



Technical Report

Deploying Microsoft DFS with NetApp Storage Systems

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ABSTRACT

This report offers guidance on configuring Microsoft® Distributed File System (DFS) with NetApp® storage systems for global namespace deployment. The report's goal is to provide all the information you need to integrate NetApp storage systems into the Microsoft DFS environment. The report also covers the options provided by NetApp storage systems for disaster recovery solutions in a DFS environment.

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1 INTRODUCTION

The Microsoft Distributed File System (DFS) protocol is a critical component of Windows® deployments to address your large-scale file system storage infrastructure and namespace management requirements. DFS provides the ability to map a logical name to a physical device, creating a namespace that shields end users from the intricacies of server management and share layout. When implemented effectively, DFS can serve as a global namespace for all of your file services.

DFS is a set of client and server services that organizations like yours can use to organize many distributed Windows shares into an enterprise global namespace, providing share location transparency and redundancy to improve file availability in the event of a server failure or a facility disaster. DFS allows shares in multiple locations to be grouped logically into a single server location, or DFS root. When users access a share that exists in the DFS root structure, they are experiencing a DFS link that transparently redirects their request to the correct server and share.

2 DISTRIBUTED FILE SYSTEM OVERVIEW

DFS enables system administrators to create a global namespace that consists of folders from various physical locations. The actual location of the storage is transparent to end users, and DFS takes care of redirecting them to the appropriate location. Users experience files and folders as being in a unified location, although the actual shares may reside on multiple servers throughout the file sharing network.

REASONS FOR USING DFS

You should consider implementing DFS if:

- You expect to add file servers or modify share locations
- Users who access targets are distributed across one or more sites
- Most users require access to multiple server and share targets
- Server load balancing could be improved by redistributing server and share targets
- Users require uninterrupted access to server and share targets
- Your organization has multiple Web sites for either internal or external use

DFS NAMESPACES

A DFS *namespace* is a logical view of folders representing your file sharing. For end users, the folders in the namespace appear to reside in a single centralized location. Users can select the folders and work with files without needing to know the server or share names hosting the actual data.

DFS NAMESPACE ROOT

A DFS namespace *root* is a logical share that serves as the starting point and host to other shares.

DFS FOLDER TARGET

A DFS *folder target* is a network path of a shared folder on a network server. Users who are accessing the DFS folders are redirected to the network paths defined transparently in folder targets.

HOSTING A DFS FOLDER TARGET

Any shared folder on a file server can be a DFS folder target. A NetApp® storage system or any Windows Server® can host a share referenced by a DFS folder target with a distinct name.

