Dell™ DR4000 Disk Backup and Disaster Recovery Solution:
Integrating into Tape Backup Environments

A Dell Technical White Paper

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Feedback

We welcome your feedback. E-mail us at StorageSolutionsFeedback@Dell.com.

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1 Introduction

With its efficient deduplication and compression algorithms, the Dell DR4000 advanced disk backup and disaster recovery appliance can be a cost-effective and critical addition to an organization’s disaster recovery plans. In most cases, a Dell DR4000 solution replaces a tape drive or library as the primary backup solution because the DR4000 can deliver fast full backups and restores more efficiently than traditional tape devices. Using a combination of the DR4000 for primary backups and existing tape infrastructure for secondary backups provides a high-performance and reliable solution to meet legal obligations or business requirements for offsite storage, archiving, and disaster recovery. In addition, the recent release of the DR4000 Rapid Data Access software plug-in enables more efficient workflows such as automating disk-to-disk-to-tape backups to consolidate tape backup systems from remote sites into the data center.

Audience

This paper is intended for system/storage administrators, solution architects, IT managers, who need to learn about how to backup data from DR4000 to a tape device. We expect the reader to have working knowledge of CommVault® Simpana®, Symantec™ NetBackup™, or Backup Exec™ software applications; the Dell DR4000 disk-based storage appliance; and related backup and disaster recovery operations.
2 Integrating the Dell DR4000 into Tape Infrastructure

With the Dell DR4000, customers can seamlessly integrate backup-to-disk into existing tape-based environments for fast local backup and restore operations. In typical customer environments, the DR4000 replaces existing tape-based primary backup infrastructures and is used to back up and quickly recover recent data. With its higher performance, inline deduplication and compression, and smaller footprint, the DR4000 can reduce reliance on tape backups, which are expensive and time-consuming to recall when needed for data recovery. Tape is reserved for longer-term storage of backup copies to meet long-term retention, disaster recovery, and compliance requirements.

Integrating the DR4000 as the primary backup device, with secondary copies made to tape, fits well into existing backup processes and workflows primarily controlled by a data management application such as Symantec Backup Exec, Symantec NetBackup, or CommVault Simpana. These applications ensure that backup server catalogs are updated with both the DR4000 and tape copies of the data so that restores are faster and more seamless in the case of a failure. In deployments where a DR4000 replicates to another DR4000 at a remote site, the remote DR4000 can back up to tape at that site. The Dell DR4000 Rapid Data Access software plug-in adds even tighter integration with data management applications. Currently, the DR4000 Rapid Data Access plug-in supports Symantec OpenStorage Technology (OST)-enabled backup applications. Support for OST enables Symantec Backup Exec and NetBackup to better leverage the efficient deduplication and replication capabilities of the DR4000.

Although the DR4000 does not yet support the Network Data Management Protocol (NDMP) directly, it can serve as the backup source location in an NDMP-based backup configuration. In this workflow, the NDMP data stream is terminated at the data management application server, and the data is transferred over CIFS, NFS, or OST to the DR4000 appliance. In this three-way (or remote) NDMP configuration, backup data must pass through the media server. For this reason, Dell recommends using a separate backup network to minimize the impact of backup data traffic between the media server and the DR4000. In the future, the DR4000 solution will support NDMP directly, allowing the appliance to serve as an NDMP target. With this support, backup data can bypass the media server and go directly to the DR4000.

In this white paper, we focus on four typical use cases for integrating the DR4000 into existing tape infrastructure. We identify the high-level Backup Exec, NetBackup, and Simpana workflows that customers can use to implement these use cases.

1 The DR4000 Rapid Data Access plug-in was included in the 1.1 release of the Dell DR4000 in August 2012.
2 Symantec OpenStorage Technology (OST) is a Symantec initiative that enables application programming interface (API)-level support for intelligent disk storage appliances such as the Dell DR4000. This native support for disk-based storage appliances provides opportunities to optimize performance and eliminate protocol overhead associated with tape emulation devices. See Dell white paper, “Overview: Dell DR4000 Support for Symantec OpenStorage” in “Additional Resources.”
3 The 1.1 release of the Dell DR4000 is certified to work with Symantec Backup Exec, Symantec NetBackup, Veeam, AppAssure (4.x), Networker, and CommVault Simpana.
3 Integration Use Cases

The following use cases show how the Dell DR4000 can be integrated into existing tape infrastructure.

