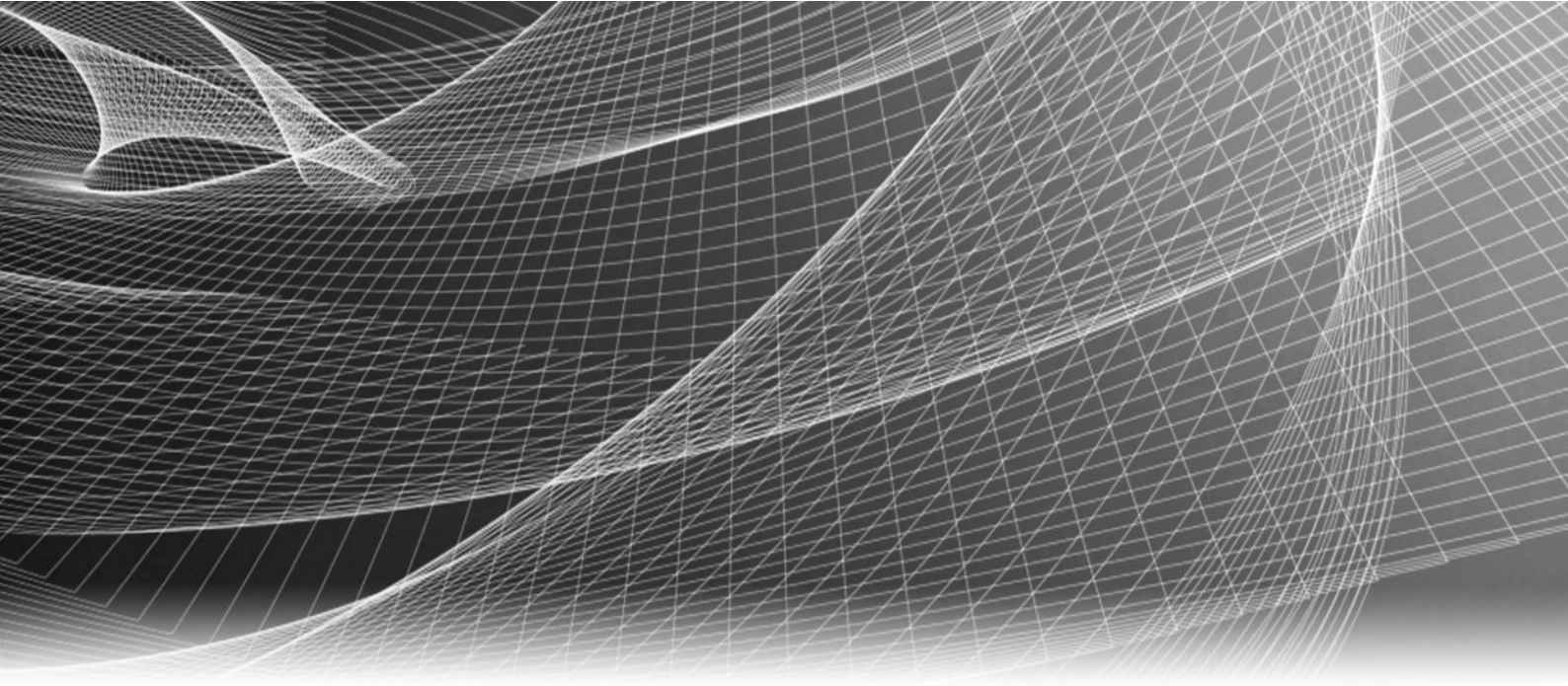

EMC® VNX® Series

Version VNX1, VNX2

Configuring and Managing CIFS on VNX

P/N 300-014-332 REV. 04

EMC²

Published June, 2016

EMC Corporation
Hopkinton, Massachusetts 01748-9103
1-508-435-1000 In North America 1-866-464-7381
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Preface

As part of an effort to improve and enhance the performance and capabilities of its product lines, EMC periodically releases revisions of its hardware and software. Therefore, some functions described in this document may not be supported by all versions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

If a product does not function properly or does not function as described in this document, please contact your EMC representative.

Special notice conventions used in this document

EMC uses the following conventions for special notices:

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Addresses practices not related to personal injury.

Note

Presents information that is important, but not hazard-related.

Where to get help

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Product information—For documentation, release notes, software updates, or for information about EMC products, licensing, and service, go to EMC Online Support (registration required) at http://Support.EMC.com.

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Note

Do not request a specific support representative unless one has already been assigned to your particular system problem.

Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications.

Please send your opinion of this document to:

```
techpubcomments@EMC.com
```

CHAPTER 1

Introduction

EMC VNX has incorporated the Common Internet File System (CIFS) protocol as an open standard for network file service. CIFS is a file access protocol designed for the Internet and is based on the Server Message Block (SMB) protocol that the Microsoft Windows operating system uses for distributed file sharing. The CIFS protocol lets remote users access file systems over the network.

This document is part of the VNX documentation set and is intended for use by system administrators responsible for implementing CIFS on VNX in a Windows environment or a multiprotocol (Windows and UNIX) environment and managing VNX in their Windows network.

Topics included are:

- System requirements 10
- User interface choices 10
- Related information 11

System requirements

Table 1 on page 10 describes the EMC® VNX® series software, hardware, network, and storage configurations.

Table 1 CIFS system requirements

Software	File OE version 7.1 and later
Hardware	VNX
Network	Windows Server domain configured with: • Active Directory (AD) • Kerberos or NT LAN Manager support • DNS server The DNS server should support dynamic updates. If dynamic DNS (DDNS) is unsupported, you must manually update the DNS server. *Configuring VNX Naming Services* provides instructions on configuring a Data Mover to use naming services. • Network Time Protocol (NTP) server *Configuring Time Services on VNX* provides instructions on configuring VNX as a client of an NTP server.

Note

VNX does not support the Samba software re-implementation of the SMB and CIFS protocols.

User interface choices

VNX offers flexibility in managing networked storage based on your support environment and interface preferences. This document describes how to configure CIFS on a Data Mover by using the command line interface (CLI). You can also perform many of these tasks by using one of the VNX management applications:

- EMC Unisphere®
- Microsoft Management Console (MMC) snap-ins (Windows Server only)
- Active Directory Users and Computers (ADUC) extensions (Windows Server only)

Note

The ADUC plug-in and the CIFS migration tools do not support 64-bit Windows editions. The MMC snap-in however, supports 64-bit Windows editions.

For additional information about managing your VNX:

- EMC VNX Documentation on EMC Online Support website
- Unisphere online help

Installing Management Application on VNX for File includes instructions on launching Unisphere, and on installing the MMC snap-ins and the ADUC extensions.

The *EMC VNX Operating Environment for File Release Notes* contain additional, late-breaking information about VNX management applications.

Related information

Specific information related to the features and functionality described in this document are included in:

- *Configuring and Managing Networking on VNX*
- *Configuring Time Services on VNX*
- *Configuring Virtual Data Movers on VNX*
- *Configuring VNX Naming Services*
- *Configuring VNX User Mapping*
- *EMC VNX Command Line Interface Reference for File*
- VNX for File man pages
- *Installing Management Applications on VNX for File*
- *Managing a Multiprotocol Environment on VNX*
- *Managing Volumes and File Systems for VNX Manually*
- *Parameters Guide for VNX for File*
- *Using EMC Utilities for the CIFS Environment*
- *Using International Character Sets on VNX for File*
- *Using VNX Replicator*
- *Using Windows Administrative Tools on VNX*

NOTICE

EMC VNX Command Line Interface Reference for File explains advanced options supported by the `server_cifs` command.

EMC VNX documentation on EMC Online Support

The complete set of EMC VNX series customer publications is available on EMC Online Support. To search for technical documentation, go to http://Support.EMC.com. After logging in to the website, click **Support by Product** and type **VNX series** in the Find a Product text box. Then search for the specific feature required.

VNX wizards

Unisphere software provides wizards for performing setup and configuration tasks. The Unisphere online help provides more details on the wizards.

Use of the term Windows Server

Because the CIFS implementation on VNX is virtually identical for Windows 2000, Windows Server 2003, and Windows 2012, the term Windows Server used in this document pertains to both the operating systems and later versions of Windows Server.

CHAPTER 2

Concepts

VNX is a multiprotocol system that provides access to data through a variety of file access protocols including the Common Internet File Service (CIFS) protocol. CIFS is based on the Microsoft Server Message Block (SMB) and allows users to share file systems over the Internet and intranets, primarily by Windows platforms.

VNX implements CIFS inside the operating system kernel rather than as a user-mode application. This implementation allows VNX to deliver higher performance with native Windows Server functionality.

When a VNX is configured as a CIFS server, VNX provides file access features similar to those of a Windows Server. During configuration, VNX joins a specific Windows domain as a member server.

You might need to understand some or all of the following concepts when operating in a multiprotocol file sharing environment:

- Active Directory 14
- Windows environments 14
- DNS servers 14
- NTP servers 15
- IPv6 best practices 15
- Domain migration 15
- Domain-joined and stand-alone CIFS servers 16
- Network interfaces and CIFS servers 16
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- Planning considerations 46
- BranchCache 47

Active Directory

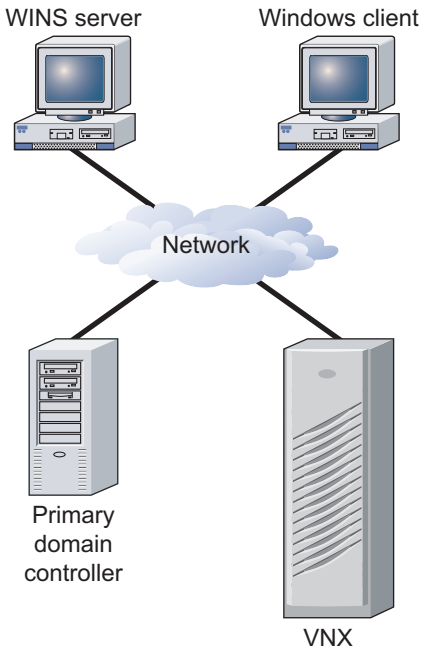
Active Directory (AD) lists resources and services available in a Windows network. When you configure CIFS on VNX, you create a VNX container for the CIFS server account in active directory users and computers (ADUC) or another AD container.

The AD account is created automatically when you create and join a CIFS server to the Windows domain. Create a CIFS server for Windows Server environments on page 53 and Join a CIFS server to a Windows domain on page 55 provide procedural information.

Windows environments

Figure 1 on page 14 shows VNX within a Windows domain. The Data Mover in this configuration provides CIFS file system operations for users in the Windows domain. The domain associated with the Data Mover is declared during Data Mover configuration.

Figure 1 VNX in a Windows domain



Note

In a CIFS environment, the Data Mover performs the functions of a CIFS file server, but not those of a Windows application server, such as a print or DNS server.

DNS servers

VNX supports the following Domain Name System (DNS) features:

- DNS Service Resolution — Resolves service names instead of computer names. DNS returns a list of machines that run a specific service, such as the Light Weight Directory Access Protocol (LDAP) and Kerberos.

- DNS Dynamic Updates — Reduces administration complexity in DDNS environments.

Windows Server environments require a DNS server. The DNS domain name and IP address for the Data Mover are defined to the domain through the `server_dns` command.

In dual stack domains with both IPv4 and IPv6 DNS servers configured, you should ensure that at least one interface for each address type is configured on all CIFS servers for a Data Mover in that domain.

Configuring VNX Naming Services provides additional information on naming services.

You must configure more than one DNS domain per Data Mover when the Data Mover's CIFS configuration includes CIFS servers that are:

- For domains not in the same Windows forest
- Not served by the same DNS servers

For example, you could have two networks connected to the Data Mover—a public network and a private network with no communication between the two networks.

Note

The `server_dns` command can be repeated for different domains.

Note

Because most DNS requests are short messages, User Datagram Protocol (UDP) is the preferred protocol. When a DNS message is longer than 512 bytes, the Data Mover automatically switches to the Transmission Control Protocol (TCP) for a specific request processing. You should only force the TCP protocol when there is no DNS server close to the Data Mover.

NTP servers

Windows Server environments require an NTP server. It is strongly recommended that you set up a minimum of two NTP servers per domain to avoid single point of failure.

The date and time must be synchronized among the Data Movers and other time sources by using the `server_date` command. *Configuring Time Services on VNX* explains how to synchronize Data Movers.

IPv6 best practices

Avoid IPv6-only CIFS servers and Data Movers with only IPv6 interfaces.

If Data Movers with only IPv6 interfaces are desired, it is imperative that the DNS, NIS, and NTP servers for that Data Mover have IPv6 addresses configured for these services to work.

If IPv6 is being deployed, configure both IPv4 and IPv6 addresses for DNS, NIS, and NTP servers. This way, if an IPv6-only situation arises for any reason, then these services will still work.

Domain migration

VNX CIFS servers act as member servers in Windows domains and provide data storage for domain users. Data stored on CIFS file systems contain security metadata such as discretionary access control lists (DACLs), system access control lists (SACLs), and

ownership associated with the domain security IDs (SIDs) from which the CIFS accounts are derived.

Due to Microsoft end-of-life policy, you might need to perform domain migration from one version of the domain to another. During and after a Windows domain migration process, any data generated by user accounts in the source domain must be accessible by user accounts in the target domain.

Note

Domain migration is a complex task that is not covered in this document. Microsoft documentation provides detailed information on domain migration.

VNX provides two `server_cifs` command options, `-Migrate` and `-Replace`, to meet the requirements of data availability during and after domain migration.

These options update the security IDs (SIDs) generated for resources created by CIFS users in one Windows domain (source) to another Windows domain (target).

Note

A trusted relationship must be established between the source and target domains. This is a Microsoft requirement for domain migration.

Manage domain migration on page 88 provides procedural information.

Domain-joined and stand-alone CIFS servers

A CIFS server can participate as a member of a Windows domain or operate independently of any Windows domain as a stand-alone CIFS server. CIFS servers that are members of a Windows domain use domain-based Kerberos authentication of users, maintain their own identity (computer account) in the domain, and leverage domain site information to locate services such as domain controllers. Domain-based CIFS servers are appropriate for production use. Joining a CIFS server to a domain allows any user in the domain to connect to the CIFS server.

Note

You can join a CIFS server to a domain in a Windows environment where the active directory (AD) namespace is named independently from the DNS namespace.

Create a CIFS server for Windows server environments on page 53 and Join a CIFS server to a Windows domain on page 55 provide procedural information.

In contrast, a stand-alone CIFS server does not have access to a domain and its associated services. The only users that can connect to a stand-alone CIFS server are those that use a local user account created and managed on the stand-alone CIFS server with the CIFS server itself performing all user authentications. Stand-alone CIFS servers are useful in test environments. Create a stand-alone CIFS server on page 60 provides procedural information.

Network interfaces and CIFS servers

The CIFS server created on a physical Data Mover with no interface specified becomes the default server. It is automatically associated with all unused network interfaces on the Data Mover and any new interfaces that you subsequently create. If you create additional

CIFS servers on the Data Mover, you must specify one or more network interfaces with which to associate the server.

You can reassign network interfaces to other CIFS servers on the Data Mover as you create them, or later as required. The default CIFS server behavior is useful if you plan to create only one CIFS server on the Data Mover. It is recommended that you always explicitly associate network interfaces with the first CIFS server created on a Data Mover. This practice makes it easier to create more network interfaces in the future and avoids having CIFS traffic flow onto networks for which it is not intended. The default CIFS server cannot be created on a Data Mover having a loaded Virtual Data Mover (VDM).

You can use network interfaces to access more than one Windows domain by creating multiple network interfaces, each associated with a different domain, and assigning a different CIFS server to each interface. Use the `server_ifconfig` command to create an IP interface on the specified Data Mover. *Configuring and Managing Networking on VNX* provides more information.

Note

For security reasons, consider using a VDM or a separate Data Mover in environments with multiple Windows domains. *Configuring Virtual Data Movers on VNX* explains how to configure VDMs.

CIFS shares

You create a share by exporting the pathname of the file system by using the `server_export` command. After the share is created, you can access it from a Windows client by mapping a network drive to the share or by connecting to the UNC path of the share. Create shares for CIFS users on page 57 provides procedural information.

Table 2 on page 17 describes the server_export command options.

Table 2 `server_export` options

Option	Result
`ro`	Creates the share as read-only for CIFS clients.
`rw=<client>[:<client>]...`	Creates the share for CIFS clients as read-mostly. Read-mostly means exported read-only to most clients, but read/write to those specified. By default, the pathname is exported read/write to all. A client may be either a *<user_name>* or *<group_name>*. The *<user_name>* and *<group_name>* must be defined in the Data Mover's password file. **Note** If user authentication on the Data Mover is set to NT, this option is ignored and file access is controlled by the share and file access control lists (ACLs).
`maxusr=<maxusr>`	Sets the maximum number of simultaneous users permitted for a share. The `maxusr` value cannot be set to zero.
`netbios=<netbios_Name>[,netbios=<netbios_Name>] ...`	Associates a share on a single domain with one or more NetBIOS names created with `server_cifs`. By default, if a NetBIOS name is not specified for a share, the share is a global share visible to all NetBIOS names.

International character support

If Unicode support is enabled, the `-name` and `-comment` options of the `server_export` command accept any multibyte characters defined by the Unicode 3.0 standard. Otherwise, these options accept only ASCII characters. Note the following restrictions for the `-name` and `-comment` options:

- Share name length is limited to 12 characters unless Unicode support is enabled, in which case the limit is 80 characters.
- Share names cannot include the following characters: /, \, %, ", NUL (Null character), STX (start of header), SOT (start of text), and LF (line feed).
- Share names can contain spaces and other nonalphanumeric characters, but must be enclosed by quotes if spaces are used.
- Share names cannot begin with a - (hyphen) or @ symbol. '.' and '..' are not allowed as share names.
- Share names are case-insensitive but the case is preserved.
- Comment length is limited to 256 bytes (represented as 256 ASCII characters or a variable number of Unicode multibyte characters).
- A comment cannot include the following characters: NUL (Null character), STX (start of header), and SOT (start of text).

Enable internationalization support

Enabling internationalization support is for Windows Server only. If you are using UNIX or SHARE user authentication on the Data Mover, skip to Create a domain account in Active Directory on page 52.

Internationalization support must be provided on VNX by enabling Unicode.

Note

VNX must use the NT user authentication method when Unicode is enabled. NT security is the default user authentication method for VNX.

Best practices

As a best practice, enable Unicode as the default option during installation. If you do enable Unicode, enable it before populating the file system. When you first enable Unicode, the conversion process might cause an interruption in file system availability while the file system is scanned and converted.

NOTICE

After enabling Unicode you cannot disable it and return to ASCII mode.

Notes on ASCII filtering

Be aware of the following issues with ASCII filtering:

- If ASCII filtering is enabled, you might be unable to administer CIFS servers by using the Microsoft management tools such as the Users and Computers MMC snap-in.
- When ASCII filtering is enabled, you cannot create or rename files with non-ASCII characters (characters with more than seven bits) in the filename. You can still access files with non-ASCII names; however, the filenames might contain strange characters.

- If the filtering parameter is set, ASCII filtering is applied to all Windows clients. If the parameter is set, and at least one compname is created, you cannot reset the parameter to 0 until you remove all the compnames.