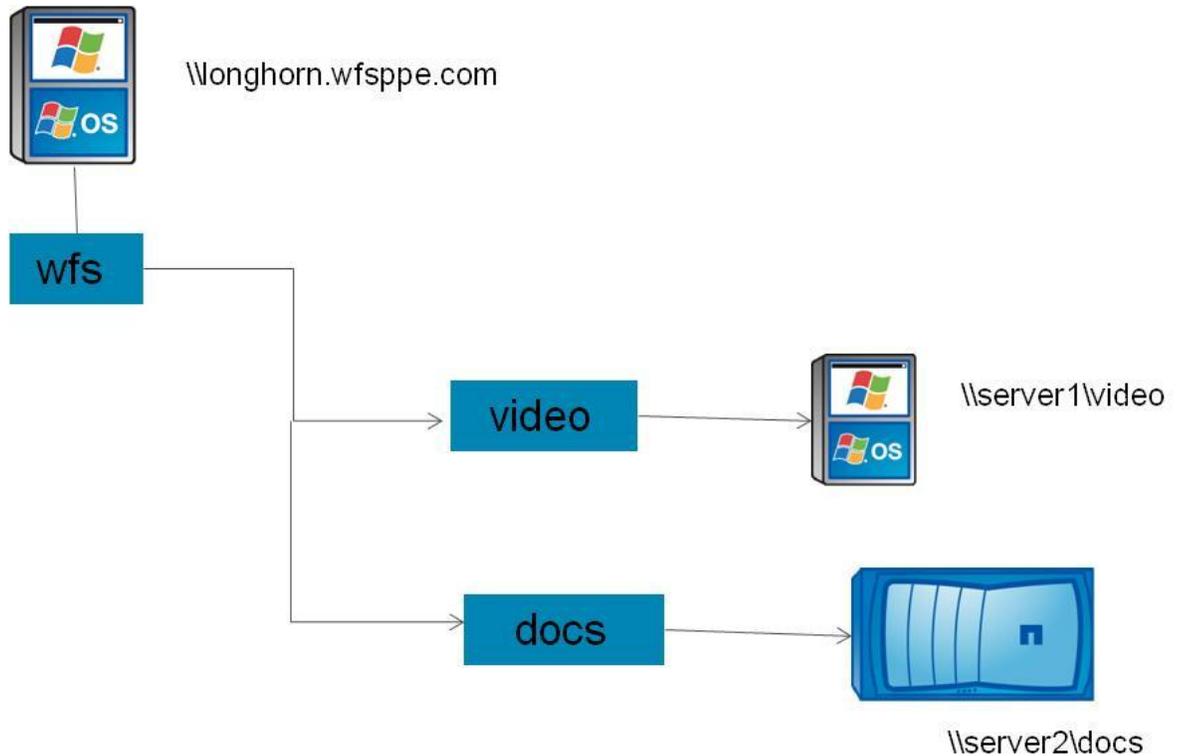


Figure 1) A DFS namespace.

Figure 1 shows an example DFS namespace. The root of the namespace is created on a Windows Server, and a folder without any targets is created with the name “wfs.” Two folders are created with DFS targets, and the folders are named “video” and “docs.” The target for folder video is on a Windows Server where the path is \\server1\video, and for folder docs the target is a NetApp storage system with the path \\server2\docs.

2.1 DISTRIBUTED FILE SYSTEM FEATURES

DFS offers the following features:

- User-friendly and transparent access to servers and shares means that there’s no need to inform end users if the physical location of the files changes.
- There’s no need for a number of drive mappings for multiple servers and shares.
- Maintenance and software updates to the servers can be done without disrupting user access.
- DFS replication helps with availability of the data at all times in multiple locations.
- Load balancing is possible with multiple folder targets support.

2.2 DFS ENHANCEMENTS IN WINDOWS SERVER 2008

A number of administrative usability and performance improvements have been introduced in the Windows Server 2008 operating system.

DFS NAMESPACE TYPES

There are two types of DFS namespaces:

- Standalone DFS namespace
- Domain-based DFS namespace:
 - Windows 2000 Server mode

- Windows Server 2008 mode, which includes support for access-based enumeration and increased scalability

If any of the following is true, choose a standalone namespace:

- No Active Directory® domain is in use
- The domain is in pre-Windows 2008 level and needs more than 5,000 DFS folders

If any of the following is true, choose a domain-based namespace:

- Need to increase the availability by using multiple namespace servers
- Need to hide the name of the DFS server from users

Table 1 describes the characteristics of each namespace type and mode.

Table 1) DFS namespace characteristics

Characteristic	Standalone DFS	Domain-Based DFS (Windows 2000 Server Mode)	Domain-Based DFS (Windows 2008 Server Mode)
Path to DFS namespace	\\ServerName\RootName	\\NetBIOSDomainName\RootName \\DNSDomainName\RootName	\\NetBIOSDomainName\RootName \\DNSDomainName\RootName
Namespace information storage location	In the registry and in a memory cache on the namespace server	In Active Directory and in a memory cache on each namespace server	In Active Directory and in a memory cache on each namespace server
Size recommendations	The namespace can contain more than 5,000 folders with targets	No more than 5,000 folders with targets, because DFS object in Active Directory should be less than 5MB	More than 5,000 folders with targets
Minimum Active Directory domain-functional level	Active Directory not required	Windows 2000 mixed	Windows Server 2008
Minimum supported namespace servers	Windows 2000 Server	Windows 2000 Server	Windows Server 2008
Support for access-based enumeration (if enabled)	Yes, requires Windows Server 2008 namespace server	No	Yes
Supported methods for namespace availability	Create a standalone namespace on a failover cluster	Use multiple namespace servers to host the namespace	Use multiple namespace servers to host the namespace

Windows Server 2008 DFS includes the following enhancements.

ACCESS-BASED ENUMERATION

Access-based enumeration restricts users to listing only the files and folders that they have permission to access. This feature is not enabled by default.

SEARCH FOR FOLDERS OR FOLDER TARGETS

Windows Server 2008 DFS includes the ability to search for folders or folder targets within a DFS namespace.

