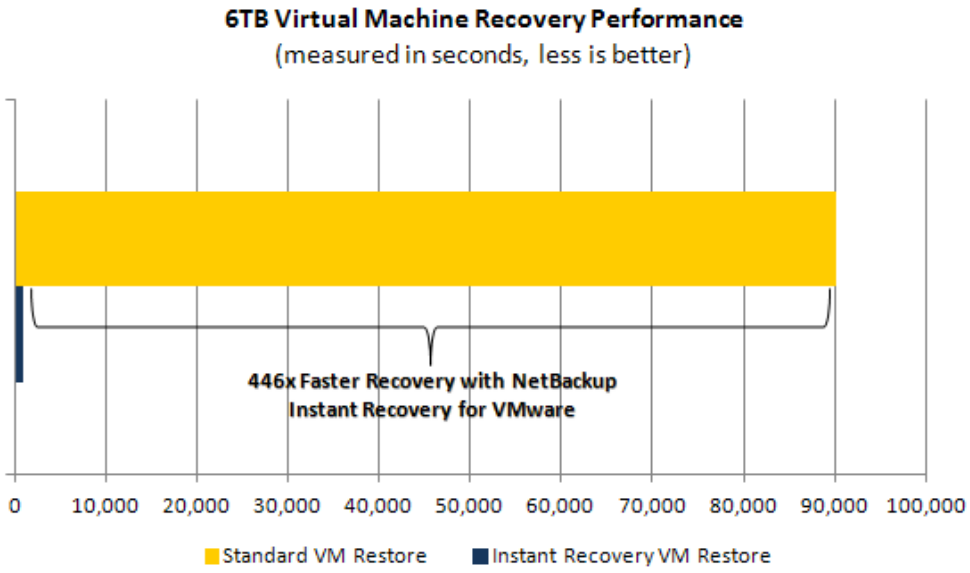


Figure 7 shows the results of a restore using the instant recovery process as compared with a standard restore.

Figure 7. Instant Recovery for VMware Results



What the Numbers Mean

- IRV for VMware was 446 times faster than a standard restore.
- The standard restore of a 6TB virtual machine took approximately 25 hours.
- The same 6TB virtual machine was restored with IRV in just over three minutes.

Why This Matters

Server virtualization brings greater flexibility and availability to business environments. However, because it is so fast and easy to spin up new VMs, users have come to expect "instant IT" for any task they need done. These higher expectations of service levels are a challenge to IT organizations when it comes to data protection. Backup and restore can take significant time, but most organizations have little tolerance for business interruption or downtime, especially for tier-1 applications. In ESG research, 53% of respondents reported that they can tolerate less than one hour of downtime for tier-1 data without significant business impact.[2]

ESG Lab validated that Symantec NetBackup 7.6 for VMware can speed backup and restore, while also reducing data volumes. "Incremental forever" backup and VMware CBT provide speed and data volume reduction, with NetBackup deduplication further shrinking hardware needs. Also, ESG Lab validated that a 6TB VM could be backed up 35 times faster with NetBackup Accelerator than without it, shrinking backup time from 15.75 hours to less than a half hour (26 minutes). In addition, with Instant Recovery for VMware, the Lab validated 446 times faster restore for a 6TB VM backed up using NetBackup deduplication, returning users to productivity in about three and a half minutes, compared with more than 25 hours with standard restore.

[2] Source: ESG Research Report, *2010 Data Protection Trends,* June 2010.