Quotas

CIFS implementation of VNX supports disk quotas. Quotas can be configured by using the VNX for File CLI, Unisphere, or the Windows Server user interfaces. *Using Quotas on VNX* provides detailed information on quotas.

If you plan to use quotas, activate them on a file system before populating the file system. When you first activate quotas, the entire file system is unavailable while it is being scanned by the quota initiation process.

Alias

An alias provides multiple, alternative identities for a given resource. The alias shares the same set of local groups and the primary NetBIOS name or computer name because an alias acts as the secondary name.

A NetBIOS alias registers the alternative name in Windows Internet Naming Service (WINS), not in domain name system (DNS). If you want the NetBIOS alias to appear in DNS, you must add it to DNS.

The client can connect to an alias through the Network Neighbourhood, Windows Explorer, or by using the Map Network Drive window.

Based on the Microsoft requirements, aliases must be unique across a domain for WINS registration and broadcast announcements. Aliases must also be unique on the same Data Mover to avoid WINS name conflicts.

For performance reasons, it is recommended that you limit the number of aliases to 10 for each CIFS server. You can add aliases to an existing server or when creating a new server. The *EMC VNX Command Line Interface Reference for File* provides additional information on alias name restrictions.

NetBIOS compared with DNS alias

You might have a file server called Finance that has been removed and replaced with a new file server called Accounting_and_Finance. The existing users would continue to have their mapping to the old file server called Finance. To avoid every user needing to manually change the mapping to Accounting_and_Finance, you can create a NetBIOS alias called Finance. With the NetBIOS alias created, the old mapping will work.

DNS alias is slightly different than the NetBIOS alias. The DNS database would typically have:

- Address (A) resource records that map a computer name to an IP address. For example, a file server Finance mapped to 10.20.30.40.
- Canonical (CNAME) resource records that map a domain name to another domain name. For example, finance.emc.com mapped to accounting.emc.com.

Assign a NetBIOS or computer name alias on page 75 provides procedural information.

Kerberos authentication

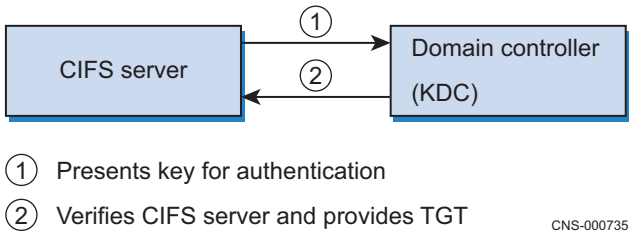
The Kerberos Key Distribution Center (KDC) stores and retrieves information about security principles in the AD database. Each domain controller in Windows 2000 or later is a Kerberos KDC that acts as a trusted intermediary between a client and a server.

Kerberos authentication uses a KDC to confirm the identity of a CIFS server that is attempting to communicate with a domain or trying to access Windows network services.

Every computer, server, or client joined to a domain has a unique password associated with a computer account in the active directory (AD). A password authenticates the identity of a CIFS server that attempts to communicate with a domain controller.

After you join a CIFS server to a domain or change the computer account password of a CIFS server, Kerberos generates a set of encryption and decryption keys that it shares with the domain controller. When the KDC receives an authentication request from a CIFS server, it performs authentication by decrypting the preauthentication data sent by the Data Mover with the decryption keys. If the decryption succeeds and the pre-authentication data is accurate, the CIFS server is authenticated. After a CIFS server is authenticated, the KDC generates an initial ticket called the Ticket-granting Ticket (TGT), as shown in Figure 2 on page 20. The TGT is a special ticket that enables the CIFS server to request services to the KDC.

Figure 2 Kerberos authentication



The Microsoft website provides a detailed description of Kerberos authentication.

For domain configurations with multiple domain controllers, computer accounts and passwords are replicated to all domain controllers during AD replication. Because AD replication occurs at scheduled intervals, a delay in updating all the domain controllers with a new password can occur, possibly causing failed authentication attempts. The Data Mover retains a history of the new and old passwords of each CIFS server. When a Windows client attempts to open a new session with a Data Mover, the service ticket sent by the client is decrypted using the decryption key generated from the CIFS server computer account password. If the decryption fails, another attempt is made by using the key generated from the previous passwords. When a password is updated twice on the same domain controller or on different domain controllers without AD replication, the Data Mover only uses the first password update; it does not recognize the second password change.

Set maximum number of passwords to retain in Kerberos authentication on page 66 provides procedural information.

Kerberos SPN Mismatch

CIFS allows Windows clients to connect to the Data Movers and mount shares. For Windows Server domains, Kerberos authentication is used as an authentication mechanism, although NTLM (pre-Windows 2000) authentication is still available, for backwards compatibility.

When Kerberos authentication is not used or fails, the use of NTLM authentication significantly increases the load on the Windows domain controller. In addition, NTLM authentication is not considered to be as secure as Kerberos authentication.

The Kerberos Workstream feature addresses this. If Kerberos is not configured correctly, that is, if SPNs do not exist or are out of sync and do not match the DNS hostname entries, the Kerberos authentication fails and the client may revert to NTLM to connect to the Data Mover. If this happens, the user has to be notified to diagnose and fix the issue.

The *Parameters Guide for VNX for File* provides more information on the `cifs.spncheck` parameter. The *EMC VNX Command Line Interface Reference for File* provides more information on the `-setspn` option of the `server_cifs` command.

The incoming client CIFS connections are analyzed to determine whether a Kerberos authentication error has occurred. The CIFS Server FQDN and the received FQDN are cached. The Server FQDN cache is checked each time when the possible Kerberos failure occurs. When there are cache entries, an EventLog message will be generated for each entry once an hour, when configured. The EventLog for each entry contains a detailed description with recommended action, both to notify the user of the issue and to resolve it. It also includes two counts of occurrences, since the last set of EveltLog messages and since the last reboot.

LDAP signing and encryption

In some instances, communication between VNX and the active directory (AD) is handled by using the LDAP. LDAP is used during a domain join and unjoin, server account password change, GPO updates, and when VNX is configured to use the AD for storing user mappings.

During an LDAP BIND procedure, the Data Mover (LDAP client) authenticates to a domain controller (LDAP server) through Kerberos by using the simple authentication and security layer (SASL) protocol. The SASL protocol provides a means for the Data Mover and the domain controller to negotiate a security layer for LDAP queries and answers.

A signed security layer checks the integrity of each LDAP packet on the network to ensure that an intermediate party did not tamper with its contents. An encryption security layer prevents the data in the LDAP packets from being sent in clear text between the client and the server.

The LDAP client (in this case, the Data Mover) makes the final decision on the security level to use. This negotiation of signing or encryption is for each LDAP connection.

By default, a domain controller does not enforce any form of data protection for LDAP traffic. A Registry attribute or a security policy controls whether the domain controller enforces LDAP message signing.

Note

Although Windows supports encryption of LDAP messages through other systems, such as VNX, it does not allow the configuration of LDAP message encryption.

Windows 2000 LDAP Registry setting

Table 3 on page 21 shows the Windows 2000 Registry setting required to enforce LDAP message signing for a domain controller.

Table 3 Registry parameter for LDAP message signing

Key path	HKLM\System\CurrentControlSet\Services\NTDS
Key	Parameter
Value name	LdapServerIntegrity
Format	REG_DWORD
Value	2 (Require signing); other values are 0 (Not defined) and 1 (None)

Note

Define the Registry parameter on each domain controller because Registry changes are not replicated among domain controllers in a domain.

Windows Server 2003 LDAP security policy

For Windows Server 2003, the LDAP security policy is defined as a group policy object (GPO) and can be configured on a domain controller or a domain. You can set this GPO security policy by going to **Administrative tools** › **Domain Controller Security Policy (or Domain Security Policy)** › **Security Settings** › **Local Policies** › **Security Options** and selecting **LDAP server signing requirements**.

Note

Applying the LDAP server signing requirements policy to a domain controller or domain overrides the Windows 2000 LdapServerIntegrity Registry parameter.

Table 4 on page 22 shows the Windows Server 2003 GPO LDAP security policy settings and the corresponding Windows 2000 LDAP LdapServerIntegrity Registry parameter settings.

Table 4 GPO and Registry LDAP security policy settings

GPO LDAP security policy settings	LDAP Registry parameter settings	Description
Not defined	0	LDAP signing is not enabled or disabled at the domain-controller level.
None	1	LDAP signing is not required to bind with the domain controller. If the Data Mover requests data signing, the domain controller supports it.
Require signing	2	LDAP signing is negotiated between the Data Mover and the domain controller unless the Transport Layer Security/ Secure Socket Layer (TLS/SSL) has started.

Change the LDAP security level on page 66 provides procedural information.

Combining Windows settings with VNX ldap SecurityLayer

Table 5 on page 23 shows the security actions taken when combining the Windows GPO LDAP security policy or LDAP Registry setting with the VNX ldap SecurityLayer parameter settings.

Table 5 Combining Windows settings with VNX ldap SecurityLayer settings

	VNX ldap SecurityLayer parameter settings			
	0 (No security layer)	**1 (Same as LDAP server)**	**2 (Integrity protection)**	**4 (Privacy protection)**
Windows LDAP security policy/ Registry settings				
0 (Not defined)	No signing or encryption	Uses security layer proposed by the domain controller	Uses LDAP message signing	Uses LDAP message encryption
1 (None)				
2 (Require signing)	Rejects LDAP BIND			

User authentication methods

Before configuring the CIFS service, you must define the user authentication method for the Data Mover. The user authentication method defines the way the Data Mover validates users logging in to the Data Mover. When a Windows user logs in, a security access token is created; it contains the security ID (SID) for the user, the SID for the user group, and access rights but not the permissions. This token is compared with the security descriptor of any CIFS object such as a share to determine access.

The user authentication method and the dialect parameter that define the protocol level that VNX supports is set for each Data Mover and applies to every interface on the Data Mover. Therefore, all CIFS servers on the Data Mover must use the same user authentication method and dialect. When creating a computer name, you can limit authentication to Kerberos only; otherwise, NTLM or NTLMSSP and Kerberos are allowed.

Data Movers use NT user authentication as the default authentication method. Set maximum number of passwords to retain in Kerberos authentication on page 66 provides procedural information.

Note

EMC recommends to use a CIFS stand-alone server instead of Data Movers with SHARE authentication. Create a standalone CIFS server on page 60 provides procedural information.

A stand-alone server provides all advantages that the NT authentication offers.

Table 6 on page 23 summarizes and compares NT, UNIX, and SHARE user authentication methods.

NOTICE

You should review the CIFS user authentication methods to understand the proper usage and limitations.

Table 6 CIFS user authentication methods

NT	UNIX	SHARE
Overview:	Overview:	Overview:

Table 6 CIFS user authentication methods (continued)

NT	UNIX	SHARE
• Allows access to shares only after authentication by a domain controller. • In case of NTLM, the client sends a username and encrypted password to the Data Mover for authentication. • Checks file, directory, and share-level ACLs. • Default user authentication method. • Recommended.	• Authentication is done on the Data Mover by using the local files (passwd and group) or NIS. • Uses plain-text passwords. • ACLs unchecked. • Not recommended.	• Uses no passwords or uses plain-text passwords. • Asks for read-only or read/write password. • ACLs unchecked. • Not recommended.
How it works: • The client sends a username and encrypted password to the Data Mover or Kerberos tickets. User authentication is done by the domain controller by using NTLM V0.12 (default in Windows Server) and LDAP. • Access-checking is against user and group security IDs (SIDs).	How it works: The client sends a username and a plain-text password to the Data Mover. The Data Mover verifies ID information by checking the passwd file on the Data Mover or NIS.	How it works: • If you do not specify a password when creating the share, any user connecting to the share is granted access. • If you do specify a password, the user must provide the specified password when connecting to the share.
Limitations: • None	Limitations: • No Unicode. • No VDM. • No Common AntiVirus Agent (CAVA). • Maximum file size 4 GB.	Limitations: • No Unicode. • No VDM. • No CAVA. • Maximum file size 4 GB.
Requirements: • Requires a UNIX-style UID and GID for each Windows user.	Requirements: • Requires a UNIX-style UID and GID for each Windows user. • Plain-text password support must be enabled on clients.	Requirements: • Plain-text password support must be enabled on clients.
When to use: • Most useful for configurations requiring a high degree of security and that are accessed primarily by CIFS users. • Recommended.	When to use: • Typically used when there is no Windows domain available. • Not recommended.	When to use: • Only useful for configurations with few security requirements. • Not recommended.

User mapping

Every user of VNX, either a Microsoft Windows user or a UNIX and Linux user, must be identified by a unique numeric user identifier (UID) and group identifier (GID). Windows, however, does not use numeric IDs to identify users. Instead, it uses strings called security identifiers (SIDs). Therefore, before you configure the Windows file-sharing

service (CIFS) on VNX, you must select a method of mapping Windows SIDs to UIDs and GIDs.

Configuring VNX User Mapping provides additional information.

Local user and group accounts

Enabling local user support creates local user accounts in the local groups database on the CIFS server. When local users try to log in to the CIFS server, they are authenticated by NTLM V1/V2 against the local groups database. When you enable local user support on a CIFS server, the local groups database is automatically populated with two local user accounts—Administrator and Guest.

The local user feature allows you to create up to 128 local user accounts per CIFS server. Supporting local user accounts on a CIFS server accomplishes two goals:

- Provides access to the CIFS server even when the domain controller is unavailable for authentication. If the domain controller is unavailable, domain user accounts cannot access the CIFS server. In this situation, the local user feature lets you access the domain CIFS server by logging in through a local account.
- Enables the creation of a simple CIFS server configuration with no domain infrastructure. This type of CIFS server, called a stand-alone server, does not require external components such as a domain controller. Users log in to the stand-alone CIFS server through local user accounts.

A stand-alone server is a low-cost, low-overhead server that you can use for small environments or in place of servers using SHARE security mode. EMC recommends that you create a stand-alone CIFS server instead of using SHARE authentication. Create a standalone CIFS server on page 60 provides procedural information.

Note

Local user accounts are for CIFS access only and cannot be mapped to UNIX accounts. Local user accounts are not assigned UIDs with the mapping methods used for domain users; local user UIDs are assigned from a special range by VNX directly.

User authentication method must be set to NT and Unicode support must be enabled on the Data Mover for local users support.

Note

If a Windows Server compatible CIFS server is configured to accept Kerberos authentication only, local user accounts cannot log in to the server. Setting the server_cifs authentication to kerberos is a convenient way to disable local user login.

NOTICE

After being enabled, local user support cannot be disabled. You can only disable individual local user accounts.

Create local user accounts

You can manage local user accounts through Windows User Manager or the User and Computer Management MMC snap-in. You cannot manage local user accounts by using the VNX command line interface (CLI) or Unisphere. Local user accounts are stored in the local groups database on the CIFS server.

usrmgr.exe resources

For non-Windows NT platforms, the usrmgr.exe is available as a free download in the Windows Server Resource Kit Tools.

Supported account management functions

The following are the administrative functions supported for local user accounts on a Data Mover:

- Create a new user account
- Delete an existing user account
- Rename a user account
- Change user password from the Login window
- Reset a user password from any native Windows management interface

Supported username and password formats

Usernames and passwords must use these formats:

- Usernames can be up to 256 Unicode characters in length, cannot be terminated by a period, and cannot include the following characters:

  " / \ [ ] : ; | = , + * ? < >

Note

Limits other than 256 characters may be imposed by the administration tools used to create user accounts. Windows User Manager and Computer Management MMC limit usernames to 20 characters.

- Passwords can be up to 255 Unicode characters in length.
- Comments can contain spaces and other nonalphanumeric characters, but must be enclosed by quotes if spaces are used.

Supported user properties

Table 7 on page 26 lists the supported and unsupported user properties when creating local user accounts on a Data Mover.

Table 7 Local user account features

Feature	Supported	Unsupported
New User dialog box: • Username • Full Name • Description • Password • User must change password at next logon • User cannot change password • Password never expires • Account disabled	All supported	
Group Membership	Supported	
User Environment profile: • User profile path		All unsupported

Table 7 Local user account features (continued)

Feature	Supported	Unsupported
• Logon script name • Home directories		
Dialin Information		Unsupported
Terminal Services profile: • Terminal server profile path • Terminal server home directory		All unsupported

Administrator accounts

The Administrator account is enabled by default and has full administrative rights to the CIFS server. The password you provide when you enable local users support becomes the initial password for the local Administrator account. You must change this password before logging in to the CIFS server with the Administrator account. Change password for the local Administrator account on page 70 provides procedural information.

Note

You cannot disable the Administrator account on stand-alone servers.

Guest accounts

The Guest account has very limited user rights and is disabled by default. The Guest account provides a very simple access method for stand-alone CIFS servers. If you enable this account with an empty password, any user can access the CIFS server without authentication.

NOTICE

The Guest account is not a member of the Authenticated Users group. Therefore, to ensure that your CIFS server remains secure, you should use the Authenticated Users group instead of the Everyone group when setting access control lists (ACLs) on shares.

If you have existing shares on the server with ACLs that use the Everyone group, change these ACLs to use the Authenticated Users group.

Note

The Administrator and Guest accounts can be renamed.

Other local user accounts

Local user accounts inherit the rights and privileges from the local groups to which they belong. Local user accounts can be created, deleted, and managed through Windows management tools.

Note

VNX supports the well-known Windows group names Everyone and Authenticated users. VNX does not support renaming these well-known groups.

Virtual Data Movers

A Virtual Data Mover (VDM) is a software feature that allows administrative separation and replication of CIFS environments. A VDM houses a group of CIFS servers and their shares.

A VDM looks like a computer on the Windows network. It has its own event log, local user and group database, CIFS servers and shares, and usermapper cache. These are applicable when using NFS and CIFS to access the same file system on the same VNX file system.

EMC recommends that you create CIFS servers in VDMs to provide separation of the CIFS server user and group databases, CIFS auditing settings, and event logs. This is required if the CIFS server and its associated file systems are ever to be replicated by using VNX Replicator. An exception to creating a CIFS server in a VDM is when the CIFS server is to be used to route anti-virus activity.

Note

A default CIFS server and CIFS servers within a VDM or VDMs cannot coexist on the same Data Mover. A default CIFS server is a global CIFS server assigned to all interfaces, and CIFS servers within a VDM require specified interfaces. If a VDM exists on a Data Mover, a default CIFS server cannot be created. Avoid using a default CIFS server by specifying an interface for it to use.

Configuring Virtual Data Movers on VNX and *Using VNX Replicator* provide detailed information on VDMs.

Note

For the VNX2 series, if a VDM will be used in a synchronous replication for disaster recovery environment, the interface where the compname will be created must be attached to the VDM. For instructions, refer to either the "Create a network interface for a sync-replicable VDM" section in *Using VDM MetroSync with MetroSync Manager for Disaster Recovery* or the "Create a network interface for a FAR-replicable VDM" section in *File Auto Recovery with SRDF/S*. Both documents are found on EMC Online Support.

Group policy objects

The Group Policy settings are stored in group policy objects (GPOs) that are linked to the site, domain, and organizational unit (OU) containers in the AD. The domain controllers replicate GPOs on all domain controllers within the domain.