3 DEPLOYMENT OF DFS

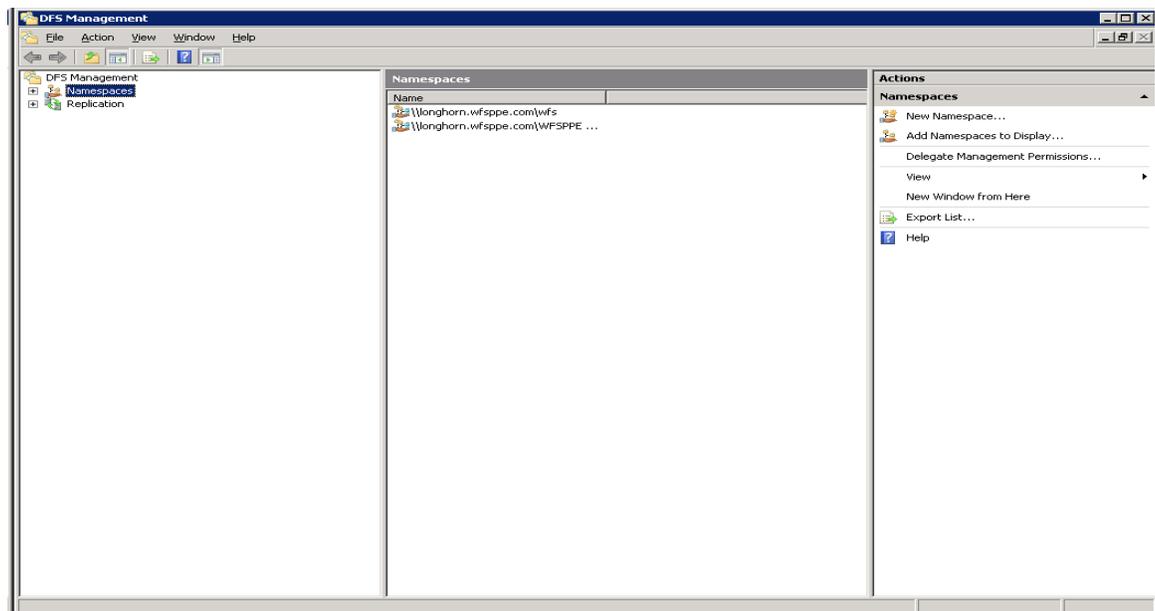
3.1 DEPLOYING A DFS NAMESPACE

This section describes the steps required to deploy a namespace.

3.1.1 Create a DFS Namespace

Use the DFS Management snap-in to create the namespace.