- **Use Case 1**: Integrate DR4000 when backup window is not time-constrained.
- **Use Case 2**: Integrate DR4000 when backup window is time-constrained.
- **Use Case 3**: Integrate DR4000 as tier 1 of life cycle policy-based backup storage strategy.
- **Use Case 4**: Integrate Dell DR4000 as part of disk-to-disk-to-tape solution that centralizes tape backups.

**Use Case 1: Integrate Dell DR4000 when backup window is not time-constrained.**

In this use case, the customer integrates the Dell DR4000 into existing tape infrastructure to gain high-speed restores and, thus, meet or exceed service level agreement (SLA) requirements. The customer continues to use tape infrastructure for longer-term backups to meet business, legal, or regulatory compliance requirements. The customer’s backup window is not time-constrained.

The high-level workflow consists of the data management application making duplicate copies simultaneously—referred to as *inline copy* by Symantec and CommVault—to different target devices. One copy goes to the DR4000 to be used for quick recovery, if needed. The other copy goes to tape for long-term retention, disaster recovery, and compliance requirements.

The backup-to-tape workflow is primarily controlled by data management applications such as Backup Exec, NetBackup, and Simpana. Customers can use the following workflows for this use case:

- **Backup Exec**: Duplicate Backup Sets Template
- **NetBackup**: Inline Copy
- **Simpana**: Inline copy

**Pros**

This approach optimizes the performance impact on the production environment. It also takes advantage of the Dell DR4000’s high performance, inline duplication, and compression capabilities for primary backup and recovery operations. In addition, the inline copy approach ensures that tape backups are available as soon as the copy is completed.

**Cons**

The inline copy workflow is not complete until the slowest of the two or more target devices has completed—in this case, the tape drive. For this reason, the inline copy may require a longer backup window and be better suited to smaller backups. In addition, inline/duplicate copies can increase disk contention at the data management application level because of the additional use of the disk to write copies. See Use Case Two for an alternative approach that does not extend the backup window.
Use Case 2: Integrate Dell DR4000 when backup window is time-constrained.

This use case is similar to use case 1, except that here the customer’s backup window is time-constrained. The customer integrates the Dell DR4000 into existing tape infrastructure to gain high-speed restores and, thus, to meet or exceed service level agreement (SLA) requirements. The customer continues to use tape infrastructure for longer-term backups to meet business, legal, or regulatory compliance requirements.

However, because the backup window is time-constrained, the data management application first backs up to the primary storage device, the Dell DR4000. Next, the data management application creates a copy(ies) by duplicating the primary backup on the DR4000 to the secondary device, a tape drive. The duplicate(s) can be produced at a later time when the production environment is not impacted.

The backup-to-tape workflow is primarily controlled by data management applications such as Backup Exec, NetBackup, and Simpana. Customers can use the following workflows for this use case:

- Backup Exec: Duplicate Backup Sets Template
- NetBackup: Vault Copy
- Simpana: Auxiliary Copy

Pros

This approach enables high-speed backups. Like use case 1, it minimizes the performance impact on the production environment and takes advantage of the Dell DR4000’s high performance, inline duplication, and compression capabilities for primary backup and recovery operations. In contrast to use case 1, this approach reduces the backup window by sending backups to the faster DR4000 device, and allowing the flexibility to schedule duplicate copies to tape at a later time. The result is faster backups than use case 1.

Cons

This workflow requires two separate jobs, rather than just one. The first job backs up to the DR4000. A second job is required to make multiple copies from the DR4000 to the secondary media. In addition, the ability to restore from tape backups is not available until after the DR4000 duplicate backup to tape runs and completes.
Use Case 3: Integrate Dell DR4000 as tier 1 of life cycle policy-based backup storage strategy.