Note

Data Mover security settings in the Unisphere online help provides more information on audit policy.

GPO support on VNX

VNX provides support for GPOs by retrieving and storing a copy of the GPO settings for each CIFS server joined to a Windows Server domain. VNX stores the GPO settings in a GPO cache on the Data Mover. Although there might be multiple CIFS servers on a Data Mover, there is only one GPO cache per Data Mover.

When you start the CIFS service on a Data Mover, VNX reads the settings stored in the GPO cache, and then retrieves the most recent GPO settings from the Windows domain controller. VNX also retrieves GPO settings whenever a CIFS server is joined to a domain. After retrieving the GPO settings, VNX automatically updates the settings every 90 minutes. Update GPO settings on page 95 provides procedural information.

CIFS servers on a Data Mover can have different GPO settings if they belong to separate organizational units. When a Data Mover has more than one CIFS server, the system processes the GPO audit and event log settings as explained in GPO conflict resolution on page 120.

Table 8 on page 29 summarizes the GPO settings that VNX supports.

Table 8 GPO settings

Setting	Default Values
Kerberos Max Clock Skew (minutes)	5 minutes
LAN Manager Auth Level	From VDM registry LMCompatibilityLevel default: 1=Use NTLMv2 session security if negotiated
Digitally sign client communications (always)	Disabled
Digitally sign client communications (if server agrees)	Disabled
Digitally sign server communications (always)	Disabled
Digitally sign server communications (if client agrees)	SMB1 disabled, SMB2 enabled
NTLM SSP Minimum Client Security	From VDM registry NtlmMinClientSec default: 0
NTLM SSP Minimum Server Security	From VDM registry NtlmMinServerSec default: 0
Send unencrypted password to connect to third-party SMB servers	Not used
Disable machine account password changes	Password changes not disabled except if parameter cifs.srvpwd updtMinutes is 0
Maximum machine account password age	Parameter cifs.srvpwd updtMinutes (0: no password change)
Default Owner for Administrator Objects	Disabled
Audit account logon events	Disabled
Audit account management	Disabled
Audit directory service access	Disabled
Audit logon events	Disabled
Audit object access	Disabled
Audit policy change	Disabled

Table 8 GPO settings (continued)

Setting	Default Values
Audit privilege use	Disabled
Audit process tracking	Disabled
Audit system events	Disabled
Back up files and directories	Administrators; Backup Operator
Restore files and directories	Administrators; Backup Operator
Bypass traverse checking	“All supported local groups"
Generate security audits	Administrators
Manage auditing and security log	Administrators
Access this computer from the network	Enabled
Deny access to this computer from the network	Disabled
Take ownership of files or other objects	Administrators
EMC Virus Checking	Privilege disabled
EMC CEPP Bypass Event	Privilege disabled
Maximum security log size	500 KB
Restrict guest access to security log	Disabled
Retention period for security log	10 days
Retention method for security log	Overwrite events by days
Maximum system log size	500 KB
Restrict guest access to system log	Disabled
Retention period for system log	10 days
Retention method for system log	Overwrite events by days
Maximum application log size	500 KB
Restrict guest access to application log	Disabled
Retention period for application log	10 days
Retention method for application log	Overwrite events by days
Disable background refresh of Group Policy	Background refresh is not disabled
Restricted Groups	None
Group Policy Refresh interval (minutes)	90
Refresh interval offset (minutes)	0

Note

The SMB2 signing is enabled by default because the SMB2 signing specification rule is different than the SMB1 rule. For SMB2, the traffic is signed only when either the client or the server requires signing for the communication. For SMB1, the traffic is signed, once both the client and the server enable signing. For this reason the SMB1 default value is disabled to avoid signing the traffic when the client does not require signing.

Note

Time synchronization is done for each Data Mover, not for each CIFS server. If you configure multiple CIFS servers on a Data Mover for multiple domains, then all the time sources for these domains must be synchronized.

Display GPO settings on page 94 provides procedural information.

Support for restricted groups

Restricted groups are GPO security settings that allow the administrators to easily define and control the default membership for security-sensitive groups. Restricted groups are primarily used to configure the membership of local groups on a workstation or member servers of the domain.

Restricted groups define two properties:

- Members - The Members list defines who belongs and who does not belong to the restricted group. When a restricted groups policy is enforced, any current member of a restricted group who is not on the Members list is removed. Any user on the Members list who is currently not a member of the restricted group is added.
- MemberOf - The MemberOf list ensures that the restricted group is added to the groups that are listed under the MemberOf property. It does not remove the group from the other groups of which it is a member.

Note

Restricted groups are automatically applied after the CIFS service is started.

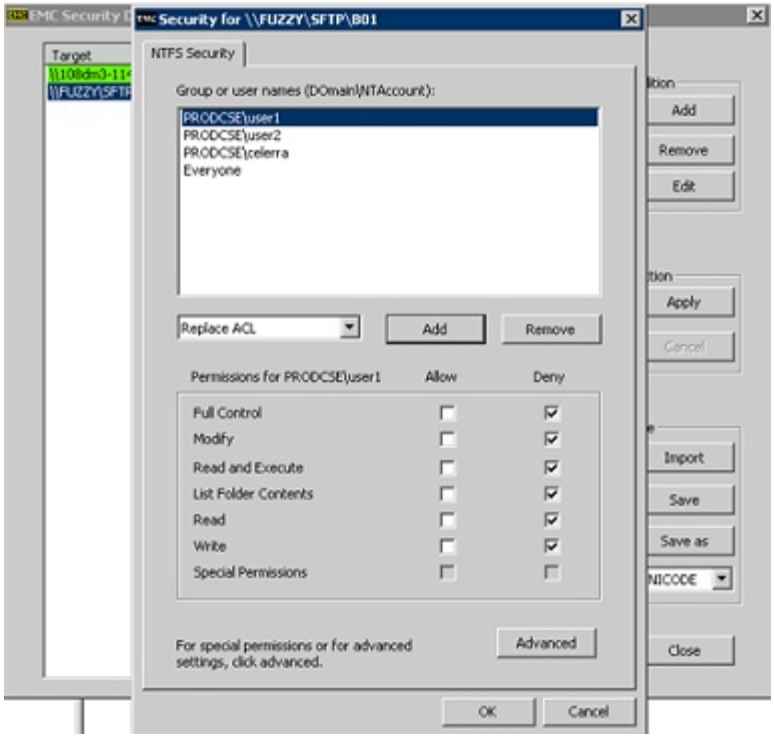
Manage and enforce ACL

Windows administrators use the Microsoft Management Console (MMC) Group Policy Object (GPO) to set and configure their Windows environment. The file systems object can be used to enter Access Control Entries (ACEs) to grant and limit access to the file system objects in Windows to the users and groups. A group of ACEs for a file system is called an Access Control List (ACL). Windows updates the file system ACLs periodically, according to the security rules set up by the administrator. If a rule is not set, it will run the update cycle every hour and a half (90 minutes).

The update cycle can be computer resource intensive, especially if the file system is large, and deep, and has a lot of directory branches. Also, since it may not be immediately updated, a security loophole may exist between the time the ACL is updated, and the GPO rule is updated. For these reasons, the operating system can initiate an update event of the file system ACLs to provide immediate changes to the file systems.

VNX for File provides a GUI tool that directly applies the GPO security settings to the file systems. It will have the same effect as applying the security update from a Windows server, but it will take a significantly shorter time to do so on large directories, because the security settings are managed locally on the Data Movers. Figure 3 on page 32 shows how to add users and groups.

Figure 3 Adding users and groups



Delegating joins

In a delegate join, the active directory (AD) account creation is separated from the join action. Consequently, a user other than the one who created the computer account for a CIFS server in the AD can join the CIFS server to the domain.

Add the user performing the join to the local administrators group on page 111 and Delegate join authority on page 82 provide procedural information.

Table 9 on page 32 shows the domain join parameter values that you must set on VNX to perform a delegated join, in the same or disjoint namespace AD domain.

Note

Domains within the disjoint namespace forest that do not have the same hierarchical domain name are in a different domain tree. When different domain trees are in a forest, the tree root domains are not contiguous. Disjoint namespace is the phrase used to describe the relationship between different domain trees within the forest.

Table 9 Domain join parameter combinations

	djUseKpassword	djAddAdminToLg	djEnforceDhn
Join delegated to	1 (default)	0 (default)	1 (default)
Domain Admins Group Member (Microsoft default)			
Domain User Account			
Domain Global Group			

Table 9 Domain join parameter combinations (continued)

	djUseKpassword	djAddAdminToLg	djEnforceDhn
Domain Local Group	0		

Home directories

The VNX home directory feature lets you create a single share to which all users connect. You do not have to create individual shares for each user.

The home directory feature simplifies the administration of personal shares and the process of connecting to them by letting you associate a username with a directory that then acts as the home directory for each user. The home directory is mapped in each user profile so that upon login, the home directory is automatically connected to a network drive.

Note

If a client system (such as Citrix Metaframe or Windows Terminal Server) supports more than one Windows user concurrently and caches file access information, the VNX home directory feature might not function as desired. With the VNX home directory capability, the path to the home directory for each user appears the same to the VNX client.

If a user writes to a file in the home directory, and another user reads a file in the home directory, the second request is completed by using the cached data from the home directory of the first user. Because the files have the same pathname, the client system assumes they are the same file.

On Windows Server systems, you can enable and manage home directories through the VNX home directory management snap-in for MMC. *Installing Management Applications on VNX for File* provides information on installing the snap-in. The snap-in online help describes the procedures for enabling and managing home directories. Enable and manage home directories on page 92 provides procedural information.

Permissions and security

Before version 5.6.50.1, when a home directory was automatically created by the system, the UNIX root (UID=0x0) was the owner of that directory and the permission applied to that directory was inherited from its parent folder or set to Everyone (group) Full_Control if nothing could be inherited.

From version 5.6.50.1 and later, the system provides new mechanisms to tighten control over access to home directories through the Access Control Lists (ACLs) applied to them. Specifically, a new registry flag offers two new security options that apply to new, automatically created home directories. A third option for this flag is available for compatibility with its previous behavior.

Note

The default security applied to automatically created home directories changed with version 5.6.50.1 and later versions. You can return to the previous security model by setting the registry entry to 0x2.

NOTICE

EMC recommends to create a temporary VDM and file system to customize the ACL (registry entry value 0x1) with this new functionality before choosing an ACL for production use.

The registry entry can have the following values:

- `0x0` (default) - This option restricts the ACL to the owner of the directory, who is the user logged in. Only the logged in user has access, with permission set to Full Control.
- `0x1` - This option sets the ACL based on values inherited from the parent. To use this option, two ACEs (described below) must be applied to the parent folder. Other ACEs may be applied and inherited from the parent ACL as desired:
  - The CREATOR OWNER SID must be configured to allow the users to create, modify, execute, and delete files and folders (or have Full Control) in their home directory. Set this ACE in the parent directory ACL and apply to either 'Subfolders and files only' or 'This folder, subfolders and files'. Failure to apply this ACE results in the home directory user being unable to use the home directory.
  - An ACE is required that grants the set of home directory users specific permissions within the parent folder only (not within child folders). If this is not done, then permissions configured on the parent are not inherited by the home directories and only the specific user has access. "Authenticated Users," "Domain Users," or any group that contains the intended home directory users may be used. Permissions granted by this ACE should not be allowed to propagate to subfolders through inheritance unless that is your specific intent.

    The required permissions to grant to this group are:

    - Traverse Folder/Execute File
    - List Folder/Read Data
    - Create Folders/Append Data
- `0x2` - This option reverts to the old behavior (UNIX root owner, Inherit parent ACL or “Everyone Full Control” if nothing has been inherited). The UNIX root user owns the home directory folder.

  When the home directory folder is created, it can inherit an ACE from the ACL of its parent folder provided the parent folder ACL contains ACEs that apply to subfolders. When the ACL is inherited, you must ensure that there is an ACE inherited by the home directory ACL when it is created that gives read, write, execute, and delete permission (or Full Control) to a group in which the home directory user will be a member. This ACE should be set in the parent directory ACL and applied to either ‘Subfolders and files only’ or ‘This folder, subfolders and files’. Failure to apply this ACE results in the home directory user being unable to use the home directory. Other ACEs may be applied and inherited from the parent ACL as desired.

  If an ACE cannot be inherited from the parent folder ACL, then the Everyone group is granted Full Control of the home directory when it is created.

  EMC recommends that you use the 0x2 setting only when ACL inheritance from the parent folder is not allowed. If you want the home directory folder to inherit its ACL, EMC recommends that you use the 0x1 registry entry value so that the home directory folder’s owner will be the actual home directory user (unless root ownership is specifically desired).

  EMC recommends that you do not share or export the parent folder in 0x2 mode unless you manually adjust ACLs on home directories to exclude all users but those that should have access.

Each Data Mover or X-blade and VDM has its own registry, and therefore its own value for this security option. All have the same default value. The registry key and value are:

- Key: `HKEY_LOCAL_MACHINE\Software\EMC\Homedir`
- Value: `Flags`
- Type: `DWORD`
- Data: `0x0` (default)

To change this registry setting, use regedit or regedt32 from Windows to connect to the CIFS Server's registry and edit the Flags value. You do not need restart the CIFS service for the registry change to take effect.

Restrictions to using the home directory

A special share name, HOME, is reserved for the home directory feature. Because of this limitation, the following restrictions apply:

- The home directory feature is not available on CIFS servers configured with SHARE or UNIX-level security.
- If you have created a share called HOME, you cannot enable the home directory feature.
- If you have enabled the home directory feature, you cannot create a share called HOME.

Additional Home Directory Information on page 125 provides additional information.

Alternate data stream support

With the release of Windows NT, Microsoft introduced the Windows NT File System (NTFS) and the concept of alternate data streams (ADS). This feature is also known as multiple data streams (MDS). Data streams are independent resources that store data and information about the file. Unlike the file allocation table (FAT) file system, in which a file consists of only one datastream, NTFS uses different data streams to store the file and metadata such as file access rights, encryption, date and time information, and graphic information.

Microsoft originally created ADS so that a server that is using NTFS could act as a file server for Macintosh clients. Macintosh hierarchical file system (HFS) uses two basic elements to represent files, as shown in Table 10 on page 35.

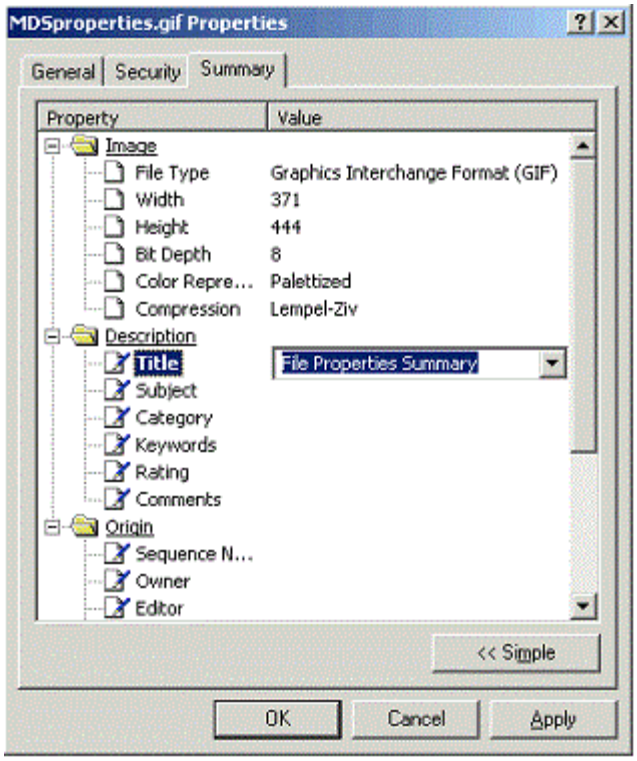
Table 10 HFS elements

Element	Purpose
Data fork	Stores data for a file
Resource fork	Stores information about a file

NTFS files contain one primary data stream and, optionally, one or more alternate data streams. The primary data stream acts as the data fork and the alternate data streams act as the resource forks.

For files, you can view and set this additional information from the Summary tab in the file Properties dialog box as shown in Figure 4 on page 36.

Figure 4 Properties dialog box — Summary tab



The VNX supports ADS for files and directories with the following restrictions:

- Directory streams are supported on mount points. If a file system is mounted on a mount point, only the root directory streams of the mounted file system are visible. If no file system is mounted, the streams of the mount point are visible.
- There is a limit of 64,000 streams per file or directory.

ADS support is enabled by default. Disable alternate datastreams on page 98 provides procedural information.

SMB protocol support

Server message block (SMB) is the underlying protocol used by the CIFS protocol to request file, print, and communications services from a server over a network through TCP ports. The protocol level is negotiated by the client and server when establishing a new SMB connection. VNX supports both SMB1 and SMB2; SMB1 is enabled by default.

Note

SMB2 protocol support is available with Microsoft Windows Vista and Microsoft Windows Server 2008 systems. SMB2 has an improved performance over SMB1. With Windows 8 support, SMB3 protocol is supported by VNX from version 7.1.61.0 onwards.

Manage SMB2 and SMB3 protocols on page 101 provides procedural information.

SMB 2.1 features supported by VNX

VNX supports the following SMB 2.1 features with Microsoft Windows 7 and Windows 2008 Release 2 Server:

- The lease feature as compared to the oplock mechanism enables the client to keep the data cache synchronized with the server for a longer time. SMB2 leases are rarely broken as compared to oplocks, therefore, the performance improves by reducing the

network traffic between the SMB2 client and the server. The `smb2.capabilities` parameter allows you to specify the SMB2 capabilities supported by the CIFS servers of the complete Data Mover, including Virtual Data Movers. Modifying this parameter affects the SMB negotiation when new SMB2 clients connect to the Data Mover. The *Parameters Guide for VNX for File* provides additional information on managing the SMB protocol.

- The unbuffered write option gives an opportunity for the client to write a file with no server-side buffering, regardless of how the file was opened. This prevents the client to reopen the file with the `FILE_FLAG_WRITE_THROUGH` option for performing the unbuffered write.

Display SMB2 dialect release on page 80 provides conceptual information.

SMB signing

SMB signing is a mechanism in the SMB protocol that is used to ensure that a packet has not been intercepted, changed, or replayed. SMB signing only guarantees that the packet has not been changed by a third party. Signing adds an 8-byte signature to every SMB1 packet. SMB2 uses a 16-byte signature. The client and server use this security signature to verify the integrity of the packet.

To use SMB signing, the client and the server in a transaction must have SMB signing enabled. By default, Windows Server domain controllers require that the clients use SMB signing. SMB signing is enabled by default on all CIFS servers created on Data Movers.

SMB signing resolution on page 122 provides additional information.

Note

On Windows NT domains (Windows NT4 SP4 or later), SMB signing is set by using the registry. For Windows Server domains (Windows 2000 and later), SMB signing is set by using a GPO policy.

Data Movers use client-side and server-side SMB signing depending on the situation. The following are some examples of when a Data Mover uses each type of signing:

- Data Mover acts as a server:
  - When a client maps a share
  - With file migration service
- Data Mover acts as a client:
  - When retrieving group policy objects (GPO) settings
  - With file migration service

Configure SMB signing on page 98 provides procedural information.