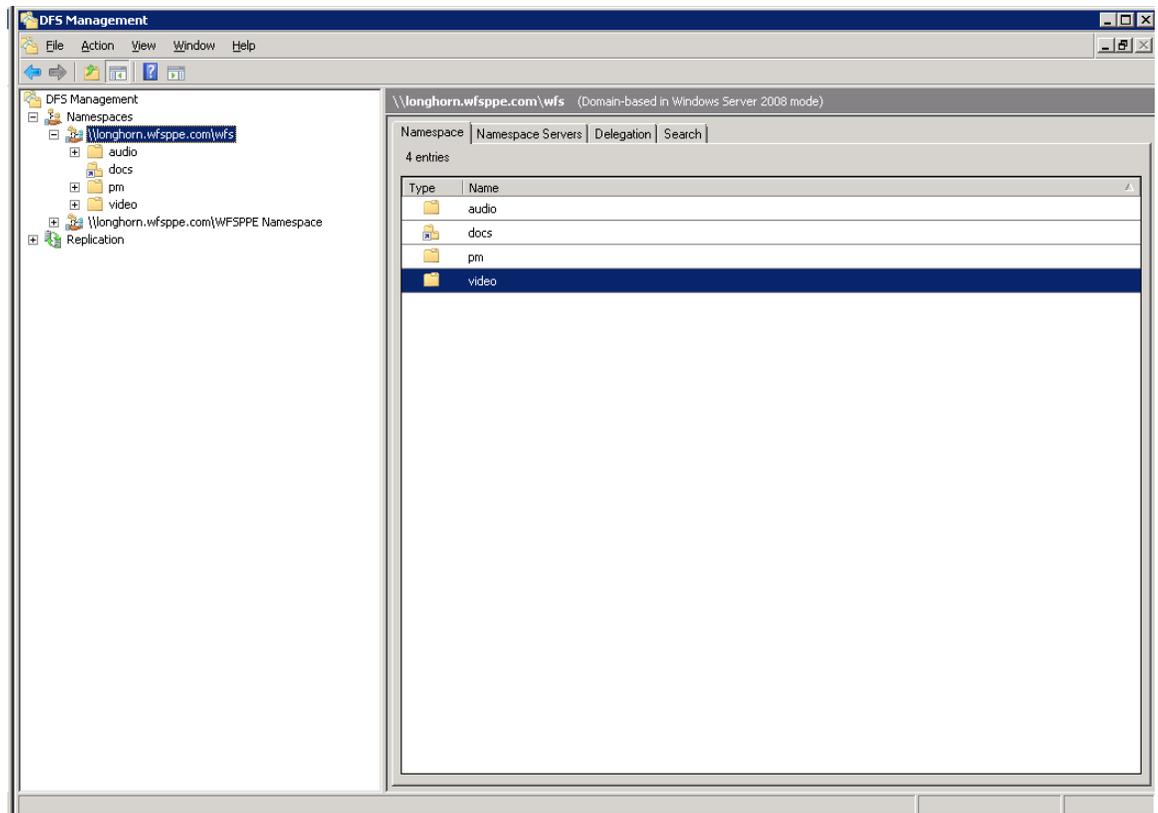
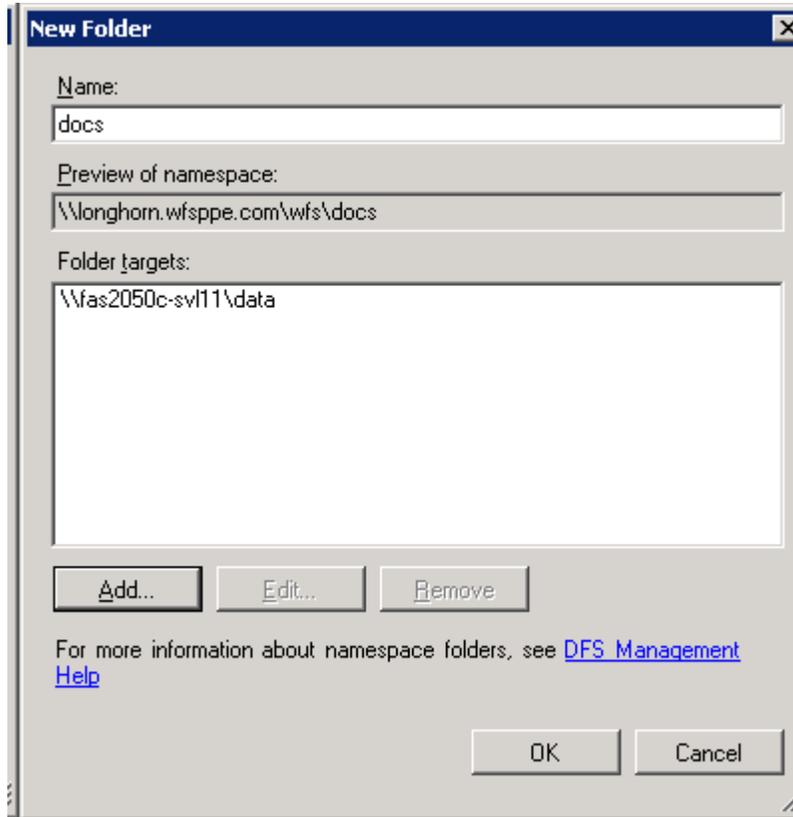
1. In the console tree of the DFS Management snap-in, right-click the Namespaces node and click New Namespace.
2. Follow the steps in the New Namespace wizard.