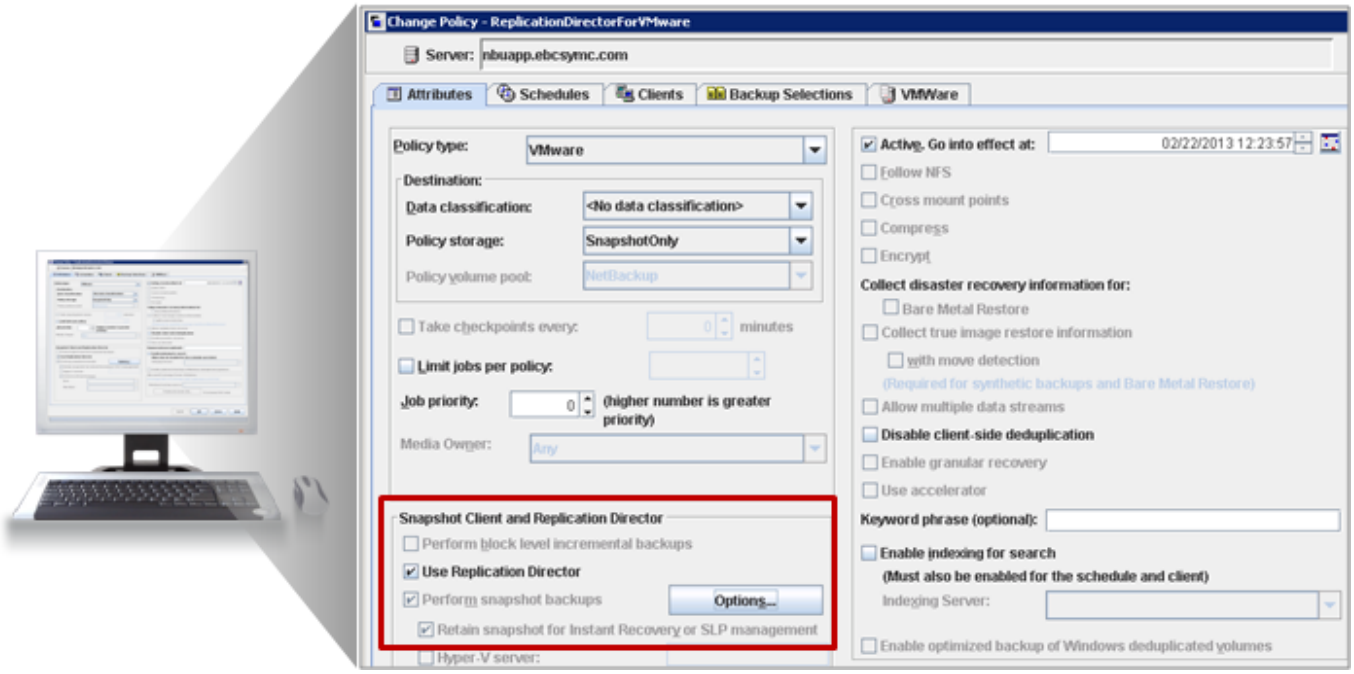
Backup-managed Storage Snapshots

NetBackup 7.6 Replication Director provides the ability to manage NetApp snapshots as backups completely within the NetBackup GUI. The entire data protection lifecycle—from backup to replication to tape-outs—can be managed from within NetBackup.