Symbolic links

Symbolic links are special nodes created by UNIX clients that point to another node (a file or directory called the target node). The target node is defined in a symbolic link node as a pathname. Normally, NFS symbolic links have no meaning to Windows clients because the client must resolve or follow the symbolic link to its target. However, under certain circumstances, VNX resolves symbolic links for Windows clients so that these clients can access the same files and directories as UNIX clients through a symbolic link.

By using symbolic links, CIFS clients can access multiple file systems on a Data Mover from a single share. This gives the appearance of one large namespace when it actually consists of individual file systems linked together with symbolic links. After enabling the

`shadow followabsolutpath` parameter, a single CIFS share that provides access to multiple file systems on a Data Mover can be created. Access symbolic links through CIFS clients on page 106 provides procedural information.

If the Data Mover is able to access the target on behalf of the CIFS user, the user is able to see the target of the symbolic link rather than the link itself. The user does not realize that a symbolic link has been followed. If the target is not accessible, the users see the symbolic link as a file but cannot access that file.

By default, VNX resolves symbolic links for Windows clients when:

- The target is relative to the directory in which the link itself resides. That is, the target does not contain an absolute path (full pathname).
- The target is within the same share as the link itself. The target does not have a pathname that refers upwards by using the '..' component.

NOTICE

- When a Data Mover resolves symbolic links on behalf of CIFS clients, users cannot distinguish between the symbolic link itself and the target of the symbolic link. Therefore, if a symbolic link refers to a directory, and a Windows user attempts to delete the symbolic link, the link and the contents of the directory that the link references are deleted.
- Do not use Microsoft Office applications on files represented by symbolic links. When a file is updated, Microsoft Office creates the updated file in the directory containing the symbolic link, instead of the symbolic link target directory.
- When the target is unreachable, a symbolic link cannot be removed through a Windows client. During the removal process, Microsoft Explorer tries to open the file, which is unreachable, and fails. In that case, the symbolic link needs to be removed through a UNIX client.

Symbolic link limitations on page 119 provides additional information.

SMB2 support for symbolic links

The SMB2 protocol supports symbolic links like UNIX. This link is transparent for the application and allows access to the destination file system object (file or directory).

The different types of symbolic links that you can create on a system are:

- The target of the link can be a file or a directory. Both are supported. The creation of a link on a non-existing target is also supported.
- Absolute symbolic links are links that point to the absolute path of the file or folder, for example, C:\windows.
- Relative symbolic links are links that point to a file or directory using the relative path, for example, ..\..\file.txt.
- Universal naming conventions (UNC) symbolic links are links that point to a network file or directory, for example, \\server\share1\dir\foobar.txt.

Create a symbolic link to a file with a relative path on page 103 provides procedural information.

Opportunistic file locking

Opportunistic file locks (oplocks) improve network performance by allowing CIFS clients to locally buffer file data before sending it to the server. These locks are configured per

file system and are on by default. Unless you are using a database application that recommends oplocks be turned off, or if you are handling critical data and cannot afford any data loss, leave oplocks on. VNX supports level II, exclusive, and batch oplocks in the following ways:

- Level II oplocks: When held, a level II oplock informs a client that multiple clients are currently accessing a file, but no client has yet modified it. A level II oplock lets the client perform read operation and file attribute fetches by using cached or read-ahead local information. All other file access requests must be sent to the server.
- Exclusive oplocks: When held, an exclusive oplock informs a client that it is the only client opening the file. An exclusive oplock lets a client perform all file operations by using cached or read-ahead information until it closes the file. At this time the server must be updated with any changes made to the state of the file with respect to the contents and attributes.
- Batch oplocks: When held, a batch oplock informs a client that it is the only client opening the file. A batch oplock lets a client perform all file operations by using cached or read-ahead information including opens and closes. The server can keep a file opened for a client even though the local process on the client machine has closed the file. This mechanism curtails the amount of network traffic by letting clients skip the extraneous close and open requests.

Note

Filter oplocks are not applicable to a remote file server.

Turn oplocks off on page 83 provides procedural information.

File change notification

Applications that run on Windows platforms, and use the Win32 API, can register with the CIFS server (or local OS) to be notified of file and directory content changes, such as file creation, modify, or rename. For example, this feature can indicate when a display needs to be refreshed (Windows Explorer) or when the cache needs to be refreshed (Microsoft Internet Information Server), without having to constantly poll the CIFS server (or local OS).

The Win32 API, and thus the CIFS protocol, supports the ability to specify the root of the directory tree that requires monitoring. If a subdirectory is specified, changes occurring above the specified directory will not notify the application.

To monitor changes occurring to directories beneath the specified directory, the application can also set the WatchSubTree bit. By default, monitoring for changes occurring in up to 512 directory levels beneath the root is supported. After receiving a change notification response, the application must reissue or reset the monitoring process to be notified of further modifications. Changes can also be buffered and notification can be satisfied by a single response to the client requesting the monitoring. Configure file change notification on page 84 provides procedural information.

Note

The file change notification feature can only be used in a pure CIFS environment. It is supported only when the user authentication method is set to NT on the Data Mover.

Event log auto archive

With Windows operating system, applications can use the event logging mechanism to log their own events. VNX currently supports three such event logs that is security, system, and applications.

The physical format of these logs use a Microsoft format called 'evt' that has a limitation of 4 GB in size because there are some fields stored on 32-bit integers. Windows Server 2008 has introduced a new format 'evtx' that does not have this limitation.

The event log auto archive feature allows automatically archiving an event log on a particular trigger policy and to continue the logging on a new event log without losing any events. The archive is triggered on a time or on an event log size basis defined by parameters in the Windows registry. This allows overcoming the 4 GB limitation of the 'evt' format by enabling the possibility to keep as many events as needed. The only limitation is the file system size. You can also specify a retention policy to keep the event log archives before they can be recycled based on the duration or the total archive disk size. Table 11 on page 41 provides more information.

All the parameters are stored in the Windows registry of each VDM. Therefore, each VDM will have its own configuration. The parameters can be viewed and edited with standard tools like regedit.

The archive files of a given log file are stored in the same directory as the active event log file.

NOTICE

The auto archive will be effective only if the active log file is not located on the root file system or on a VDM root file system and if the event log retention is set to infinite. It is recommended to use a dedicated file system for performance reason.

The location of an active log file can be changed by modifying the registry entry:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Eventlog
\Logname\File
```

The retention of the event log can be set from the event viewer or in the following registry entry:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Eventlog
\Logname\Retention
```

Each time an archive is created, it is renamed with the following name:

```
Logname-YYYY-MM-DD-HH-MM-SS.evt
```

where:

- `Logname` = name of the log, for instance, security
- `YYYY` = year
- `MM` = month
- `DD` = day
- `HH` = hour
- `MM` = minutes
- `SS` = seconds

The date part of the archive log file name is the GMT date when the file is archived. No event in this file is later than this date. If the file system or the log file becomes full, then

an event is sent to the Control Station so that the administrator can take appropriate actions.

The evt format of the file is readable by the standard Windows event viewer.

Note

Depending on the system memory, it may not be possible to view huge log files due to a limitation in Windows 2000, Windows XP, and Windows Server 2003 systems. However, Windows Vista, Windows 7, and Windows Server 2008 do not have this limitation.

Table 11 Windows registry parameters for event log auto archive

Key Name	Type	Comments
`AutoArchiveEnabled`	DWORD	• 1 = auto archiving is enabled for this log • 0 = auto archiving is disabled for this log
`AutoArchiveTriggerPolicyTime`	STRING	Specify that the active log file is archived on a time interval. This field has the following format: • Number of days followed by 'days', for example, 40days • Number of hours followed by 'hours' for example, 300hours
`AutoArchiveTriggerPolicySize`	STRING	Specify that the active log file is archived if the log file size reaches a given size. This field has the following format: • Percentage of the maximum event log size, for example, 50% . The maximum event log size is defined by using the Windows Event Viewer or directly in the log registry key 'MaxSize' • Size in kilobytes followed by 'kb', for example, 512kb • Size in megabytes followed by 'mb', for example, 128mb • Size in gigabytes followed by 'gb', for example, 3gb
`AutoArchiveRetentionPolicyTime`	STRING	Specify the retention policy for when archive files can be removed is based on time duration. The format is either: • Number of days followed by 'days', for example, 40days • Number of hours followed by 'hours' for example, 300hours **Note** If a retention policy is not set, then the archived files are not deleted. In this case, delete or move these files manually before the file system becomes full.
`AutoArchiveRetentionPolicySize`	STRING	Specify the retention policy for when archive files can be removed is based on the total size occupied by all archives of the event log. The format is either: • *<Percentage of the max size of the log file>*%, for example, 400%. The maximum log size is the value that can be set in the Windows event viewer • Size in kilobytes followed by 'kb', for example, 512kb

Table 11 Windows registry parameters for event log auto archive (continued)

Key Name	Type	Comments
		• Size in megabytes followed by 'mb', for example, 128mb • Size in gigabytes followed by 'gb', for example, 3gb **Note** If a retention policy is not set, then the archived files are not deleted. In this case, delete or move these files manually before the file system becomes full.
AutoArchiveLastArchiveDate	STRING	GMT date of the last archive of this log. The format is YYYYMMDDHHMMSS. This field is read-only and is valid only if auto archive has been enabled.

SMB 3.0 protocol support

Windows Server 2012 introduces the new version 3.0 of the SMB protocol.

With Windows 2012, Microsoft will deliver file based storage for Hyper-V and SQL storage. Hyper-V can store virtual machine files, such as configuration, virtual hard disk (VHD) files, and snapshots in file shares over the SMB 3.0 protocol.

SMB in Windows Server 2012 includes the new SMB 3.0 protocol with new improvements in the features and functionality. Some of them can be listed as:

- Windows Server 2012 delivers on continuous availability of file based storage by efficiently utilizing industry standard storage, network and server components.
- SMB Encryption provides secure access to data on SMB file shares. It protects data on untrusted networks by providing end to end encryption of SMB data.
- MultiPath IO (MPIO) allows to optimize the usage of the bandwidth, by opening multiple Transmission Control Protocol (TCP) connections on different links.
- A VNX File Server can join a Windows 2012 domain as a Member Server (if the VNX File Server is running VNX for File OE versions 7.1.65.8 or 8.1 and later).
- A VNX File Server running VNX for File OE 7.1.65.8 or 8.1 can join previous Windows Active Directory domain versions, such as Windows 2008, 2003, and so on.

SMB 3.0 protocol support for Continuous Availability

SMB 3.0 introduces several methods for achieving Continuous Availability for applications or network shares in the Windows environment:

- VNX File Server failover to Standby Server with transparent Client reconnect
- Windows 2012 Client cluster failover using Application ID
- Ability to configure multi-path IO (MPIO) with multiple TCP connections to CIFS server/shares/sessions

VNX File Server Active/Passive CA

The solution for providing Continuous Availability (CA) for the VNX File Server is to implement Active/Passive CA failover to a Standby Server. If the primary File Server fails, it will failover to a Standby Server, and SMB 3.0 capable clients will transparently reconnect if the failover occurs within 60 seconds or less. VNX File Server configuration

for this method requires the establishment of a Standby Server for the Primary Server, and network Shares that are mounted and exported with a special 'smbca' flag, as shown below:

Mount File Server file systems with smbca option, and export Shares with type=CA option:

```
# server_mount server_2 -o smbca fs1
server_export server_2 -P cifs -name fileshare -option
type=CA /fs1
```

Note

CA mount and Export options are not supported in the Unisphere GUI.

VNX Standby Server Failover Use Case

1. The SMB 3.0 client accesses the SMB 3.0 server on the production Data Mover.
2. The production Data Mover has a failure (software, hardware, or transparent upgrade) and is failed over the standby Data Mover.
3. The SMB 3.0 client reconnects to the standby Data Mover, to the same CIFS server and recovers the same context as before the failover.

Default VNX File Server CIFS Timeout

To support VNX File Server Active/Passive CA, the File server uses a CIFS parameter (smb2.maxCaTimeout), with a default timeout value of 120 seconds. This value can be configured from 0-180 seconds, depending on customer requirements. *Parameters Guide for VNX for File* provides more information on how to modify this parameter.

To address this issue, SMB 3.0 has introduced persistence for durable handles. Persistent handles allow a server to save most of metadata on disk associated to an open files. When the standby server restarts, it re-establishes all the open files that were present before the failover.

Note

VNX for Block does not have a single point of failure due to multiple access nodes and cannot share data across multiple hosts.

Windows 8 Cluster CA ApplicationID solution

To mitigate client failure, the SMB 3.0 client also runs on Windows cluster:

1. The application opens a file and sets lock on the SMB 3.0 server.
2. In case of a failure of one of the nodes (software or hardware), the cluster moves the application to the other node.
3. The application then re-opens its context on the SMB 3.0 server from the other node. Typical applications are SQL server, IIS, or Hyper-V VM.

To address this issue, SMB 3.0 has introduced the concept of application ID, so now the application after a failover to the other node will not conflict with its previous "session" from the first node because it is identified by an ID that does not change with the failover (in particular with its own resilient handles).

Performance improvements with Windows 8

Windows 8 also introduces some improvements to performance through the following features:

- Multi Path IO — Introduction of the Multi Path IO (MPIO). A user session can be associated to more than one TCP connections. If one TCP connection is broken, the

user session can still continue using the remaining TCP sessions. Obviously, the TCP connections must not use the same NIC. Besides reliability, MPIO will also allow to optimize the usage of the bandwidth, by opening multiple TCP connections on different links.
The basic process flow of the MPIO constitutes the client that establishes a standard TCP connection as usual. The client then requests all the available interfaces of the server (not necessarily registered to DNS). To establish an additional TCP connection, the process is repeated exactly the same way as the SMB2_SESSION_SETUP, except for specifying the sessionID of the user session on the first connection. Eventually, the client does the tree connection which is then valid on all TCP connections associated to the session. Thus the MPIO connection is very simple and requires little change from network protocol perspective.

- Directory Lease — The SMB2 client uses a directory cache associated to a timeout. This dramatically improves performance and avoids the numerous directories listing over the network. However the cache may be not up to date. To resolve this, SMB 3.0 extends the concept of lease to the directory. This way a client can set a lease on a directory and is automatically notified when there is a content change. There is no configuration required for VNX in order to support this capability.
- Branchcache V2 — SMB 3.0 also introduces BranchCache V2. BranchCache allows a client in branch offices to retrieve data locally when available instead of from the distant main office. For this release, the VNX File Server as a BranchCache "Content Server" has simplied the data hash mechanism. BranchCache on page 47 provides more information about BranchCache. BranchCache V2 is an extension of BranchCache V1, a feature delivered by Microsoft in Windows 7 & Windows Server 2008R2. A BranchCache V2 client requests a Hash File v2 when all the following conditions are met:
  - The SMB2_TREE_CONNECT is returning the flag SHI1005_FLAGS_ENABLE_HASH_V2
  - The GPO to force client using the BranchCache V1 format is not enabled
  - The client is configured in hosted cache mode.

  There is a new format for the hash files. Microsoft documents on http://msdn.microsoft.com/en-us/library/dd303704.aspx provide more information about the hash files.

New GPO of Windows 8 domains

Domain Controllers of Windows 8 domain manages new GPO that need to be supported by the VNX OE for File:

Location: "Computer Configuration\Policies\Administrative Templates\Network\Lanman Server\

Setting: "Hash Version support for BranchCache"

- Value: 1=support BranchCache V1 only
- Value: 2=support BranchCache V2 only
- Value: 3=supports BranchCache V1 and V2

Remote Volume Snapshot Service for SMB 3.0

In order to enable remote backup of an SMB 3.0 storage, Microsoft has extended its well known Snapshot framework named VSS. Remote Volume Snapshot Service (RVSS) not only allows taking a remote snapshot, but also allows taking a consistent set of snapshots across different servers and SMB shares.

The RVSS feature is implemented in the VNX OE for File through a new MS-RPC interface. This interface contains 13 functions defined in the Microsoft document [MS-FSRVP].pdf, available at http://msdn.microsoft.com/en-us/library/hh554852(v=prot.10).aspx.

SMB encryption

SMB 3.0 in Windows 2012 provides secure data transfer by encrypting the data in-flight. This protects data transfer from untrusted networks.

The SMB3 encryption provides the following benefits:

- SMB encryption can provide a cost benefit, since it does not require IPSec, specialized hardware, or WAN accelerators.
- SMB encryption is easily configured on the VNX File Server, either for each share by using a new `server_export` option, or for each CIFS server, after modifying various VNX CIFS Server Registry settings. *EMC VNX Command Line Interface Reference for File* provides more information about the `server_export` command.

SMB messages on the network are encrypted by using the AES-CCM cryptographic algorithm. Once defined as encrypted, an SMB3 client needs to encrypt all the requests related to this share, and a share defined as encrypted is no longer accessible by default from SMB1 and SMB2 clients (which do not support the SMB encryption).

Encryption Settings

The messages encryption for each share is configured by using a new share type with the `server_export` command. Once defined as encrypted, any SMB3 client should encrypt all the requests related to this share.

SMB encryption can be implemented on VNX by using one of the following methods:

- Set-up individual VNX File Shares for encryption by using the new `server_export type=Encrypted` option:

  ```
  # server_export server_2 -P cifs -name smben -o type=Encrypted /
  smb30encrypt
  server_2: done
  ```

- Set-up VNX File CIFS Server encryption by accessing the CIFS Server registry:

  Open the Registry Editor from a Windows Administrative Management station, navigate to the following registry values, and change the values to those that match your required configuration.

  New values added into the VNX OE for File registry, shown in Table 12 on page 45, are:

  Key: `HKLM\CurrentControlSet\Services\LanmanServer`:

  Table 12 VNX OE for File registry values

Value	Type	Default	Description
`EncryptData`	DWORD	0	If set, all the sessions established from any SMB3 clients to the CIFS server should be encrypted.
`RejectUnencryptedAccess`	DWORD	1	If set and if the client should encrypt his message and if he sends unencrypted messages, then the server returns an `ACCESS_DENIED` error.

Note

- If `RejectUnencryptedAccess=0`, then the server treats encrypted and unencrypted requests with no difference.
- If `RejectUnencryptedAccess=1`, then SMB1, SMB2.0, and SMB2.1 clients cannot access an encrypted share or a CIFS server that requires encrypted sessions.

Offload Copy for File

For files greater than 256KB in size, Offload Copy can be used to copy data on a VNX. It can be done in a single VNX CIFS Server, between 2 CIFS Servers in the same system, or across VDM within the same system.

Offload Copy uses a 512-byte token that can represent up to 128MB of data at a time:

1. The client requests a token for a range of bytes within an open file for copying.
2. The File Server provides a token back to the Client.
3. The Client requests the data be written to a destination file.
4. The File Server does the copy.
5. The VNX performs the copy from the original source location to a destination location.
6. The VNX sends acknowledgment to the File Server.
7. The File Server sends acknowledgment to the Client.

Note

Data is copied in 256MB chunks.

Planning considerations

Table 13 on page 46 summarizes the tasks that you need to perform in a Windows Server environment before you start CIFS configuration.