3.1.2 Add Folders to the DFS Namespace

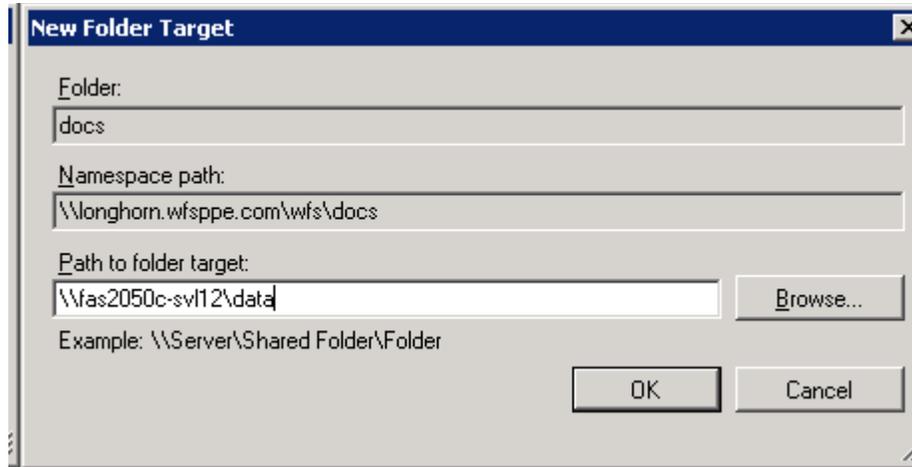
Follow these steps to add the folders to the namespace.

1. In the console tree of the DFS Management snap-in, right-click the namespace that you created in the previous section and click New Folder.
2. In the Name field, enter the folder name (for example, docs), and then click Add to add the folder target.



To increase the availability of the docs folder, you can add a second folder target to docs.

1. In the console tree of the DFS Management snap-in, right-click the docs folder and click Add Folder Target.
2. In the Path to Folder Target field, enter the path of the share.
3. Click New Shared Folder.
4. When prompted about creating a replication group for these folder targets, click No.



ENABLE ACCESS-BASED ENUMERATION

```
dfsutil property abde enable \\ <namespace_root>
```

Set the security for each DFS folder:

```
dfsutil property ACL grant \\<namespace_root>\<folder> <username>:<permission>
```

4 NETAPP STORAGE SYSTEMS IN DFS INFRASTRUCTURE

4.1 GLOBAL NAMESPACE SOLUTION

NetApp storage systems can host any DFS folder target in the DFS namespace, but they cannot be a DFS root. When creating a folder target, as explained in section 3.1.2, the target can be entered in the form \\NetApp_Server\ShareName, where ShareName is the CIFS share on the NetApp storage system. Then the Windows clients can follow the DFS folder to get to the CIFS share on the NetApp storage system.

4.2 DISASTER RECOVERY SOLUTION

NetApp storage systems allow DFS users to fail over to another destination in the event of a disaster. NetApp provides the following solutions to address this issue.

4.2.1 Multiple Folder Targets or Alternate Volumes

DFS folders can have multiple targets, and administrators can set the priority on the order of the target list returned to the DFS clients. The first target on the list is always used by the DFS clients, and it

should point to the primary/source NetApp storage system in the SnapMirror® pair. The second and last target should be the SnapMirror destination. DFS clients do not use this target unless the first target is not reachable or not responding. Administrators have to identify the event of a disaster, break the mirror manually, and then make the destination writeable. It is possible to script these operations so that they are triggered based on the detection of the network failure or disaster.

4.2.2 SnapMirror with Protection Manager

SnapMirror is used to replicate the data between the NetApp storage systems. Protection Manager can help in managing the SnapMirror operation, in addition to breaking the mirror in the event of a disaster. After breaking the mirror, it is necessary to make the SnapMirror destination writeable, so that the DFS clients can access the data without any interruption. Protection Manager can do both of these tasks by using a simple one-click button. This simplifies the operation of bringing up the SnapMirror destination in the event of a disaster. The folder target in the DFS namespace needs to be updated with the new destination, either through a script or by manual intervention.