ESG Lab Testing

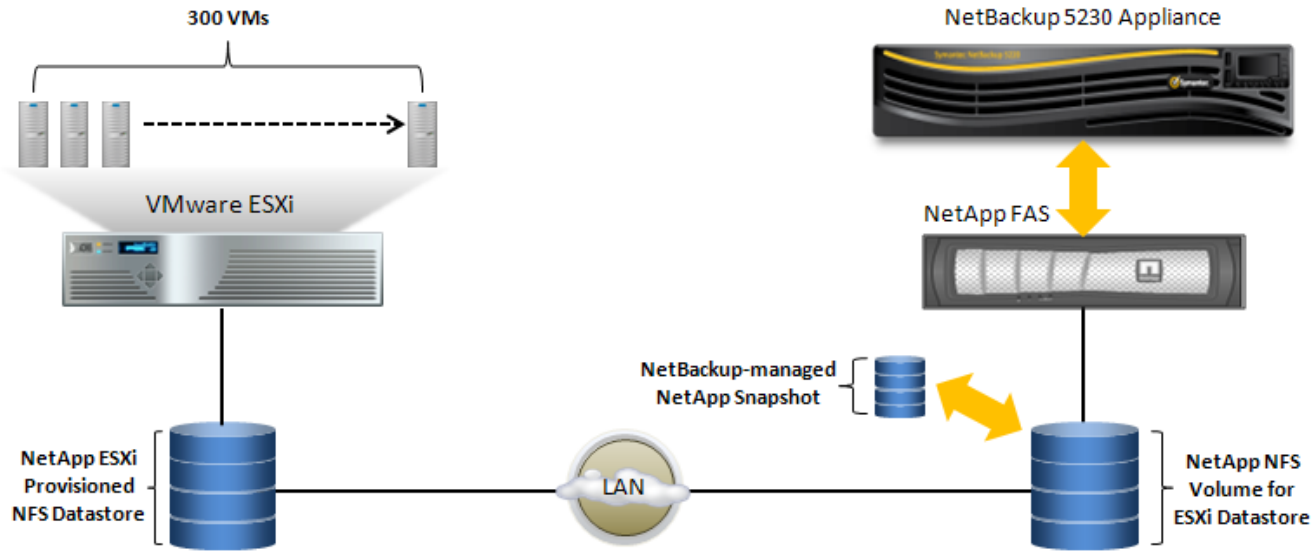
ESG Lab began testing backup-managed storage snapshots by creating a Replication Director-enabled policy. As shown in the red callout box in Figure 8, the Lab selected the ***Use Replication Director*** option for a VMware policy. We then used the option to select the backup clients automatically through a query. The query was designed to look for VMs based on their storage location, in this case NetApp provisioned datastores. The query was then run. It indentified 300 VMs that would be backed up upon execution of the policy. It should be noted that any new VMs added to the environment and associated with these datastores will be automatically protected upon subsequent runs of the policy.

Figure 8. Replication Director Policy Settings



Next, with the policy configured, ESG Lab initiated the backup. Figure 9 shows the workflow of the Replication Director-enabled backup. The left side of the figure shows the 300 virtual machines and the VMware ESXi server that hosts them. The VMs are configured on NetApp-provisioned NFS datastores. On the right side of the figure, we see the NetApp FAS2240 array that serves the NFS datastores and the NetBackup 5230 backup appliance.