Table 13 Preliminary CIFS setup

Action	Procedure
Enable internationalization support	Enable internationalization support on page 18
Create network interface	Network interfaces and CIFS servers on page 16
Configure NTP server to synchronize date and time	NTP servers on page 15
Configure DNS servers	DNS servers on page 14
Join the domain	Create a domain account in Active Directory on page 52
Create, mount, and export file system for CIFS access	Mount a file system for CIFS access on page 56
Configure quotas	Quotas on page 19

BranchCache

BranchCache is a new Microsoft feature that is introduced in the Windows 7 and Windows Server 2008 R2 operating systems. When the feature is enabled, it creates a cache of the content from the file and web servers, locally within a branch office. A client from the same network can request the file and download it from the local cache, instead of downloading it from the wide area network (WAN). BranchCache optimizes the local link utilization and the responsiveness of applications and reduces the WAN bandwidth consumption.

The article explaining BranchCache in Windows 7 and Windows Server 2008 R2 Overview on the Microsoft Technet website provides detailed information about the BranchCache feature.

To be able to participate as a content server for BranchCache, the operating system must be able to provide a signature (also called SMB hash file) of the data for any file (greater than 64 KB by default) requested by the SMB2 client.

Configuring BranchCache on VNX

The VNX content server configuration is similar for the Hosted Cache mode and the Distributed Cache mode:

1. To enable BranchCache service on a per Data Mover basis, use this command syntax:
   `# server_cifs <movername> -smbhash -service enable`

   Where:

   <movername> = name of the Data Mover

2. To enable hash support on each CIFS Share to be used for supporting Branch Cache clients, use this command syntax:
   `# server_export <movername> -name <fs_name> -option <netbios_name> type=hash /<fs_name>`

   Where:

   <movername> = name of the Data Mover

   <fs_name> = name of the file system

   <netbios_name> = associated NETBIOS name

   Example:

   `# server_export server_2 -name fs1 -option netbios=inyo1,type=hash /fs1`

3. Configure Hash Publication by using either GPO policies or the VNX File Server Registry:

   - GPO
     Run: gpedit.msc **Computer Configuration** › **Administrative Templates** › **Lanman Server** › **Hash Publication** for BranchCache:
     - 1 = Disallow hash publication on all shares
     - 0 = Allow hash publication only for specific shares
     - 2 = Allow has publication for all shares

Note

GPO policies take precedence over manual registry entries. VDMs can only make use of GPO policies for enabling Hash publication, not registry entries.

- Registry configuration
  Run: regedit.msc **File** › **Connect Network to Registry** › **CIFS_Server** › **HKLM** › **Software** › **EMC** › **SmbHash** › **HashPublication**: 0x00000001 (Default value 1, which is no hash publication allowed)

Note

Double-click to edit and set to 0 or 2, similar to the GPO values outlined above.

4. To stop and restart the VNX File CIFS service to enable the SMBHash feature (the feature is not running until this is done), use the following commands:
   # server_setup server_2 -P cifs -o stop

   Output:

   ```
   server_2 : done
   ```

   # server_setup server_2 -P cifs -o start

   Output:

   ```
   server_2 : done
   ```

5. Configure the Windows Clients for Branch Cache operation. Microsoft BranchCache deployment guide provides more information about this.
6. To verify the VNX File Branch Cache configuration, operation, and statistics, use the following commands:
   $ server_cifs -smbhash -audit enable (use Event Viewer to review)

   $ server_cifs server_2 -smbhash -info

   $ server_stats server_2 -list |grep -i branch

   $ server_export server_2

SMB Hash File

Format

The SMB Hash File is defined by the [MS-PCCRC] and [MS-SMB2] Microsoft documents. It is generated only on demand for files with size greater than 64 KB by default.

Storage

SMB Hash Files are stored in a dedicated directory in the file system containing the content file. The size of this directory is not constrained; it is below the limit of 1 percent of the total file system size in blocks. However, for performance reasons, if a content file is deleted or modified, the corresponding SMB Hash File is not updated or deleted. If this limit is reached then obsolete SMB Hash Files will be deleted, from time to time, to free up disk space. The selection of the SMB Hash Files to be deleted will be done as follows:

- Delete all SMB Hash Files corresponding to a content file that does not exist.
- Delete all obsolete SMB Hash Files. This includes the SMB Hash Files that have:
  - The last change time of the content file stored that is different than the actual last change time of the content file.
  - The size of the content file stored is different than the actual size of the content file.

GPO

Hash generation is enabled by using the GPO. The corresponding GPO is: `Computer Configuration\Policies\Administrative Templates\Network\Lanman Server\Hash Publication for BranchCache`.

This GPO is an integer with three possible values:

- 0 = Allow hash publication only for shared folders with flag SHI1005_FLAGS_ENABLE_HASH set.
- 1 = Disallow hash publication on all shared folders. No SMB Hash Files can be generated.
- 2 = Allow hash publication for all shared folders. SHI1005_FLAGS_ENABLE_HASH flags of shares are ignored.

By default, this GPO is not set in the domain. So hash generation and publication are defined by the local registry of the VNX OE for File which is disabled by default as for Windows 2008 R2 server.

Note

Parameters Guide for VNX for File provides more information about the parameters that are supported by this feature. *EMC VNX Command line Interface for VNX for File* provides more information on the options related to the `server_export` and `server_cifs` commands. *Managing Statistics for VNX* provides information on the statistics added to the `server_stat` command.

Events generated by the SMB Hash File Generation

Audit

For the BranchCache service, you can enable its usage for each CIFS server or share. However, only a single event log that is generated because there is only one BranchCache service for all the Data Movers. To view this log with the computer manager MMC tool, you must connect to the CIFS server that is on the physical Data Mover.

By default no audits are generated. Audits generation is configured by using the `server_cifs –smbhash –audit` CS command.

Events generated internally or by the Control Station have the **user** field equal to **System** and **computer** field equal to the NAS version.

Events generated by the protocol have **user** field equal to the logged user name and the **computer** field equal to the NetBIOS name on which this user is logged in.

Service

Service events monitor the start or stop of the service as well as any configuration parameters changes.

Task

This allows auditing the tasks that have been executed and the ones that are pending. For a given task, there is always the given set of events generated:

1. An event when a new task has been added. This event also describes the task itself.
2. An event when the task execution has started (Id=512).
3. An event when the task execution has ended.

Additionally in between the add task and the end task events, two additional events may be generated mentioning if an error (Id=513) or a warning (Id=514) had occurred. For instance, if a task has been cancelled, then an additional event 513 is generated mentioning that the task has been canceled and why.

A set of events relative to a given task can be linked by using the `TaskId` parameter which is always present.

At last, the last events in this category which could be generated are mentioning that a task has been rejected and why, for instance if the same task already exists.

Access
Access events allow monitoring access by the SMB2 protocol to the SMB Hash Files. It can help in some circumstances to troubleshoot general BranchCache issues.

Performance of SMB hash generation

- The SMB2 clients get to read the data with less usage of the server resources.
- The performance of the protocols does not get affected. The hash files are updated with the modifications only when the SMB2 clients request for this update.
- The small size of the SMB Hash File leads to the minimal usage of the disk space. However, there is an extra usage of the disk space required to store the SMB Hash Files.
- The computation of the hash file may considerably impact the CPU usage.

Impact of SMB hash generation

The SMB hash generation service takes place at high level and does not impact other components. This includes:

- If the SMB Hash File needs to be computed for an offline file, the data needs to be recalled from the secondary storage as it is done for a standard client access enforcing the File Mover policy.
- SMB Hash Files are bad candidates as they are unique by essence.
- Files that are frequently changed, prove to be "bad candidates" for deduplication. It is recommended to enable a filter to exclude these files from SMB Hash Files generation.
- If you take a snapshot during the SMB Hash File generation, the hash file gets ignored. The status appears as "STATUS_HASH_NOT_PRESENT" and the normal SMB protocol access takes place.
- SMB Hash Files are self descriptive (no external parameter is needed to decode the file). They reside on the same file system as that of the corresponding content files. You can replicate SMB Hash Files.
- Backup is not required for SMB hash Files. When you restore the corresponding content file, the hash file becomes obsolete as with Windows.

CHAPTER 3

Configuring

NOTICE

Review the Planning considerations on page 46 before you begin CIFS configuration.

The tasks to configure CIFS on a Data Mover are:

- Add a CIFS server to a Windows domain 52
- Create a domain account in Active Directory 52
- Add a WINS server 52
- Start the CIFS service 53
- Create a CIFS server for Windows Server environments 53
- Join a CIFS server to a Windows domain 55
- Mount a file system for CIFS access 56
- Create shares for CIFS users 57
- Create a stand-alone CIFS server 60
- Create a CIFS share on MAC OS by using the GUI 61
- Create a CIFS share on MAC OS manually 62

Add a CIFS server to a Windows domain

Before adding a VNX-based CIFS server to a Windows domain, you must add a machine account to the Windows domain controller to identify the CIFS server, which you create in Create a domain account in Active Directory on page 52.

Note

This step is not necessary if you are using UNIX or SHARE user authentication.

Procedure

1. On the primary domain controller, select **Start** › **Administration Tools** › **Server Manager**.
2. From the Computer menu, select **Add to Domain**.
3. On the **Add Computer to Domain** dialog box, select **Windows NT Workstation or Server** and specify the NetBIOS name of the CIFS server in the **Computer Name** field. Click **Add**.

   Note

   The NetBIOS name is the name used to identify the CIFS server you will create in Create a domain account in Active Directory on page 52.

Create a domain account in Active Directory

The user account must belong to a domain in the same Active Directory forest as the domain the CIFS server is joining.

Procedure

1. Create a new computer with the same comp_name you will use to create the CIFS server in your environment.
2. Join the CIFS server to the Windows domain as explained in Join a CIFS server to a Windows domain on page 55.

   Note

   CIFS server is automatically joined to Windows domain in an NT environment.

Add a WINS server

Note

The system processes a list of Windows Internet Naming Service (WINS) servers in the order in which you add them in the `wins=` option, with the first one being the preferred WINS server. For example, if the WINS server times out after 1500 milliseconds, the system uses the next WINS server in the list. Use the `wins.TimeOutMS` parameter to configure WINS timeout.

Procedure

1. To add a WINS server to the CIFS configuration for use by all CIFS server on a Data Mover, use this command syntax:

   ```
   $ server_cifs <mover_name> -add
   wins=<ip_addr>[,wins=<ip_addr>,...]
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <ip_addr> = IPv4 address of the WINS server.

   Example:

   To add two WINS servers to server_2, type:

   ```
   $ server_cifs server_2 -add
   wins=172.31.255.255,wins=172.168.255.255
   ```

   Output:

   ```
   server_2: done
   ```

Start the CIFS service

After completing the preliminary CIFS configuration, you must start the CIFS service to activate the CIFS protocol for each Data Mover.

Note

To change the thread number after starting the CIFS service, you must stop the service and restart it with the new thread number. Stop the CIFS service on page 85 provides procedural information.

Procedure

1. To start the CIFS service, use this command syntax:

   ```
   $ server_setup <mover_name> -Protocol cifs -option start
   [=<n>]
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   [=*<n>*] = number of threads for CIFS users (if there is 1 GB of memory on the Data Mover, the default is 96 threads; however, if there is over 1 GB of memory, the default number of threads is 256).

   Example:

   To start the CIFS service on server_2, type:

   ```
   $ server_setup server_2 -Protocol cifs -option start
   ```

   Output:

   ```
   server_2 : done
   ```

Create a CIFS server for Windows Server environments

After starting the CIFS service, create the CIFS server on a Data Mover.

NOTICE

Do not attempt to mix the NetBIOS and compname in the same Windows domain. Doing so can result in the Data Mover losing contact with the domain.

Assign a NetBIOS or computer name alias on page 75 provides procedural information.

Procedure

1. To create the CIFS server for a Windows Server environment on the Data Mover, use this command syntax:

   ```
   $ server_cifs <mover_name> -add
   compname=<comp_name>,domain=<full_domain_name>
   [,netbios=<netbios_name>][,interface=<if_name>]
   [,dns=<if_suffix>]
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <comp_name> = Windows Server-compatible CIFS server.

   <full_domain_name> = full domain name for the Windows environment.

   <netbios_name> = (Optional) a NetBIOS name used in place of the default NetBIOS name.

   Type an optional NetBIOS name if the first 15 characters of the *<comp_name>* do not conform to the NetBIOS naming conventions or if you want something other than the default.

   Note

   You can only assign one compname to a CIFS server. You may assign multiple NetBIOS names to a CIFS server by creating aliases.

   <if_name> = an interface to be used by the CIFS server being configured. If you add a CIFS server and do not specify any interfaces (with the interfaces= option), this server becomes the default CIFS server and uses all interfaces not assigned to other CIFS servers on the Data Mover. You can only have one default CIFS server per Data Mover.

   Note

   Link local interfaces cannot be added to a CIFS server as they are not supported on VNX.

   <if_suffix> = different DNS suffix for the interface for DNS updates. By default, the DNS suffix is derived from the domain. This DNS option has no impact on the DNS settings of the Data Mover.

   Example:

   To create CIFS server dm32-ana0 on server_2, type:

   ```
   $ server_cifs server_2 -add compname=dm32-cge0,domain=universe.com,
   netbios=eng23b,interface=cge0,dns=nasdocs.emc.com
   ```

   Output:

   ```
   server_2 : done
   ```

Join a CIFS server to a Windows domain

A CIFS server has to be joined to the Windows domain in a Windows Server environment.

Note

If a CIFS server is removed from the Windows domain by using an unjoin command, you need to run the join command again to rejoin the CIFS server to the Windows domain.

Join a CIFS server to a Windows domain - Advanced Procedures on page 109 provides more information on joining CIFS server to a Windows domain in different configurations.

Procedure

1. To join the CIFS server to the Windows domain, use this command syntax:

   ```
   $ server_cifs <mover_name> -Join compname=<comp_name>,
   domain=<full_domain_name>,admin=<domain_administrator_name>
   ou=<organizational_unit>
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <comp_name> = name for the CIFS server account in the AD.

   <full_domain_name> = DNS name for the Windows domain.

   <domain_administrator_name> = login name of the user with administrative rights in the domain. The user is prompted to type a password for the admin account.

   <organizational_unit> = container where the CIFS server's account is being created in the AD.

   Example:

   To join dm112-cge0 into the AD domain nasdocs.emc.com, using the administrator account, and to add this server to Engineering\Computers organizational unit, type:

   ```
   $ server_cifs server_2 -Join compname=dm112-cge0,
   domain=nasdocs.emc.com,admin=administrator,ou=
   "ou=Computers:ou=Engineering"
   ```

   Output:

   ```
   server_2 : Enter Password: *******
   done
   ```

   Note

   The user account and user password are used to create the account in the AD, and are not stored after adding the machine account.

Join existing computer accounts

To join existing computer accounts:

- If the Windows computer account already exists, VNX checks the `servicePrincipalName` attribute to see if the computer is already joined to the computer account.

- If the attribute is not set, the Data Mover joins the new CIFS server to the existing account. If the `servicePrincipalName` attribute is already set, the Data Mover issues an error and logs a message saying that the account already exists.

If you still want to join the CIFS server to this computer account, you can reuse the account by typing:

```
$ server_cifs server_2 -Join compname=dm32-ana0,domain=
nsgprod.xyzcompany.com,admin=administrator -option reuse
```

When you join a CIFS server to a domain VNX:

- Searches for an existing account or creates an account for the CIFS server in active directory (AD) and completes its configuration.
- Sets several attributes in the computer account, including the `dnsHostName` and `servicePrincipalName` attributes.

Verify the configuration

During the CIFS server join procedure, the system configures the following attributes of the computer account in the active directory (AD):

- `dNSHostName`
- `servicePrincipalName`

Note

The attributes of the precreated computer accounts, `dNSHostName` and `servicePrincipalName`, must be empty before a join. After you perform a successful join, these attributes are assigned values.

Procedure

1. To verify the configuration using ldp.exe, log in to the domain controller by using the domain administrator credentials.
2. Verify that the support tools are installed.
3. Select **Start** › **Run**.
4. Type **`ldp.exe`** and click **OK**.
5. Connect and BIND to the AD.
6. Perform a search for the specified container (CN) with the associated attributes, including `dNSHostName` and `servicePrincipalName`.

Mount a file system for CIFS access

When a file system is mounted, it is integrated into the local directory tree. File systems are mounted permanently by default. If you unmount a file system temporarily and then restart the file server, the file system is remounted automatically.

Note

When mounting a share, if the default options such as locking behavior and access control policy are not manually typed, the options are active but not displayed in the list of mounted file systems.

By default, VNX uses the native security policy to access file systems. The native access policy means that a Windows user is granted access to a directory by using an access

control list (ACL) and a UNIX user is granted access to a directory by using UNIX rights. If you are using both UNIX and Windows clients to access the same file systems, you must set the access-checking policy for the file system. *Managing a Multiprotocol Environment on VNX* explains how to set up such an environment.

Procedure

1. To mount a file system, use this command syntax:

   ```
   $ server_mount <mover_name> [-option <options>] <fs_name>
   <mount_point>
   ```

   Where:

   <mover_name> = name of the physical Data Mover or VDM.

   <options> = file system mount type can be designated as either read/write (rw) or read-only (ro).

   <fs_name> = name of the file system being mounted.

   <mount_point> = name of the mount point beginning with a forward slash (/).

   Example:

   To mount the file system ufs1 as read/write, type:

   ```
   $ server_mount server_2 -option rw ufs1 /ufs1
   ```

   Output:

   ```
   server_2 : done
   ```

Create shares for CIFS users

Use the Computer Management MMC or the Windows NT Server Manager for Domains to create shares and set access control lists (ACLs) on shares. For domain CIFS servers with local users support, you can mix local and domain users and groups in ACLs.

Note

If you create a share with Windows management tools, you cannot use any of the special CIFS export options provided by `server_export`. *Using Windows Administrative Tools on VNX* provides procedural informarion.

Create a local share

A local share is accessible from a single CIFS server of the Data Mover. A local share created with the `netbios=` option or by Windows management tools (for example, MMC) can only be managed by the CLI if you specify the NetBIOS name as part of the command. The NetBIOS name is required to locate the entry because multiple CIFS entries can have the same *<sharename>* when belonging to different NetBIOS names. CIFS shares on page 17 provides conceptual information.

Note

If the *<sharename>* you are creating exists, the parameters are modified with the new information indicated. You cannot create a NetBIOS share with the same *<sharename>* as a global share.

Procedure

1. To create a local share by exporting the pathname of the share, use this command syntax:

   ```
   $ server_export <mover_name> -Protocol cifs -name
   <sharename> [-option <options>] <pathname>
   ```

   Where:

   <mover_name> = name of the physical Data Mover or VDM.

   <sharename> = name of the CIFS share.

   <options> = export options for the share. Table 2 on page 17 describes the server_export command options.

   <pathname> = pathname of the directory to export. This can be a mountpoint.

   Example:

   To create a local share named cifs_share on server_2, type:

   ```
   $ server_export server_2 -Protocol cifs -name cifs_share -option
   netbios=dm32-cge0 /mntpt1
   ```

   Output:

   ```
   server_2 : done
   ```

Create a global share

A global share is accessible from all CIFS servers on the Data Mover.