In this use case, the customer integrates the Dell DR4000 as tier 1 storage into existing tape infrastructure. The customer uses life-cycle management to implement a policy-based tiered storage strategy. The policy is time-based. As data ages, it is automatically migrated to less-expensive storage platforms. Tier 1 back-up data is stored on the Dell DR4000 for a specified period of time and then moved from the DR4000 to a tier-2, lower-cost, and on-site platform—in this case, tape. From here, the data is migrated after a specified period of time to the lowest tier, an off-site tape archive.

The data life cycle described here and its backup-to-tape workflows are primarily controlled by data management applications such as Backup Exec, NetBackup, and Simpana. Customers can use the following workflows to implement this life cycle and its backup-to-tape workflows:

- **Backup Exec:** Duplicate Backup Sets Template
- **NetBackup:** Storage Lifecycle Policy (SLP)
- **Simpana:** Replicated Magnetic Libraries and Auxiliary Copy

**Pros**

This approach uses automated workflows that are easy to modify to meet changing requirements. It also enables local high-speed recovery of tier-1 production data that resides on the Dell DR4000. The approach does not impact the performance of the production environment. The result is more cost-effective backup operations — less staff time and lower capital and operating expenses — and easier management of various storage device types. For example, a single NetBackup SLP can replace both the duplication and staging processes by introducing a series of storage destinations, each made up of a specific storage medium with associated retention period. The SLP then ensures that backup copies are made using the appropriate destinations at each phase of the life cycle. The automated workflows used in this approach take advantage of the deduplication and compression capabilities of the DR4000, which can help achieve a data-reduction level of as much as 15:1.

**Cons**

The life-cycle management approach is designed primarily to tier data—i.e., duplicate data from one tier to another as it ages. To fully protect data, Dell recommends that customers make additional backup copies using one or more of the following methods:

- Replicate the primary DR4000 to a second DR4000.
- Configure additional copies to tape as part of the life cycle workflow. The priority of these duplicate copies can be controlled so that they do not affect the production environment or backup window.
Use Case 4: Integrate Dell DR4000 as part of disk-to-disk-to-tape solution that centralizes tape backups.

In this use case, the customer integrates the Dell DR4000 as part of a solution to consolidate tape operations from remote offices over a WAN to a central data center tape server. Today, IT organizations are looking at disk-to-disk-to-tape backup as an alternative to purchasing and maintaining tape libraries for each branch office. These decentralized tape libraries are expensive and require IT staff on-site to remove tape cartridges and ship off-site, recycle expired cartridges for reuse in the tape library, and in some cases secure the backup with encryption software or hardware. Off-site tape storage can also delay recovery time.

To implement the disk-to-disk-to-tape backup solution, the customer stages remote office backup data to a local Dell DR4000. The DR4000 deduplicates and replicates the data over a WAN to another DR4000 in the data center. There, a media server controls the process of archiving the data to a centralized tape library and, after a prescribed period of time, to an off-site tape archive.

The data life cycle described here and its backup-to-tape workflows are primarily controlled by data management applications such as Backup Exec, NetBackup, and Simpana. Like use case 3, the customer uses life cycle policy-based management workflows to implement a tiered backup storage strategy. The policy is time-based. At the central data center, tier 1 back-up data is stored on the Dell DR4000 for a specified period of time and then moved to a tier-2, lower-cost, and on-site tape library. From here, the data is migrated after a specified period of time to the lowest tier, an off-site tape archive.

Customers can use the following workflows to implement this life cycle and its backup-to-tape workflows:

- **Backup Exec**: Duplicate Backup Sets Template with OpenStorage Technology
- **NetBackup**: Storage Lifecycle Policy (SLP) with OpenStorage Technology
- **Simpana**: Replicated Magnetic Libraries and Auxiliary Copy