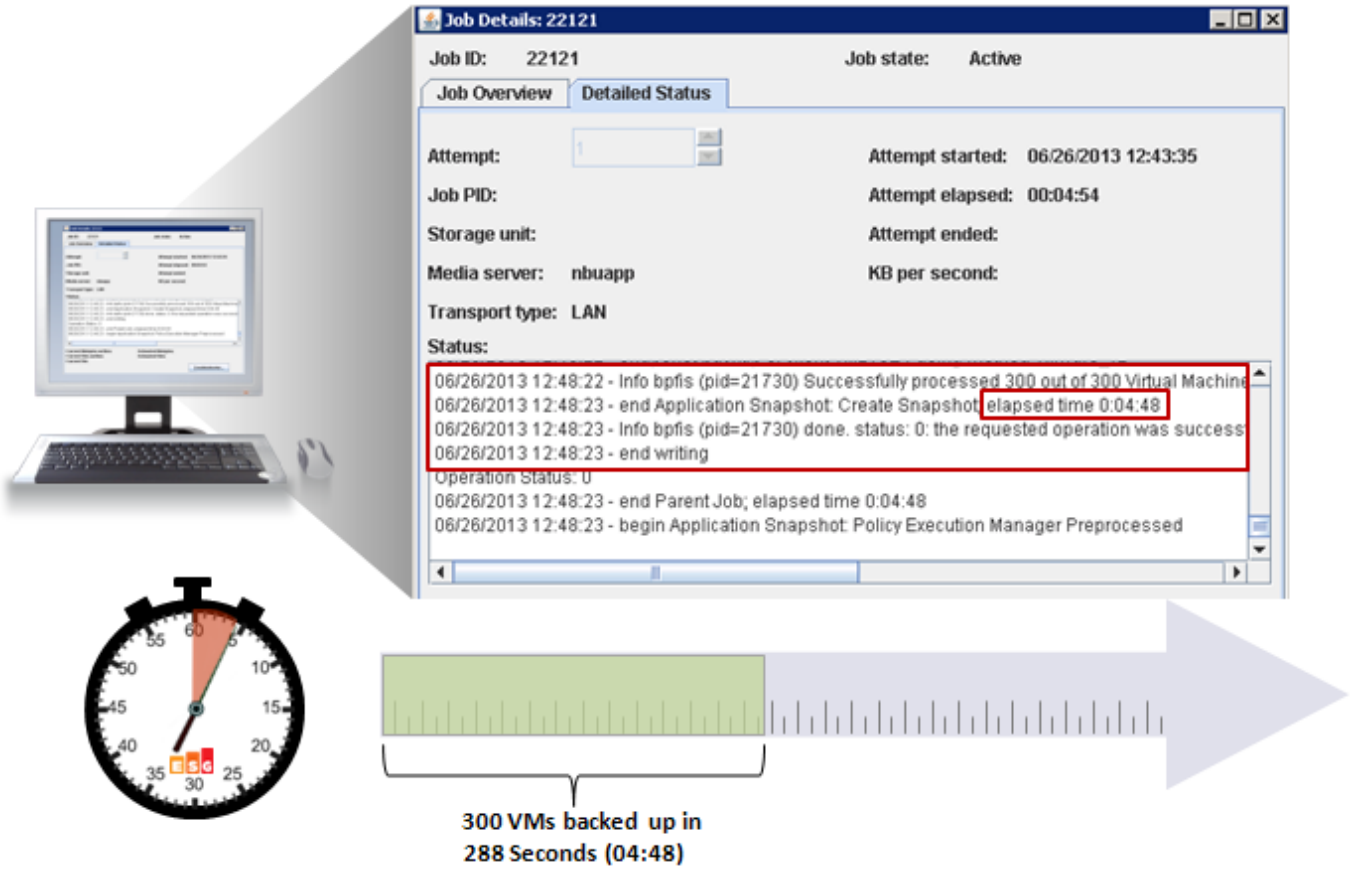
Figure 9. Replication Director Workflow



When the Replication Director-enabled policy runs, it communicates to the NetApp storage array through a NetApp OnCommand management server not shown in Figure 9. It leverages an NBU open storage transport (OST) plug-in created and maintained by NetApp. Through the OnCommand server via OST, NetBackup manages the NetApp snapshot technology process for data protection as shown by the smaller blue snapshot icon on the lower right side of Figure 9. With this process, each snapshot is seen by NetBackup as a typical backup and its images are indexed in the backup catalog. It should be noted that NBU Plug-in options allow for granular level restores of VM data and that Replication Director can be enabled via a Storage Lifecycle Policy. Introduced to NetBackup in the last few years, a Storage Lifecycle Policy is designed to help manage the creation, number of copies, placement, and retention of backup data. This type of policy allows data to be managed and moved from snapshot-based storage units to traditional NetBackup storage units like advanced disk and tape.

Lastly, the Lab monitored the status of the Replication Director backup job. As shown in Figure 10, the NetBackup GUI was used to display details of the job status. The details shown in the red callout box display a status of zero for the job. This indicates that the job was successful and that no issues were encountered during the process. The details also show the number of VMs that were protected and the elapsed time of the backup. Figure 10 shows that the Lab was able to backup 300 VMs in less than five minutes.

Figure 10. Replication Director Results



Why This Matters

Backup applications provide a catalog of restore points and a browse/search feature for recovering individual files, database objects, messages, etc., but both backup and restore can take time. Storage array-based snapshots create quick pointer-based copies, but offer no detailed catalog from which to restore, and in some cases can only restore at the volume level. Organizations are forced to manage backups and snapshots on different schedules from different interfaces, adding complexity and cost to data protection.