Procedure

1. To create a global share by exporting the pathname of the share, use this command syntax:

   ```
   $ server_export <mover_name> -Protocol cifs -name
   <sharename>[-option <options>] <pathname>
   ```

   Where:

   <mover_name> = name of the physical Data Mover or VDM.

   <sharename> = name of the CIFS share.

   <options> = export options for the share.

   <pathname> = name of the mount point.

   Example:

   To create a global read-only share named cifs_share on server_2, type:

   ```
   $ server_export server_2 -Protocol cifs -name cifs_share -option
   ro /mntpt1
   ```

   Output:

   ```
   server_2 : done
   ```

Create global shares with MMC or Server Manager

Normally, shares created through Windows administrative tools are local shares and are only accessible from the CIFS server used by the Windows client. However, the `cifs srvmgr.globalShares` parameter lets you change this behavior so that shares

created through Server Manager or Microsoft Management Console (MMC) are global shares.

Note

Parameter and facility names are case-sensitive.

Procedure

1. To cause all shares created through the Server Manager or MMC to be global shares, use this command syntax:

   ```
   $ server_param <mover_name> -facility cifs -modify
   srvmgr.globalShares -value <new_value>
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <new_value> = 0 (disables global shares) or 1 (enables global shares).

   Example:

   To cause all shares created through Server Manager or MMC to be global shares, type:

   ```
   $ server_param server_2 -facility cifs -modify srvmgr.globalShares
   -value 1
   ```

   Output:

   ```
   server_2 : done
   ```

Verify shares

The shares in the export table are always listed from the Control Station database. This is a static table and contains only permanent entries. Any temporary changes to the export table are not displayed.

CIFS shares on page 17 and International character support on page 18 provide conceptual information.

Procedure

1. To verify a share, use this command syntax:

   ```
   $ server_export <mover_name> -list -name
   <sharename>[-option <options>]
   ```

   Where:

   <mover_name> = name of the physical Data Mover or VDM.

   <sharename> = name of the CIFS share.

   <options> = options for listing. Currently, there is only one option, [`netbios = <netbios_name>`]. When the share has an associated NetBIOS name, the NetBIOS name is required to locate the entry because multiple CIFS entries can have the same *<sharename>* when belonging to different NetBIOS names.

   Example:

   To list the shares on server_2, type:

   ```
   $ server_export server_2 -list -name cifs_share
   ```

Output:

```
server_2 :
share "cifs_share" "/mntpt1" "Test Share" umask=022
maxusers=4294967295
```

Provide the network password when performing management tasks

When you perform a management action that tries to retrieve user and group names, such as setting access control lists (ACLs) on a share, you might be prompted for your administrative account name and password.

If you have executed a net use command with a domain name to specify the local username for the CIFS server, you must type the ‹domainname›\‹username› combination used in the net use command.

For example, if you run the command:

net use \\192.168.56.24 /user:DomainX\UserY

You must type the account information when prompted for the network password as:

DomainX\UserY

Note

UserY must belong to the Administrators group of the CIFS server that includes the domain administrators and the local administrator of the CIFS server, by default.

Create a stand-alone CIFS server

User authentication methods on page 23 provides conceptual information.

Note

EMC recommends to use a CIFS stand-alone server with local user support instead of Data Movers with SHARE authentication.

Procedure

1. To create a stand-alone CIFS server, use this command syntax:

   ```
   $ server_cifs <mover_name> -add standalone=<netbios_name>,
   workgroup=<workgroup_name>[,interface=<if_name>]
   [,local_users]
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <netbios_name> = NetBIOS name for the CIFS server.

   <workgroup_name> = name of the Windows workgroup. This value is used for announcements and WINS registration.

   <if_name> = IP interface for the CIFS server.

   Example:

   To create the stand-alone CIFS server dm32-ana0 on server_2 and provide local user support, type:

   $ server_cifs server_2 -add standalone=dm112-cge0,workgroup=NASDOCS,interface=cge0,local_users

Output:

```
Enter Password:*****
Enter Password Again:*****
server_2: done
# server_cifs server_2
CIFS Server(standalone)
SERVE_ALONE[EMC] RC=2
```

Note

- If you are using Internet Information Service (IIS) 6.0, the username and password must be the same on IIS, the Data Mover, and the client.
- The password is assigned to the local Administrator account on the CIFS server and can only be ASCII characters. You must change the temporary password from a Windows system before you can administer the local users or groups on the CIFS server with local user support enabled. When you change the password, the password can contain Unicode characters.
- The `local_users` option causes the `server_cifs` command to prompt for a password to be assigned to the local Administrator password. This option must be specified when you initially create the stand-alone server. If you do not specify the `local_users` option, the command fails.
- Do not specify the `local_users` option if you are reconfiguring the server after initial creation. To reset the Administrator password, use the `local_users` option. However, the password cannot be reset if it was changed through Windows.
- If you create the stand-alone server on a Data Mover with a VDM loaded, you must specify an IP interface.

After you finish

Change password for local Administrator account on page 70 and Enable the guest account on a stand-alone server on page 72 provide procedural information.

Create a CIFS share on MAC OS by using the GUI

Before you begin

- Click **Finder** and select **Go** › **Utilities** › **Terminal**.
- Login with the admin password.

Join MAC to the Windows domain

1. Install the Administration tools disk (applicable to MAC OS Client ONLY).
2. Open the Network configuration. Click the **Apple Icon** › **System Preferences** › **Network**.
3. Click **Advanced** button and select the **DNS** tab.
4. Set Windows DNS IP addresses and set **Search domain** to your Windows domain.
5. From **Application Utilities** Windows, start the **Directory Utility**.
6. Click **Finder** and select **Go** › **Utilities** › **Terminal**.
7. To make any changes, unlock the Directory Services by clicking on the lock icon.

Note

These changes must be made by the local MAC client administrator.

8. In **Services**, double-click on **Active Directory** to join a domain.
9. Fill the Active Directory information and click **OK**.
10. Verify that the **Search policy** includes the Active Directory with **custom path** option in the search field. Move "Active Directory" in first not grey position.

Mount a CIFS share

1. Click **Go › Connect to Server**.
2. In the **Server Address** field, specify a *<servername>* and *<sharename>* and click **Connect**.
3. A login screen appears. Type the username and password and click **Connect**.
4. You can now browse the CIFS share on the desktop.

Unmount a CIFS share

1. Browse the CIFS share on the desktop.
2. Click the **Eject** icon to unmount the share.

Create a CIFS share on MAC OS manually

Before you begin

- Click **Finder** and select **Go › Utilities › Terminal**.
- Login with the admin password.

Procedure

1. To create a CIFS share, use this command syntax:

   `sudo mount-t smbfs//Domain\;password:user@ <servername>/<sharename>/<mountpoint>;::`

   Where:

   <servername> = name of the server

   <sharename> = name of the CIFS share

   <mount_point> = path to mount point for the server

   Note

   `Mount_smbfs : server connection failed : No route to host` = servername not found (check /etc/hosts file).

   `Mount_smbfs : server rejected the connection : Authentification error` = verify that domain user and password are correct.

   `Mount_smbfs : mount error : /mountpoint : file exists` = a share with same name is already mounted.

   To check that share is correctly mounted, use this command syntax:

   `mount`

Note

Verify if the `smbfs` option is displayed.

CHAPTER 4

Managing

The tasks to manage CIFS are:

- Set maximum number of passwords to retain in Kerberos authentication 66
- Change the LDAP security level 66
- Check the current CIFS configuration 67
- Check a CIFS configuration and its dependencies 68
- Manage CIFS servers with local users support 69
- Delete a stand-alone server 72
- Rename a NetBIOS name 73
- Rename a compname 74
- Assign a NetBIOS or computer name alias 75
- Associate comments with CIFS servers 77
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- Display the SMB2 dialect release 80
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- Delegate join authority 82
- Manage file systems 83
- Stop the CIFS service 85
- Delete a CIFS server 85
- Delete CIFS shares 87
- Manage domain migration 88
- Change the user authentication method 89

Set maximum number of passwords to retain in Kerberos authentication

Note

Parameter and facility names are case-sensitive. If you experience password reset while troubleshooting problems with authentications, reset the CIFS server password by using the `server_cifs` command.

The Data Mover retains a history of the new and old passwords of each CIFS server. Kerberos authentication on page 19 provides conceptual information. Computers that are a part of the Windows Active Directory typically change the password at a regular time interval. Change the CIFS server password on page 79 provides procedural information.

Procedure

1. To indicate the maximum number of passwords to retain for Kerberos authentication, use this command syntax:

   ```
   $ server_param <mover_name> -facility cifs -modify
   srvpwd.maxHistory -value <new_value>
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <new_value> = value you want to set for the specified parameter, where:

   - 1 retains only the current password.
   - 2–10 retains the current password and n-1 previous passwords.
   - The default value is 2.

   Example:

   To use the current password and two previous passwords for authentication, type:

   ```
   $ server_param server_2 -facility cifs -modify srvpwd.maxHistory
   -value 3
   ```

   Output:

   ```
   server_2 : done
   ```

Change the LDAP security level

By default, when a domain controller proposes a security layer for signing or encryption to the Data Mover, it responds with signing (integrity protection without encryption).

For the following command to work, the specified Data Mover must contain a CIFS server that is a member of the domain to which LDAP is attempting communication.

LDAP signing and encryption on page 21 provides conceptual information.

Procedure

1. To indicate which level of security to use for LDAP messages, use this command syntax:

   ```
   $ server_param <mover_name> -facility ldap -modify
   SecurityLayer -value <new_value>
   ```

Where:

<mover_name> = name of the Data Mover or VDM.

<new_value> = one of the following values:

- 0=No security layer
- 1=Same as LDAP server
- 2=Integrity Protection
- 4=Privacy Protection

Example:

To select privacy protection for LDAP messages, type:

```
$ server_param server_2 -facility ldap -modify SecurityLayer -value
4
```

Output:

```
server_2 : done
```

Note

- Parameter and facility names are case-sensitive.
- Restart the CIFS service after executing the above command.

Check the current CIFS configuration

Note

The `server_cifs` command currently does not display the link local interfaces configured on the Data Mover.

Procedure

1. To display the CIFS configuration for a Data Mover, use this command syntax:

   ```
   $ server_cifs <mover_name>
   ```

   Where:

   <mover_name> = name of the Data Mover

   Example:

   To display the CIFS configuration for server_2, type:

   ```
   $ server_cifs server_2
   ```

   Output:

   If CIFS service is started:

   ```
   server_2 :
    256 Cifs threads started
    Security mode = NT
    Max protocol = NT1
    I18N mode = ASCII
    Home Directory Shares DISABLED
    Usermapper auto broadcast enabled
    Usermapper[0] = [127.0.0.1] state:active (auto discovered)
   ```

```
 Enabled interfaces: (All interfaces are enabled)
 Disabled interfaces: (No interface disabled)
```

If CIFS service is not started:

```
server_2 :
 Cifs NOT started
 Security mode = NT
 Max protocol = NT1
 I18N mode = ASCII
 Home Directory Shares DISABLED
 Usermapper auto broadcast enabled
 Usermapper[0] = [127.0.0.1] state:active (auto discovered)
 Enabled interfaces: (All interfaces are enabled)
 Disabled interfaces: (No interface disabled)
```

Check a CIFS configuration and its dependencies

Procedure

1. To test a CIFS configuration and all its dependencies or a specific dependency, use this command syntax:

   `$ server_checkup <mover_name> -test <component> -subtest <dependency>`

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <component> = component to test; in this case, CIFS.

   <dependency> = specific dependency of the CIFS configuration to test, such as the Kerberos subsystem or the local groups database.

   Example:

   To check all the CIFS dependencies of server_2, type:

   `$ server_checkup server_2 -test CIFS`

   Note

   The following is an excerpt of the actual output.

   Output:

```
server_2 :

----------------------Checks-----------------------
Component CIFS :
ACL       : Checking the number of ACL per file
system.................*Pass
Connection: Checking the load of TCP connections of
CIFS..............Pass
Credential: Checking the validity of
credentials.......................Pass
DC        : Checking the connectivity and configuration of the
DCs....*Pass
DFS       : Checking the DFS configuration files and DFS
registry.....Pass
DNS       : Checking the DNS configuration and connectivity to DNS
servers.Pass
EventLog  : Checking the configuration of Windows Event
Logs..........Pass
FS_Type   : Checking if all file systems are all DIR3
```

```
type............Pass
GPO        : Checking the GPO
configuration.............................Pass
HomeDir    : Checking the configuration of home directory
share........Pass
```

Manage CIFS servers with local users support

Information about the following management tasks is provided in this section:

- Enable local user support on a domain CIFS server on page 69
- Enable local user support using Celerra Manager on page 70
- Change password for local Administrator account on page 70
- Access and manage a CIFS server within the same domain on page 71
- Access and manage a standalone CIFS server within a workgroup environment on page 71
- Enable the guest account on a stand-alone server on page 72

Enable local user support on a domain CIFS server

Check CIFS configuration dependencies on page 68 and Change password for local Administrator account on page 70 provide procedural information.

Note

`-add netbios=<netbios_name>,domain=<domain_name>` options enable local user support on a Windows NT CIFS server assigning the specified *<netbios_name>* and *<domain_name>*.

Local user and group accounts on page 25 provides conceptual information.

Procedure

1. To create a Windows Server-compatible CIFS server with local user support or to add local user support to an existing CIFS server, use this command syntax:

   ```
   $ server_cifs <mover_name> -add compname=<comp_name>
   ,domain=<full_domain_name>,interface=<if_name>,
   wins=<ip_addr>[:<ip_addr>][,local_users]
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <comp_name> = compname for the CIFS server.

   <full_domain_name> = DNS name for the Windows domain.

   <if_name> = name of the interface.

   <ip_addr> = IPv4 address of the WINS server.

   You are prompted to create a temporary local administrator password.

   Example:

   To create the domain CIFS server dm32-ana0 on server_2 with local users support, type:

   ```
   $ server_cifs server_2 -add compname=dm112-cge0,domain=NASDOCS,
   interface=cge0,wins=192.168.24.18,local_users
   ```

Output:

```
Enter Password:*****
Enter Password Again:*****
server_2: done
# server_cifs server_2
CIFS Server CIFS_SERVER1[W2K] RC=4
(local users supported)
```

Note

- The password is assigned to the local Administrator account on the CIFS server and must only be ASCII characters. You must change the temporary password from a Windows system before you can administer the local users or groups on the CIFS server with local user support enabled. When you change the password, the password can contain Unicode characters.
- The `local_users` option causes the `server_cifs` command to prompt for a password to be assigned to the local Administrator password. Do not specify the `local_users` option if you are reconfiguring the server after initial creation. To reset the Administrator password, use the `local_users` option. However, the password cannot be reset if it was changed through Windows.

Enable local user support using Unisphere

Note

To enable local user support on an existing CIFS server, right-click the CIFS server, select **Properties** and then the **Local Users Enabled** option.

Procedure

1. Start the browser and type the IP address of the Control Station, for example, `http://<IP_Address_of_the_Control_Station>`.
2. Log in to Unisphere on VNX for File.
3. In the navigation pane on the left, select the system you want to set up.
4. Expand the menu and select **CIFS**. Select the **CIFS Server** tab.
5. Click **Create** to create a new CIFS server.
6. Select **Enable local users** option to enable local user support on the CIFS server. Local user support is enabled by default on a stand-alone CIFS server.

Change the password for the local Administrator account

Before you can administer local users and groups on the stand-alone CIFS server or local users enabled domain CIFS Server, you must change the password. For Windows Server clients, the password for a stand-alone server cannot be changed from a machine that is joined to a domain. Create a stand-alone CIFS server on page 60 provides procedural information.

Procedure

1. To change the password of the local Administrator account, log in to a Windows client and press **Ctrl + Alt + Delete**.
2. Click **Change Password**. The **Change Password** dialog box appears.

3. Fill in the fields as follows:
   a. In the **username** field, type **Administrator**.
   b. In the **Log on to** field, type the name or IP address of the CIFS server.
   c. In the **Old Password** field, type the original Administrator account password you typed when you enabled local users support.
   d. In the **New Password** and **Confirm New Password** fields, type the new password for the local Administrator account.

Access and manage a CIFS server within the same domain

Procedure

1. Open **Computer Management** on any computer within the same domain.
2. Go to **ActionConnect to another computer**. The **Select Computer** dialog box appears.
3. Type the CIFS server name or the IP address.

Note

As long as the CIFS server name or IP address is resolvable with DNS, there is no need to add the CIFS server name and IP address to the local C:\WINDOWS \system32\drivers\etc\hosts file.

Access and manage a stand-alone CIFS server within a workgroup environment

Procedure

1. Type the stand-alone CIFS server name in the local Windows system Host file located at `C:\WINDOWS\System32\Drivers\etc\hosts` file. Add the stand-alone CIFS server name to the lmhosts file if browsing is required on a network or if the NetBIOS name resolution is required and WINS is not established on the subnet.
2. To provide the security context for the Windows logon session, use this command syntax:

   `net use \\ <standalone_server> /user: <Local_Username>`
   Where:

   <standalone_server> = IPv4 or IPv6 address; for MMC snap-in, stand-alone NetBIOS name.

   <Local_Username> = username of an account with administrative rights on the stand-alone server.

   Example:

   To connect to a stand-alone server 192.168.56.24, type:

   `net use \\192.168.56.24 /user:administrator`
   Output:

   ```
   Type the password for <IP_address>:

   The command completed successfully.
   ```

3. Open **Computer Management**. Go to **Action › Connect to another computer**. The **Select Computer** dialog box appears.
4. Type the CIFS server name. You will not be prompted for the username and password. The console will open and the local groups database will be manageable on the

server. The security credentials are valid for the existing logon session only. Repeat step 2 to connect to a system from which access is desired, and each time you log in to the Windows system.

Note

If the password typed or the procedure to access the local groups database of the CIFS server from the Computer Management is incorrect, the error message `Unable to access the computer xxxxx. The error was: Access is denied` is displayed.

Enable the Guest account on a stand-alone server

To use usrmgr.exe to connect to a stand-alone server, you must first create a connection to the IPC$ share on the CIFS server as described in Access and manage a stand-alone CIFS server within a workgroup environment on page 71.

Guest accounts on page 27 provides conceptual information.

Procedure

1. Open **User Manager**.
2. Connect to the stand-alone server:
   a. Select **User** › **Select Domain**.
   b. In the **Domain** field, type:
      `\\<standalone_server>`
      Where:
      <standalone_server> = IP address; for MMC snap-in, stand-alone NetBIOS name.
   c. Click **OK**.
   d. When prompted, log in with the Administrator account.
3. Double-click the **Guest** account. The **User Properties** dialog box appears.
4. Configure the Guest account and click **OK**. To add security to the Guest account, you can also add a password to the account. Any unknown user that logs in with the Guest account password is logged as Guest.
5. In User Manager, select **Policies** › **User Rights**. The **User Rights Policy** dialog box appears.
6. Grant the **Access this computer from network** permission to the new Guest account.

Delete a stand-alone server

Note

If you delete a CIFS server with local user support and then create a new one with the same name and local user support, the new server retains the original local administrative password. Hence you cannot set a new password for the new CIFS server. Set maximum number of passwords to retain in Kerberos authentication on page 66 provides procedural information.