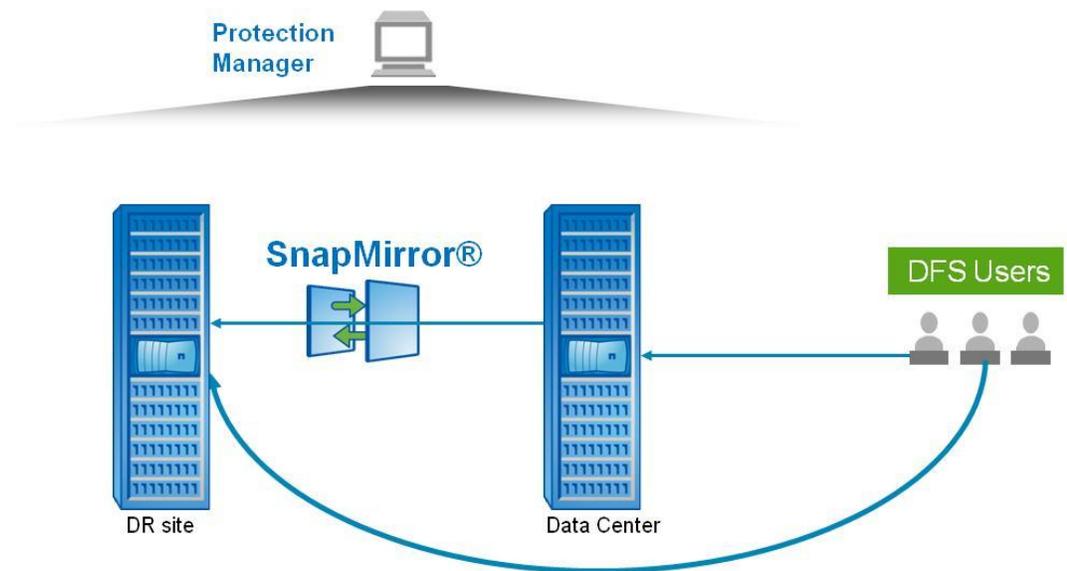


Figure 3) SnapMirror with Protection Manager.

4.2.3 MultiStore Disaster Recovery

Using MultiStore® to solve the disaster recovery problem is more transparent compared to the other options just described. In the event of disaster, the source vFiler™ unit will be migrated to the destination storage system without any changes required on the client infrastructure. Provisioning Manager helps in simplifying the migration process in the event of a disaster.

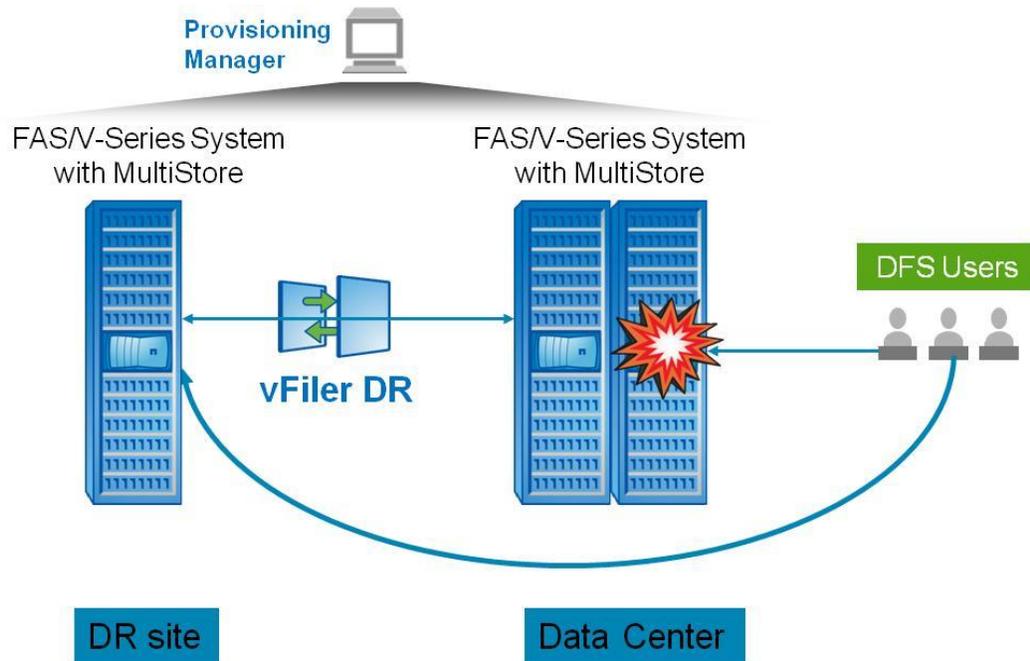


Figure 4) MultiStore disaster recovery.

5 CONCLUSION

Microsoft DFS is an excellent solution to manage your global namespace requirements for CIFS shares residing on NetApp storage systems along with Windows Servers. NetApp can provide disaster recovery solutions integrated with the Microsoft DFS infrastructure. Also, NetApp storage systems provide replication by using SnapMirror, which can work within the DFS namespace.

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