ESG Lab was extremely impressed with NetBackup 7.6 Replication Director for VMware functionality. Replication Director brings together backup and replication functions with full lifecycle policy management by combining NetBackup and NetApp technologies. From a single interface, NetBackup can manage backup, as well as local and remote replication (using NetApp SnapMirror and SnapVault), and, by copying off to tape, can leverage the OST protocol to communicate with the NetApp filer. Managing snapshots as backups, NetBackup can control granularity, retention time, data movement, and expiration/deletion. The NetBackup catalog is fully aware of and manages all data protection copies without re-indexing, providing search and browse capabilities. This can dramatically simplify protection management and provide more restore points that can be recovered quickly, increasing business uptime.

ESG Lab also validated that NetBackup Replication Director for VMware dramatically improves backup times by leveraging storage snapshots and replicas. We validated the ability to back up 300 VMs in less than five minutes.

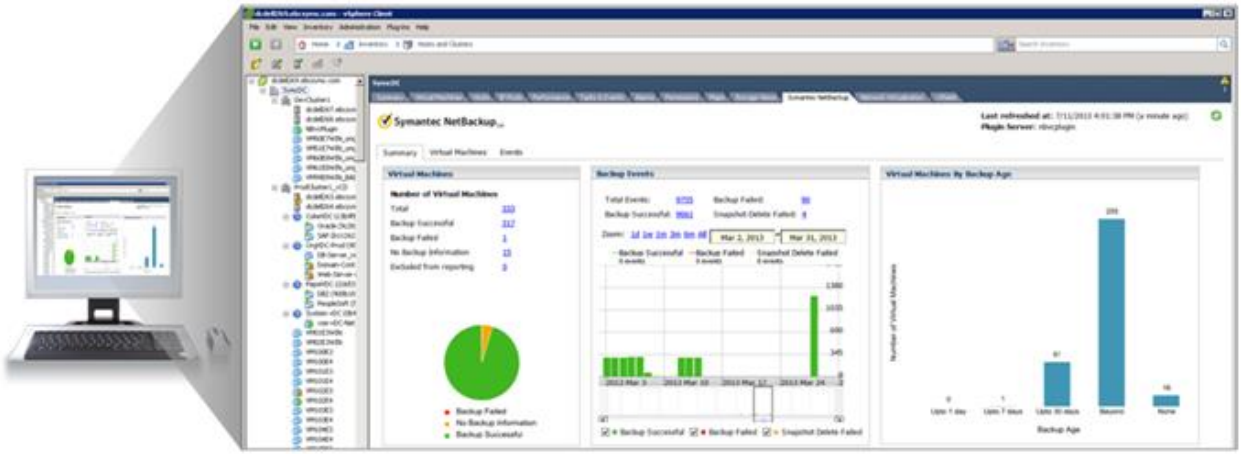
vCenter Integrated Administration

Integration between NetBackup and VMware includes a plug-in option for vCenter that provides administrators with access to extensive backup details and additional recovery capabilities.