Note

If you add the `-remove_localgroup` option, the Data Mover permanently deletes the local group information of the CIFS server from the permanent storage of the Data Mover. If you add the `alias` and `interface` options, only the alias and the interface are deleted, the CIFS server exists. You can combine the alias and interface options in the same delete command.

Procedure

1. To delete a stand-alone CIFS server, use this command syntax:

   ```
   $ server_cifs <mover_name>-delete standalone=<netbios_name>
   [-remove_localgroup][,alias=<alias_name>...]
   [,interface=<if_name>]
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <netbios_name> = NetBIOS name for the CIFS server.

   Example:

   To delete the stand-alone server, dm32-cge0, on server_2, type:

   ```
   $ server_cifs server_2 -delete standalone=dm32-cge0
   ```

   Output:

   ```
   server_2 : done
   ```

Rename a NetBIOS name

Before renaming a NetBIOS name, add the new name to the domain using the Windows NT Server Manager or the Windows Server Users and Computers Microsoft Management Console (MMC) snap-in.

When you change a NetBIOS name, the system does the following:

- Temporarily suspends NetBIOS availability and disconnects all clients connected to it.
- Updates the local groups related to the new NetBIOS name.
- Updates all the shares corresponding to the new NetBIOS name.
- Maintains the account password between the server and the domain controller.
- Unregisters the original NetBIOS name, and then registers the new name in all the WINS servers.
- Retains all aliases associated with the original NetBIOS name.
- Resumes renamed NetBIOS availability.
- The rename command changes the NetBIOS name of the server, but not the compname of that server.

NOTICE

The `server_cifs -Join` and `-Unjoin` procedures generate a new computer account for the compname, as a result the original account of the computer name is lost.

Procedure

1. To rename a NetBIOS name, use this command syntax:

   ```
   $ server_cifs <mover_name> -rename -netbios <old_name>
   <new_name>
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <old_name> = name of the current NetBIOS.

   <new_name> = name of the new NetBIOS.

   Example:

   To rename the NetBIOS name of dm102-cge0 to dm112-cge0 on server_2, type:

   ```
   $ server_cifs server_2 -rename -netbios dm102-cge0 dm112-cge0
   ```

   Output:

   ```
   server_2 : done
   ```

Rename a compname

This procedure renames a Windows Server Data Mover while preserving local groups, shares, and file system permissions for the new name. In this example W2ktemp is renamed W2kProd.

Procedure

1. To unjoin the original compname from the domain, type:

   ```
   $ server_cifs server_2 -Unjoin
   compname=W2kTemp,domain=abc.com,admin=Administrator
   ```

2. To delete the compname from the CIFS configuration of the Data Mover, type:

   ```
   $ server_cifs server_2 -delete compname=W2kTemp
   ```

3. To add the compname back to the CIFS configuration of the Data Mover as a NetBIOS name, type:

   ```
   $ server_cifs server_2 -add
   netbios=W2kTemp,domain=abc,interface=fsn01
   ```

4. To rename the NetBIOS server to the new name, type:

   ```
   $ server_cifs server_2 -rename netbios W2kTemp W2kProd
   ```

5. To delete the NetBIOS name that you renamed in step 4 from the CIFS configuration of the Data Mover, type:

   ```
   $ server_cifs server_2 -delete netbios=W2kProd
   ```

6. To add the new compname to the CIFS configuration and active directory (AD) domain, type:

   ```
   $ server_cifs server_2 -add
   compname=W2kProd,domain=abc.com,interface=fsn01
   ```

7. To join the new compname to the CIFS configuration and active directory (AD) domain, type:

```
$ server_cifs server_2 -Join
compname=W2kProd,domain=abc.com,admin=Administrator
```

Assign a NetBIOS or computer name alias

NetBIOS versus DNS alias on page 19 provides conceptual information. Perform these tasks to manage aliases:

- Add a NetBIOS alias to a CIFS server on page 75
- Add a NetBIOS alias to the NetBIOS name on page 75
- Delete a CIFS server alias on page 76
- Delete a NetBIOS alias on page 76
- View aliases on page 77

Add a NetBIOS alias to a CIFS server

NOTICE

The command `server_cifs -add alias=` creates a NetBIOS alias.

Procedure

1. To add an alias to a CIFS server, use this command syntax:

   ```
   $ server_cifs <mover_name> -add
   compname=<comp_name>,domain=<full_domain_name>,
   alias= <alias_name> [, alias=<alias_name2>...]
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <comp_name> = name of the CIFS server in the named domain.

   <full_domain_name> = full domain name for the Windows environment.

   <alias_name> = alias for the computer name.

   Example:

   To add three aliases for computer name winserver1, type:

   ```
   $ server_cifs server_2 -add compname=winserver1,domain=
   NASDOCS.emc.com,alias=winserver1-a1,alias=winserver1-a2,
   alias=winserver1-a3
   ```

   Output:

   ```
   server_2 : done
   ```

Add a NetBIOS alias to the NetBIOS name

Procedure

1. To add a NetBIOS alias to the NetBIOS name, use this command syntax:

   ```
   $ server_cifs <mover_name> -add
   netbios=<netbios_name>,domain=<domain_name>,
   alias=<alias_name> [, alias=<alias_name2>...]
   ```

   Where:

<mover_name> = name of the Data Mover.

<netbios_name> = NetBIOS name for the CIFS server.

<domain_name> = domain name for the Windows environment.

<alias_name> = alias for the NetBIOS name.

Example:

To declare three aliases for NetBIOS dm102-cge0, type:

```
$ server_cifs server_2 -add netbios=dm102-cge0,domain=
NASDOCS.emc.com,alias=dm102-cge0-a1,dm102-cge0-a2,
dm102-cge0-a3
```

Output:

```
server_2: done
```

Delete a CIFS server alias

Note

If you specify the alias option, only the alias is deleted, the CIFS server exists. If you do not specify the alias option, the CIFS server in a Windows Server environment is removed from the CIFS configuration of the Data Mover.

Procedure

1. To delete a compname alias, use this command syntax:

   ```
   $ server_cifs <mover_name> -delete compname=<comp_name>,
   alias=<alias_name>[,alias=<alias_name2>,...]
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <comp_name> = name of the CIFS server.

   <alias_name> = alias for the computer name.

   Example:

   To delete the dm102-cge0-a1 alias assigned to winserver1, type:

   ```
   $ server_cifs server_2 -delete compname=winserver1,alias=dm102-
   cge0-a1
   ```

   Output:

   ```
   server_2: done
   ```

Delete a NetBIOS alias

Note

If you specify the alias option, only the alias is deleted, the CIFS server exists. If you do not specify the alias option, the CIFS server in a Windows Server environment is removed from the CIFS configuration of the Data Mover.

Procedure

1. To delete one or more NetBIOS aliases from a CIFS server, use this command syntax:

   ```
   $ server_cifs <mover_name> -delete netbios=<netbios_name>,
   alias=<alias_name> [,alias=<alias_name2>,...]
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <netbios_name>= NetBIOS name for the CIFS server.

   <alias_name> = alias for the NetBIOS name.

   Example:

   To delete the dm102-cge0-a2 alias assigned to dm102-cge0, type:

   $ server_cifs server_2 -delete netbios=dm102-cge0,alias=dm102-cge0-a2

   Output:

   ```
   server_2: done
   ```

View aliases

Procedure

1. To list aliases on a server, use this command syntax:

   ```
   $ server_cifs <mover_name>
   ```

   Where:

   <mover_name> = name of the Data Mover

   Example:

   To view the aliases for server_2, type:

   $ server_cifs server_2

   Output:

   ```
   CIFS Server (Default) dm102 -cge0 [C1T1]
   Alias(es): dm102-cge0-a1,dm102-cge0-a2,dm102-cge0-a3
   Full computer name=dm2-cge0.c1t1.pt1.c3lab.nasdocs.emc.com
   realm=C1T1.PT1.C3LAB.NASDOCS.EMC.COM
   Comment='EMC-SNAS:T5.2.7.2'
   if=cge0 l=172.24.100.55 b=172.24.100.255 mac=0:6:2b:4:0:7f
   FQDN=dm102-cge0.c1t1.pt1.c3lab.nasdocs.emc.com (Updated
   to DNS)
   ```

Associate comments with CIFS servers

You can associate a comment with a CIFS server. Comments let you add descriptive information to a CIFS server:

- Restricted characters: Do not use double quotation ("), semi-colon (;), accent (`), and comma (,) characters within the body of a comment. Attempting to use these special characters results in an error message. In addition, you can only use an exclamation point (!) if it is preceded by a single quotation mark (').

- Default comments: If you do not explicitly add a comment, the system adds a default comment of the form EMC-SNAS:T‹x.x.x.x›, where ‹x.x.x.x› is the version of the NAS software.

You can add comments when you initially create the CIFS server or after the CIFS server is created.

Perform these tasks to associate comments:

- Add comments to a CIFS server in a Windows Server on page 78
- Clear comments on page 78
- View comments from the CLI on page 78
- Comment limitations for Windows XP clients on page 79

Add comments to a CIFS server in a Windows Server environment

To add comments in a Windows environment, use this command syntax:

```
$ server_cifs <mover_name> -add compname=<compname_name>,
domain=<full_domain_name> -comment "<comment>"
```

Where:

<mover_name> = name of the Data Mover.

<comp_name> = Windows Server-compatible CIFS server.

<full_domain_name> = full domain name for the Windows environment.

<comment> = your comment.

Example:

To add the comment “EMC_VNX" to server_2 in a Windows Server environment, type:

```
$ server_cifs server_2 -add compname=dm32-ana0,domain=NASDOCS.emc.com
-comment "EMC_VNX"
```

International character support on page 18 provides conceptual information.

Note

You cannot add or change comments through the Server Management or the Computer Management MMC. You can repeat the `server_cifs -add` command to change a comment. You might notice a delay in the comment change when browsing the domain computers. This delay occurs when the Data Mover broadcasts its name and comment approximately every 12 minutes (except on startup, when it broadcasts five times in the first minute).

Clear comments

To clear a comment, run the `server_cifs -add` command with a one-space comment as in the following example.

To clear a comment for server_2, type:

```
$ server_cifs server_2 -add netbios=dm32-ana0,domain=capitals
-comment " "
```

View comments from the CLI

When you view a CIFS server configuration from the CLI, the comment appears with other information about the CIFS server.

Procedure

1. To view the configuration information, use this command syntax:

   ```
   $ server_cifs <mover_name>
   ```

   Where:

   <mover_name> = name of the Data Mover.

   Example:

   To view the configuration information for server_2, type:

   $ server_cifs server_2

   Output:

```
server_2 :
32 Cifs threads started
Security mode = NT
.
(material deleted)
.
DOMAIN CAPITALS
SID=S-1-5-15-c6ab149b-92d87510-a3e900fb-ffffffff
>DC=BOSTON(172.16.20.10) ref=2 time=0 ms
DC=NEWYORK(172.16.20.50) ref=1 time=0 ms
CIFS Server (Default) DM32-ANA0[CAPITALS] (Hidden)
Alias(es): CFS32
Comment='EMCVNX'
if=ana0 l=172.16.21.202 b=172.16.21.255 mac=0:0:d1:1d:b7:25
if=ana1 l=172.16.21.207 b=172.16.21.255 mac=0:0:d1:1d:b7:26
```

Comment limitations for Windows XP clients

When you change a comment, the change is reflected only in certain parts of the Windows XP interface. As the computer name in a domain window, the change is immediately reflected to the Windows XP client. However, in Windows XP Explorer, the names of mapped network drives do not reflect the change.

When you first map a network drive on a Windows XP client, the client stores the comment in the local Registry and displays the comment as the name of the mapped drive. The client continues to use the stored comment as the mapped drive name until you manually change the Registry. If you manually change the name of the mapped network drive from Explorer or My Computer, the changed name is stored in another Registry entry and the client uses this name until you change it again from Explorer or in the Registry.

EMC recommends that you set the comment as part of the initial CIFS server setup.

Change the CIFS server password

Computers that are members of a Windows Active Directory (AD) typically change the password for their domain account on a regular basis (for example, every 12 hours or 7 days).

Configure automatic computer password changes on page 107 explains how to set the time interval at which the Data Mover changes passwords with the domain controller.

Note

When a Windows NT-mode CIFS server is created, a default password is assigned. The Data Mover tries to change the password when it communicates with the domain controller. If the password change fails, the CIFS server continues to use the default password. Because the default password is the name of the server you should reset the password. Restart the CIFS service to force the Data Mover to update the password on its domain controller. Start the CIFS service on page 53 provides procedural information.

Procedure

1. To reset the CIFS password and encryption keys, use this command syntax:

   ```
   $ server_cifs <mover_name> -Join compname=<comp_name>,
   domain=<full_domain_name>,admin=<admin_name> -option
   resetserverpasswd
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <comp_name> = name of the CIFS server.

   <full_domain_name> = full domain name for the Windows environment.

   <admin_name> = login name of the user with administrative rights in the domain. The user is prompted to type a password for the admin account.

   Example:

   To reset the CIFS password and encryption keys for server_2, type:

   ```
   $ server_cifs server_2 -Join compname=winserver1,domain=
   nasdocs.emc.com,admin=compadmin -option resetserverpasswd
   ```

   Output:

   ```
   server_2: Enter Password: ******
   done
   ```

Display the SMB2 dialect release

Procedure

1. To display the current SMB2 dialect release, use this command syntax:

   ```
   $ server_cifs <movername>
   ```

   Where:

   <movername> = name of the Data Mover

   Example:

   To display the current SMB 2 dialect release on server_2, type:

   ```
   $ server_cifs server_2
   ```

   Output:

   ```
   server_2 :
   256 Cifs threads started
   Security mode = NT
   Max protocol = SMB3.0      <<<< dialect here
   ```

```
I18N mode = UNICODE
Home Directory Shares DISABLED
Usermapper auto broadcast enabled

Usermapper[0] = [127.0.0.1] state:active (auto discovered)

Enabled interfaces: (All interfaces are enabled)

Disabled interfaces: (No interface disabled)
...
```

Verify the effective SMB dialect for the connected clients

Perform this task to verify the protocol that is in use on the various clients that are connected to the CIFS server.

To display the effective SMB dialect, use this command syntax:

```
# server_cifs <movername> -option audit
```

Where:

<movername> = name of the Data Mover

Example:

To display the effective SMB dialect on server_2, type:

```
# server_cifs server_2 -option audit
```

NOTICE

The audit output might be extensive as all the client connections are listed if no option is specified with the audit command. It is recommended to specify the filtering options for `server_cifs –o audit` command. *EMC VNX Command Line Interface Reference for File* provides more information related to this command.

Output:

```
SMB2 session Id=0x50a6933200000003, 1 channel(s)
Uid=0x3 NTcred(0x0338a72408 RC=6 KERBEROS Capa=0x200002)
'W2012\tmatta'
AUDIT Ctx=0x0009a50c08, ref=2,  Client(10.241.168.71) Port=59131/445
SMB30[W2012] on if=cge-2-0
CurrentDC 0x00099fa008=VM200W2012
Proto=SMB3.00, MaxReadWriteSz=0x100000, MaxTransactSz=0x100000,
popupMsg=1
SrvCapa=0x7f, CltCapa=0x7f  ---abridged---
```

Display the number and names of open files

Using Windows Administrative Tools on VNX provides more information on viewing open files by using Microsoft Management Console (MMC).

Note

In the case of a Microsoft Windows 7 SMB2 client, the suboption `full` displays the current caching lease information on the Data Mover.

Procedure

1. To display the number and names of open files, use this command syntax:
   ```
   $ server_cifs <mover_name> -option audit [,user=<user_name>]
   [,client=<client_name>][,full]
   ```

Where:

<mover_name> = name of the Data Mover.

<user_name> = the user name can be simply ‹user_name› or Domain\‹user_name› or ‹user_name@emc.com›.

<client_name> = the machine name, which can be a string or an IP address.

Example:

To display the number and names of open files on server_2, type:

$ server_cifs server_2 -option audit,full
Output:

```
AUDIT Ctx=0xdffcc404, ref=2,  Client(fm-main07B60004)
Port=36654/139
NS40_1[BRCSLAB] on if=cge0_new
CurrentDC 0xceeab604=W2K3PHYAD
Proto=NT1, Arch=UNKNOWN, RemBufsz=0xfefb, LocBufsz=0xffff,
popupMsg=1
0 FNN in FNNlist NbUsr=1 NbCnx=0
Uid=0x3f NTcred(0xcf156a04 RC=1 NTLM Capa=0x401) 'BRCSLAB\gustavo'
CHECKER
AUDIT Ctx=0xde05cc04, ref=2, XP Client(BRCSBARREGL1C) Port=1329/445
NS40_1[BRCSLAB] on if=cge0_new
CurrentDC 0xceeab604=W2K3PHYAD
Proto=NT1, Arch=Win2K, RemBufsz=0xffff, LocBufsz=0xffff,
popupMsg=1
0 FNN in FNNlist NbUsr=1 NbCnx=2
Uid=0x3f NTcred(0xceeabc04 RC=3 NTLMSSP Capa=0x11001) 'BRCSLAB
\gustavo'
CHECKER
Cnxp(0xceeaae04), Name=IPC$, cUid=0x3f Tid=0x3f, Ref=1,
Aborted=0
readOnly=0, umask=22, opened files/dirs=0
Cnxp(0xde4e3204), Name=gustavo, cUid=0x3f Tid=0x41, Ref=1,
Aborted=0
readOnly=0, umask=22, opened files/dirs=2
Fid=64, FNN=0x1b0648f0(FREE,0x0,0), FOF=0x0  DIR=\
Notify commands received:
Event=0x17, wt=0, curSize=0x0, maxSize=0x20, buffer=0x0
Tid=0x41, Pid=0xb84, Mid=0xec0, Uid=0x3f, size=0x20
Fid=73, FNN=0x1b019ed0(FREE,0x0,0), FOF=0xdf2ae504 (CHECK)
FILE=\New Wordpad Document.doc
```

Delegate join authority

When you delegate join authority, the CIFS server can be joined to its domain by any user to whom you give authority. The user does not need specific Windows permissions, but must be in the same AD forest as the CIFS server.

To delegate join authority, set the following parameters:

- `cifs djUsekpassword`
- `cifs djAddAdminToLg`
- `cifs djEnforceDhn`

Note

Use `djEnforceDhn` as a temporary measure for access rights because the Data Mover authenticates Windows clients by using NTLMSSP mode instead of Kerberos.

The *Parameters Guide for VNX for File* provides additional information. Delegating joins on page 32 provides conceptual information.

Manage file systems

Perform these tasks to manage file systems:

- Ensure synchronous writes on page 83
- Turn oplocks off on page 83
- Configure file change notification on page 84

Ensure synchronous writes

The `cifssyncwrite` option ensures that any write to the file server is done synchronously. It is important that you ensure synchronous writes if VNX is used to store certain database files. EMC recommends that you use this mount option to avoid chances of data loss or file corruption across various failure scenarios, for example, loss of power.