**Pros**

Like use case 3, this approach uses automated workflows that are easy to modify to meet changing requirements. It also enables local high-speed recovery of tier-1 production data that resides on the Dell DR4000. The approach does not impact the performance of the production environment. The result is more cost-effective backup operations — less staff time and lower capital and operating expenses — and easier management of various storage device types. For example, a single NetBackup SLP can replace both the duplication and staging processes by introducing a series of storage destinations, each made up of a specific storage medium with associated retention period. The SLP then ensures that backup copies are made using the appropriate destinations at each phase of the life cycle. The automated workflows used in this approach take advantage of the deduplication and compression capabilities of the DR4000, which can help achieve a data-reduction level of as much as 15:1. The result is more efficient replication, referred to by Symantec as OST “optimized duplication.”
Cons

The customer may need to purchase additional data management application licenses to fully leverage the DR4000 capabilities in an automated workflow. For example, Symantec NetBackup requires the purchase of a Symantec OpenStorage Disk Option license, and Backup Exec requires the purchase of the Deduplication Option to enable OpenStorage Technology.

For more details on this use case, see the Dell white paper, “Dell DR4000 Support for Symantec OpenStorage: Disk-to-Disk-to-Tape Backup Using a Storage Lifecycle Policy,” in “Additional Resources.”
4 Conclusion

Factors such as SLAs, compliance requirements, recovery point objectives (RPOs), and recovery time objectives (RTOs) will determine how you employ the use cases described in this paper, but the Dell DR4000 can deliver fast, daily full backups more efficiently than the tape devices widely used in backup operations today. The DR4000 can be integrated into existing tape infrastructure environments as the primary backup target, while tape media is reserved for storing backup image copies to meet long-term retention, business continuity, and regulatory compliance requirements. The result is more cost-effective backup operations — less staff time and lower capital and operating expenses — and easier management of various storage device types.

Combining the DR4000 with existing tape infrastructure — and using the same industry-standard backup software for both — can be a high-performance and reliable backup infrastructure for primary data, while also meeting the needs for offsite storage. The additional support for Symantec OST afforded by the DR4000 Rapid Data Access software plug-in enables more efficient workflows, including automating disk-to-disk-to-tape backups to consolidate tape backup systems from remote sites into the data center.
Appendix A  Additional Resources

Dell online support resources:

- Dell technical support site: http://support.dell.com
- Dell TechCenter is an online IT community where IT professionals connect with Dell customers and employees to share knowledge, best practices, and other information about Dell products and installations: http://DellTechCenter.com

Dell DR4000 resources:


Symantec Backup Exec and NetBackup resources:

CommVault Simpana resources:

- CommVault Books Online — Simpana Auxiliary Copy:  
  http://documentation.commvault.com/dell/release_9_0_0/books_online_1/english_us/prod_info/features.htm?var1=http://documentation.commvault.com/dell/release_9_0_0/books_online_1/english_us/features/auxiliary_copy/auxiliary_copy.htm
- CommVault Books Online — Inline Copy:  
  http://documentation.commvault.com/dell/release_7_0_0/books_online_1/english_us/features/storage_policy_copy/inline_copy.htm
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- CommVault Books Online — Magnetic Libraries. Remote Office Backup solution to replicate data from remote offices to central data centers using magnetic libraries on replicated disks:  
  http://documentation.commvault.com/dell/release_7_0_0/books_online_1/english_us/features/magnetic_library/magnetic_library.htm
- CommVault Books Online — Backup - NAS NDMP:  
  http://documentation.commvault.com/hds/release_8_0_0/books_online_1/english_us/features/backup/nas_ndmp.htm
Appendix B  Deployment Guidelines

The following recommendations and requirements help to successfully deploy the Dell DR4000 appliance in existing back-up environments:

- The DR4000 appliance is configured with either two 10-GB Ethernet ports or four 1-GB Ethernet ports that are bonded. Dell recommends your backup server NICs be configured the same.
- Dell recommends that you implement a dedicated backup network for the Dell DR4000 and the backup servers. This approach minimizes the performance impact of backup operations on the production environment.
- In Microsoft® Active Directory® environments with multiple DR4000 appliances, the backup server(s) and associated DR4000 must be members of the same Active Directory domain. Set up a service account for the backup server services and configure it to not expire.
- If using a backup application for Microsoft Windows, all DR4000 shares must be configured as CIFS.
- For Symantec Backup Exec and CommVault Simpana, use 4-gigabyte backup image sizes.