ESG Lab Testing

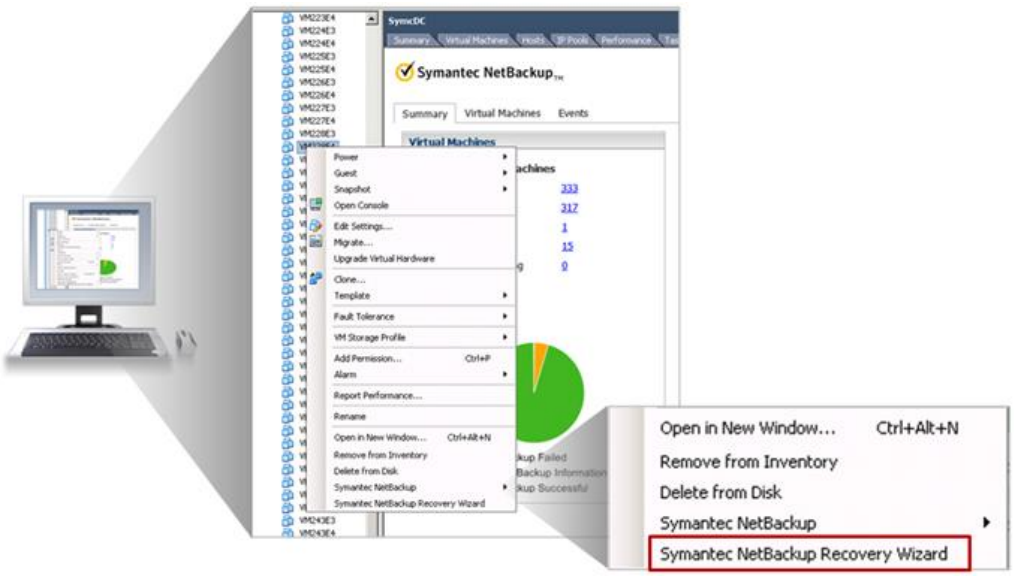
ESG Lab began validating vSphere Plug-in functionality by logging into the vCenter management interface and clicking on the Symantec NetBackup tab. As shown in Figure 11, the summary page provides the administrator with an easy-to-read overview of the number of VMs being protected, the overall success rate of the backup jobs, daily event details, and the age of the last successful backup.

Figure 11. vSphere Plug-In NetBackup Summary Page



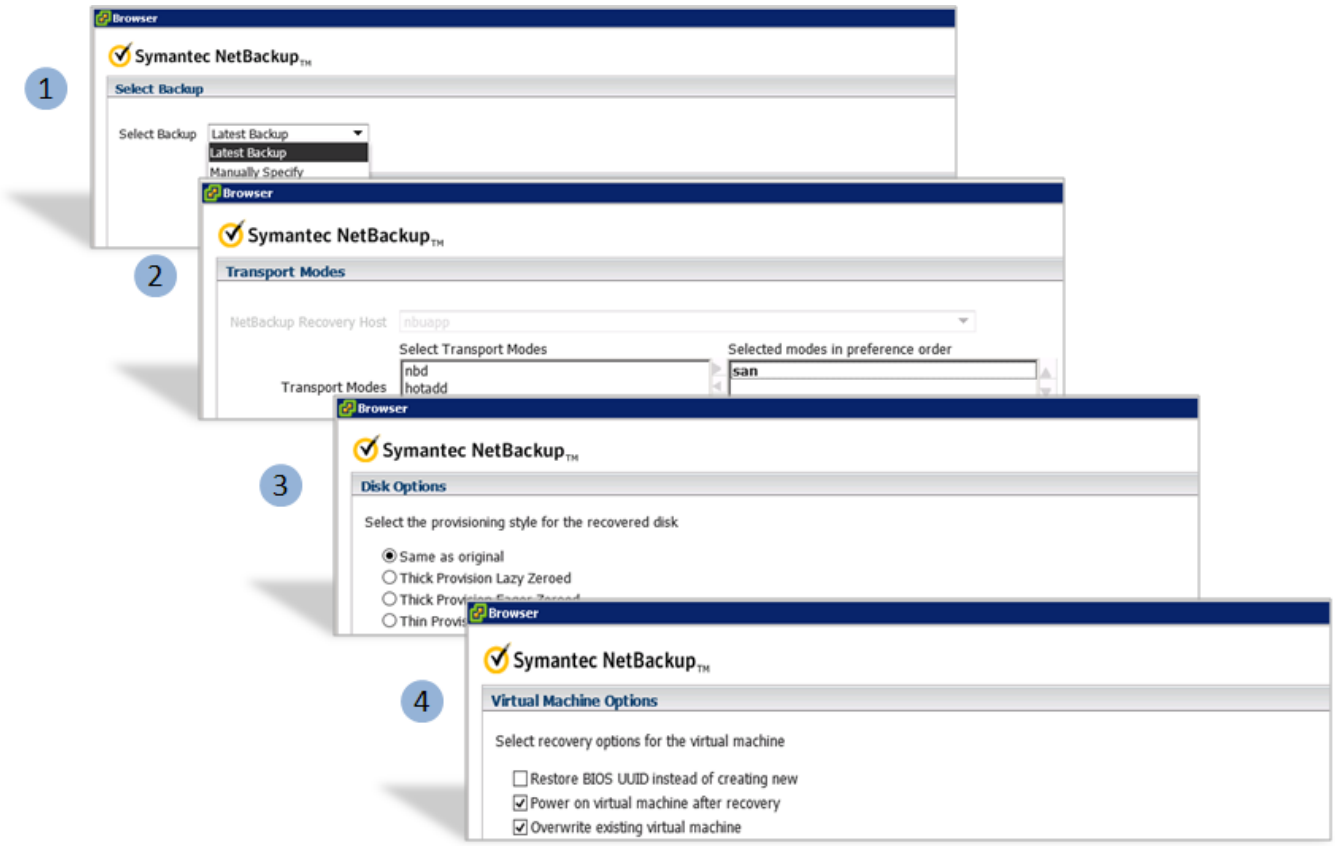
Next, as shown in the red callout box in Figure 12, the Lab selected an individual VM and right-clicked to launch the Symantec NetBackup Recovery Wizard.

Figure 12. vSphere Plug-in NetBackup Recovery Wizard



Lastly, ESG Lab used the wizard to perform an actual recovery. Figure 13 shows the details for key recovery steps, from selecting which backup to restore, through transport modes and disk options, to whether or not to power up the virtual machine after recovery.

Figure 13. Recovery Wizard Details



Why This Matters

Traditionally, infrastructure management roles were segregated—application, server, storage, and network administrators covered their own domains only, and any overlapping tasks required collaboration between them. Virtualization tends to blur those lines because tasks are not as strictly separated, and virtualization administrators often deal with application, server, network, and storage tasks as they launch new VMs for users. Separate management interfaces make tasks more difficult and time consuming, and prevent IT from gaining a holistic view across the infrastructure.

ESG Lab validated that the NetBackup vSphere Plug-in adds features by enabling NetBackup to log vSphere events, and by providing context-sensitive history, reporting, and graphs, with high-level and drill-down capabilities. Backups are listed in vCenter and can be exported to standard file formats, while reports can be generated according to selected criteria. Of particular note is the NetBackup Recovery Wizard available within vSphere. By right-clicking on a particular VM and selecting a specific backup, the VM administrator can execute restores without assistance from a backup administrator, with restore location, transport mode, VMDK format, and other options available. This simplifies and speeds return to productivity after a failure or outage.

ESG Lab Validation Highlights

- ☑ ESG Lab found it extremely easy to configure and work with VMware Accelerator. It was well integrated into the NetBackup GUI and should be an easy option to set up even for the beginner backup administrator.
- ☑ The Lab confirmed in our validation testing that backups with VMware Accelerator were 35 times faster than standard VM backups.
- ☑ We also confirmed that with IRV, we were could recover a 6TB virtual machine 446 times faster than a standard restore.
- ☑ ESG Lab was pleased to find the same level of integration provided with VMware Accelerator in the Replication Director feature. It was easy to use and configure and allowed us to back up 300 VMs in less than five minutes.
- ☑ The amount of detail and functionality built into the vSphere Plug-in was a breath of fresh air. Not only could we quickly find important information about the protection level of our test VMs, it also enabled us to offload the restore operations from the backup administrator and confidently put them in the hands of the server team.

Issues to Consider

- ☑ Though it was not difficult to conduct, the lab would like to see the Instant Recovery for VMware integrated into the NetBackup GUI. At the time of this testing, the only option was to run IRV from the command line.
- ☑ ESG Lab believes Instant Recovery for VMware provides great value to IT organizations through the quick recovery of critical data. However, proper planning must be considered when leveraging IRV as it shares storage and bandwidth resources with the backup environment for as long as the process is active and the data has been fully moved with storage vMotion back to the primary production storage location.

The Bigger Truth

If you've been around IT for any length of time at all, you know of NetBackup. From its original Control Data Corp. days to its Veritas incarnation to its (almost one-decade-old) acquisition by Symantec, NetBackup has been a key cog in the enterprise data protection schema for more than 25 years.

As the product has matured, many new features and functions have been added. But even after 25 years, NetBackup remains on the forefront of data protection innovation, as this ESG Lab Validation proves. This is no stale "hanger on," hoping to keep producing some amount of revenue as it slides into its declining years. Just the opposite, in fact: NetBackup is invigorated with new functionality aimed at today's virtualized environments, and offers features that make it unique in the industry. Aging gracefully? You could say that, but it's more like finding the fountain of youth.

Virtualization has changed the face of IT, enabling consolidation of infrastructure and management that reduces costs, and adding new levels of agility and flexibility. But protecting virtual environments can be a challenge, especially as VMs are quickly and easily created, moved, and deleted in data centers and in the cloud. In addition, just being able to back up your VMs doesn't fill the bill anymore. In recent ESG research on data protection for virtual and cloud environments, data recoverability was ranked highest on the list of primary VM data protection challenges by respondent organizations. According to the report:

> *Considering that nearly one-third of organizations cite the recoverability of data as their primary virtual server data protection challenge**, the real differentiation** [among solutions] **is in agility of restoration, and integration with management tools, virtualization consoles, and storage arrays for even more capabilities**.*[3]

ESG Lab validated that NetBackup 7.6 for VMware hits the target on all of those points. This solution utilizes a speedy "incremental forever" backup scheme and reduces data volumes with CBT and deduplication. Our testing demonstrated that NetBackup Accelerator performed 35 times faster backup, and that Instant Recovery executed 446 times faster restore of 6TB VMs. Integration with NetApp storage functionality enables NetBackup to manage the complete lifecycle of protection, including backup, replication, and tape-outs, as well as restore granularity, catalog-based search, data movement, retention, and expiration. In addition, vCenter integration provides not only backup history and reporting in the vCenter console, but also a Recovery Wizard that makes VM restore simple and fast—by the VM administrator, without any help from a storage expert.

It comes as no surprise to ESG that NetBackup earned the inaugural "Best of VMworld" award in the data protection category in 2007, and since then has continued to amass multiple VMworld data protection awards. NetBackup has long been one of the most respected data protection solutions, with a proven track record of innovation and feature support, and version 7.6 for VMware adds to that reputation. ESG Lab was extremely impressed with its capabilities, and believes that Symantec NetBackup sits firmly on the leading edge of data protection for virtual environments.

[3] Source: ESG Research Report, *Trends for Protecting Highly Virtualized and Private Cloud Environments*, June 2013.

Appendix

Table 1. ESG Lab Test Bed

NetBackup Hardware and Software	
NetBackup Appliance	Model: 5230 CPU: 2 x 6 Core 2.0GHz Xeon E5-2620 Memory: 128GB Drives: (2) 3TB RAID 1 and (8) 3TB RAID 6 Network: (4) 1GbE NICs and (2) 10GbE NICs
NetBackup Software	Version: 7.6
Storage	
NetApp	Model: FAS 2240-4 Two Single Controller units Memory: 12GB Drives: (12) 300GB 15K SAS (24) 1TB 7.2K SAS Data ONTAP: 8.1
Servers	
Dell	Model: PowerEdge R610 CPU: 2 x 6 Core 2.4Ghz Xeon E5645 Memory: 48GB Drives: 4 x 146GB 15K
Software	
VMware	vSphere Version 5.1
Microsoft Windows	Windows Server 2008 R2

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