Procedure

1. To mount a file system to ensure synchronous writes, use this command syntax:

   ```
   $ server_mount <mover_name> -option cifssyncwrite
   <fs_name><mount_point>
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <fs_name> = name of the file system being mounted.

   <mount_point> = name of the mount point.

   Example:

   To mount the file system ufs1 with ensured synchronous writes, type:

   ```
   $ server_mount server_2 -option cifssyncwrite ufs1 /ufs1
   ```

   Output:

   ```
   server_2 : done
   ```

Turn oplocks off

Opportunistic file locking on page 38 provides conceptual information.

NOTICE

EMC recommends that you leave oplock on unless you are using a database application that suggests oplock be turned off, or if you are handling critical data and cannot afford any data loss. When oplock is enabled, data loss can occur in a Microsoft network if the Windows Server crashes or network problems occur.

Note

You might notice performance degradation if oplocks are disabled.

Procedure

1. To turn oplocks off for a specific file system, use this command syntax:

```
$ server_mount <mover_name> -option nooplock <fs_name>
<mount_point>
```

Where:

<mover_name> = name of the Data Mover or VDM.

<fs_name> = name of the file system being mounted.

<mount_point> = name of the mount point.

Example:

To mount the file system ufs1 with oplocks turned off, type:

```
$ server_mount server_2 -option nooplock ufs1 /ufs1
```

Output:

```
server_2 : done
```

Configure file change notification

A directory file must be opened before this command is used. File change notification on page 39 provides conceptual information.

Note

File change notification is enabled by default. Consider disabling the option if you experience performance issues.

Procedure

1. To disable the notify feature for a file system, use this command syntax:

   ```
   $ server_mount <mover_name> -option nonotify <fs_name>
   <mount_point>
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <fs_name> = name of the file system being mounted.

   <mount_point> = name of the mount point.

   Example:

   To disable the notify feature for file system ufs1 on server_2, type:

   ```
   $ server_mount server_2 -option nonotify ufs1 /ufs1
   ```

   Output:

   ```
   server_2 : done
   ```

Option	Description	Range	Example
`triggerlevel=<value>`	Specifies how many directory levels beneath the monitored directory are monitored for changes.	*<value>* must be in hexadecimal format. Default value: 512 levels (0x00000200)	The following example shows a configuration for up to 15 directory levels: `$ server_mount server_2 -option "triggerlevel=0x0000000f" ufs1 /ufs1`

Option	Description	Range	Example
notifyonwrite	Provides a notification of write access to a file system. This option is useful when an application needs to be notified of file writes before closing the file.	Default value: disabled	The following example enables notifyonwrite: **$ server_mount server_2 -option notifyonwrite ufs1 /ufs1**
notifyonaccess	Provides a notification of the access time of a modification.	Default value: disabled	The following example enables notifyonaccess and notifyonwrite: **$ server_mount server_2 -option notifyonaccess,notifyonwrite ufs1 /ufs1**

Note

For performance reasons, the notifyonwrite and notifyonaccess options are disabled by default.

Stop the CIFS service

NOTICE

Stopping the CIFS service on a Data Mover prohibits users from accessing all CIFS servers on that Data Mover.

Procedure

1. To stop CIFS service for a Data Mover, use this command syntax:

   $ server_setup *<mover_name>* -Protocol cifs -option stop

   Where:

   <mover_name> = name of the Data Mover

   Example:

   To stop the CIFS service on server_2, type:

   $ server_setup server_2 -Protocol cifs -option stop

   Output:

   server_2: done

Delete a CIFS server

Before you begin

Use Microsoft Management Console (MMC) or Server Manager to close all active sessions before deleting a CIFS server.

NOTICE

Data loss can occur if you stop or delete a CIFS server (Windows Server or Windows NT) when writes are in process. Before you perform this procedure, notify all users in advance that the CIFS server will no longer be available.

Delete a CIFS server in a Windows Server environment

Note

The `-delete` command does not delete the NetBIOS entry from the primary domain controller (PDC).

Procedure

1. To unjoin the computer from the domain, use this command syntax:

   ```
   $ server_cifs <mover_name> -Unjoin
   compname=<comp_name>,domain=<full_domain_name>
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <comp_name> = computer name of the CIFS server.

   <full_domain_name> = full domain name for the Windows environment.

   Example:

   To unjoin the computer from the domain universe.com, type:

   ```
   $ server_cifs server_2 -Unjoin compname=dm32-
   cge0,domain=universe.com
   ```

2. To remove the CIFS server, use this command syntax:

   ```
   $ server_cifs <mover_name> -delete compname=<comp_name> [-
   remove_localgroup][,alias=<alias_name>...]
   [,interface=<if_name>]
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <comp_name> = computer name of the CIFS server.

   Example:

   To remove a CIFS server, type:

   ```
   $ server_cifs server_2 -delete compname=dm32-cge0
   ```

Note

If you add the `-remove_localgroup` option, the Data Mover permanently deletes the local group information of the CIFS server from the permanent storage of the Data Mover. If you add the alias and interface options, only the alias and the interface are deleted, the CIFS server exists. You can combine the alias and interface options in the same delete command.

Delete CIFS shares

When you delete a share, users no longer have access to that share. All unexports on CIFS shares are permanent—when a CIFS share is unexported, the entry is deleted from the export table. To provide user access to the file system, you must reexport the file system.

Before you delete shares, ensure that all users have disconnected from the share before you unexport the share. If you export a directory or file system from a Data Mover before unmounting it, you will be unable to connect to the share the next time you try to access the file system.

Note

By default, shares created by Windows management tools are local shares. Create shares for CIFS users on page 57 provides procedural information. To delete a local share through the CLI, you must specify the NetBIOS name when you run the server_export command.

Delete a specific share

Procedure

1. To delete a CIFS share, use this command syntax:

   ```
   $ server_export <mover_name> -unexport -name <sharename>
   [-option <options>]
   ```

   Where:

   <mover_name> = name of the physical Data Mover or VDM.

   <sharename> = name of the CIFS share.

   <options> = options for listing. Currently, there is only one option: netbios=*<netbios_name>*. When the share has an associated NetBIOS name, the NetBIOS name is required to locate the entry because multiple CIFS entries can have the same *<sharename>* when belonging to different NetBIOS names.

   Example:

   To delete share cifs_share on server_2, type:

   ```
   $ server_export server_2 -unexport -name cifs_share
   ```

   Output:

   ```
   server_2: done
   ```

Delete all shares

NOTICE

Use this option carefully. After deleting all shares, you must rebuild the export table by reexporting each path on each Data Mover to restore user connectivity to all mounted file systems.

Note

Deleting the shares does not delete the underlying file system.

Procedure

1. To delete all CIFS shares, use this command syntax:

   ```
   $ server_export <mover_name> -Protocol cifs -unexport -all
   ```

   Where:

   <mover_name> = name of the physical Data Mover or VDM

   Example:

   To delete all shares on server_2, type:

   ```
   $ server_export server_2 -Protocol cifs -unexport -all
   ```

   Output:

   ```
   server_2: done
   ```

Manage domain migration

The `server_cifs -Migrate` command updates all SIDs from a source domain to the SIDs of a target domain by matching the user and group account names in the source domain to the user and group account names in the target domain. The interface specified in this option queries the local server and then its corresponding source and target domain controllers to search each object's SID.

Review the following before using the `server_cifs -Migrate` command option:

- The migrate option does not require running any type of domain migration tool beforehand.
- For the migrate option:
  - The source and target domain controllers must exist.
  - As long as a trusted relationship is established between the source and target domains, you can specify the same interface or NetBIOS name in the `server_cifs` command.
  - To use different interfaces or NetBIOS names, you must configure two separate CIFS servers on the Data Mover for the source and target domains.

Domain migration on page 15 provides conceptual information.

Note

After running a local group update, stop and start the CIFS service on the Data Mover to ensure that all changes are made to the target domain. Stop the CIFS service on page 85 and Start the CIFS service on page 53 provide procedural information.

The `server_cifs -Replace` command replaces the history SIDs from the old domain with the new SIDS in the new domain. The interface that you specify in this option queries the local server and then its corresponding target domain controller to search each object's SID and history SID.

Review the following before using the `server_cifs -Replace` command option:

- The replace option requires that you first perform account migration by using a domain migration tool.

- The replace option provides one quota for each user or group.

Procedure

1. To migrate all SIDs in the ACL database for file system, ufs1, from eng.emc.com:nb=dm112-cge1:if=cge1 to nasdocs.emc.com:nb=dm112-cge0:if=cge0, type:

   ```
   $ server_cifs server_2 -Migrate ufs1 -acl eng.emc.com:nb=dm112-cge1:if=cge1 nasdocs.emc.com:nb=dm112-cge0:if=cge0
   ```

   Output:

   ```
   server_2: done
   ```

2. To replace the SIDs for ufs1, type:

   ```
   $ server_cifs server_2 -Replace ufs1 -acl:nb=dm112-cge0:if=cge0
   ```

   Output:

   ```
   server_2: done
   ```

Change the user authentication method

By default, VNX uses the NT user authentication method. Use NT user authentication with both domain CIFS servers and a stand-alone CIFS server with local user support. For security reasons, it is strongly recommended that you do not use UNIX or SHARE user authentication. User authentication methods on page 23 provides more information.

Procedure

1. To change the user authentication method for the Data Mover, use this command syntax:

   ```
   $ server_cifs <mover_name> -add security=<security_mode>
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <security_mode> = NT, UNIX, or SHARE.

   Example:

   To set the user authentication method to UNIX for server_2, type:

   ```
   $ server_cifs server_2 -add security=UNIX
   ```

   Output:

   ```
   server_2 : done
   ```

Check the user authentication method

Note

If there are CIFS servers on the Data Mover, you cannot reset the user authentication method because this method is in use by the existing CIFS servers.

Procedure

1. To check the user authentication method set on the Data Mover, use this command syntax:

   ```
   $ server_cifs <mover_name>
   ```

Where:

<mover_name> = name of the Data Mover or VDM.

Example:

To check the user authentication method for server_2, type:

$ server_cifs server_2

Output:

```
server_2 :
256 Cifs threads started
Security mode = NT
Max protocol = NT1
I18N mode = UNICODE
Home Directory Shares DISABLED
usermapper auto broadcast enabled
usermapper[0] = [128.221.253.2] state:active (auto discovered)
usermapper[1] = [128.221.252.2] state:active (auto discovered)
Default WINS servers = 172.24.101.108
Enabled interfaces: (All interfaces are enabled)
Disabled interfaces: (No interface disabled)
Unused Interface(s):
if=cge1 l=172.24.100.61 b=172.24.100.255 mac=0:60:16:4:43:ec
if=cge2 l=172.24.100.62 b=172.24.100.255 mac=0:60:16:4:43:e9
if=cge3 l=172.24.100.71 b=172.24.100.255 mac=0:60:16:4:43:e8
DOMAIN W2KPAGCHILD1NBN FQDN=child1.win2kpag.ad.root SITE=NET-100
RC=5
SID=S-1-5-15-f7d03a54-f0a67e26-297741d6-ffffffff
>DC=LNSGC046(172.24.101.46) ref=2 time=9 ms (Closest
Site)
>DC=LNSGC108(172.24.101.108) ref=3 time=1 ms (Closest
Site)
CIFS Server CS80-DM4-CGE0[W2KPAGCHILD1NBN] RC=40
Alias(es): CS80DM4-ALIAS1,CS80DM4-ALIAS2,CS80DM4-ALIAS3,CS80DM4-
ALIAS4,CS80DM4-
ALIAS5,CS80DM4-ALIAS6,CS80DM4-ALIAS7,CS80DM4-ALIAS8,CS80DM4-
ALIAS9,CS80DM4-ALIAS10
Full computer name=cs80-dm4-cge0.child1.win2kpag.ad.root
realm=CHILD1.WIN2KPAG.AD.ROOT
Comment='EMC-SNAS:T5.5.15.0'
if=cge0 l=172.24.100.47 b=172.24.100.255 mac=0:60:16:4:43:ed
wins=172.24.101.108
FQDN=cs80-dm4-cge0.pag.emc.com (Updated to DNS)
Password change interval: 30 minutes
Last password change: Thu Dec  20 14:09:07 2005 GMT
Password versions: 1088, 1087
```

CHAPTER 5

Leveraging Advanced Functionality

Advanced CIFS functionalities are:

- Enable and manage home directories 92
- Manage group policy objects 94
- Disable alternate data streams 98
- Configure SMB signing 98
- Manage SMB2 and SMB3 protocols 101
- Change the default symbolic link behavior 104
- Access symbolic links through CIFS clients 106
- Configure automatic computer password changes 107
- Change the location of the Windows security log 108
- Join a CIFS server to a Windows domain—Advanced Procedures 109
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Enable and manage home directories

The home directory feature is disabled by default. Create the CIFS server and start the CIFS service before you enable the home directory as discussed in the Unisphere online help. Home directories on page 33 provides conceptual information.

Perform these tasks to manage the home directory feature:

1. Create the database on page 92
2. Create the home directory file on page 92
3. Add home directories to user profiles on page 92
4. Disable home directories on the Data Mover on page 94

Create the database

1. To use the home directory feature, create a database file named homedir. The database file maps each domain or username combination to the home directory location of the user.
2. Use the home directory snap-in to create a new database on the Data Mover during the creation of the initial entry.

Create the home directory file

Appendix A: Additional Home Directory Information on page 125 provides more information about the home directory database file.

Note

EMC recommends that for creating home directories you use the Home Directory management MMC snap-in to create and edit user home directory entries. The MMC snap-in validates the entries as you type them. If you create or edit the homedir file and type an incorrect entry, the home directory environment might become unusable. The VNX management MMC snap-in online help provides more information about creating directories automatically.

Procedure

1. To enable home directories on the Data Mover, use this command syntax:

   ```
   $ server_cifs <mover_name> -option homedir
   ```

   Where:

   <mover_name> = name of the Data Mover

   Example:

   To enable home directories on server_2, type:

   ```
   $ server_cifs server_2 -option homedir
   ```

   Output:

   ```
   server_2 : done
   ```

Add home directories to user profiles

To allow user access to individual home directories, you must map the home directory in each user profile with one of the following paths:

```
\\<cifs_server>\HOME
OR
\\<cifs_server>\<username>[$]
```

Where:

<cifs_server> = IP address, computer name, or NetBIOS name of the CIFS server.

HOME = special share name reserved for the home directory feature.

<username>[$] = name of a user's directory. Using the $ option marks the directory as hidden.

Note

The *<username>* option is useful when migrating from a non-VNX system to a VNX system.

Example:

To map the home directory in each user profile on dm32-cge0, type:

\\dm32-cge0\HOME

Note

Alternatively, you can use *\\server\username* or *\\server\username$*.

Perform these tasks to add home directories for user profiles:

- Add home directories from Windows Server on page 93
- Add home directories with regular expressions on page 93

Add home directories from Windows Server

Procedure

1. Log in to a Windows Server from a domain administrator account.
2. Select **Start** › **Programs** › **Administrative Tools** › **Active Directory Users and Computers**.
3. Click **Users** to display the users in the right pane.
4. Right-click a user and select **Properties**. The **Sample User Properties** window appears.
5. Click the **Profile** tab and in the **Home folder** section:
   a. Select **Connect**.
   b. Select the drive letter you want to map to the home directory.
   c. In the **To** field, type:

      \\<cifs_server>\HOME

      Where:

      <cifs_server> = IP address, computer name, or NetBIOS name of the CIFS server.
6. Click **OK**.

Add home directories with regular expressions

Regular expressions on page 127 provides more information.

Procedure

1. Log in to a Windows Server from a domain administrator account.
2. Click and select **Start › Programs › Administrative Tools › Celerra Management**.
3. Right-click the **Homedir** folder icon and select **New › home directory** .
4. In the Home Directory Properties window:
   a. In **Domain**, type a regular expression. In this example, the expression matches any domain name that begins with DOC.
   b. In **User**, type a regular expression. In this example, an asterisk matches any username.
   c. In the Path, type `\homedirs\<u>`. In this example, homedirs is the share where home directories are stored, and `<u>` is the login name of the user. A directory with the same name as the login name of the user will be created, if it does not already exist.
5. Click **OK**.

Disable home directories on the Data Mover

To disable home directories on a Data Mover, use this command syntax:

```
$ server_cifs <mover_name> -option homedir=no
```

Where:

`<mover_name>` = name of the Data Mover

Example:

To disable home directories on server_2, type:

```
$ server_cifs server_2 -option homedir=no
```

Manage group policy objects

Perform these tasks to manage group policy object (GPO) support:

- Display GPO settings on page 94
- Update GPO settings on page 95
- Disable GPO support on page 96
- Disable GPO caching on page 97

Group policy objects on page 28 provides conceptual information.

Display GPO settings

Note

You can display group policy object (GPO) settings for each CIFS server joined to a Windows Server domain.

Note

To display the GPO settings for all the CIFS servers on all the Data Movers, use the `ALL` option of the `server_security` command.

Procedure

1. To display the current GPO settings for the Data Mover, use this command syntax:

   ```
   $ server_security <mover_name> -info -policy gpo
   ```

   Where:

   <mover_name> = name of the Data Mover

   Example:

   To display the current GPO settings for server_2, type:

   $ server_security server_2 -info -policy gpo

   Output:

   ```
   server_2:
   Server compname: k10eqa19s2
   Server NetBIOS: K10EQA19S2
   .
   .
   .
   by days
   Retention Method for application log server list: k10eqa19s2
   Disable background refresh of Group Policy: Not defined
   Group Policy Refresh interval (minutes): 60
   Refresh interval offset (minutes): 5
   GPO Last Update time (local): Wed Sep 10 14:47:42 EDT 2007
   GPO Next Update time (local): Wed Sep 10 15:50:42 EDT 2007
   ```

Update GPO settings

While the CIFS service is running or after restarting the CIFS service, the Data Mover updates its group policy object (GPO) settings based on one of the following refresh intervals:

- If defined in the domain, the refresh interval can be set from zero (updates every 10 seconds) up to 64800 minutes (updates every 45 days).
- If not defined in the domain, the Data Mover uses its default refresh value of 90 minutes.

Perform these tasks for GPO updates:

- Disable automatic GPO updates on page 95
- Update GPO settings manually for all Data Movers on page 96
- Update GPO settings manually for the specified domain on page 96

Disable automatic GPO updates

Procedure

1. To disable the automatic GPO updates, enable the Disable background refresh of Group Policy GPO setting.

   Output:

   ```
   Disable background refresh of Group Policy: Enabled
   Group Policy Refresh interval (minutes): 90
   Refresh interval offset (minutes): Not defined
   GPO Last Update time (local): Wed Sep 10 14:47:42 EDT 2007
   GPO Background Update disabled, must be updated manually
   ```

Update GPO settings manually for all Data Movers

If you change group policies through Microsoft Management Console (MMC) or the Server Manager, you can force an update of the GPO settings on the VNX.

Note

To update the GPO settings for all the CIFS servers on all the Data Movers, use the `ALL` option of the `server_security` command.

Procedure

1. To force an update of GPO settings for all Data Movers, type:

   ```
   $ server_security ALL -update -policy gpo
   ```

Update GPO settings manually for the specified domain

Note

To update the GPO settings for all CIFS servers in domain NASDOCS, use the `ALL` option of the `server_security` command.

Procedure

1. To force an update of GPO settings for the Data Mover in a specified domain, use this command syntax:

   ```
   $ server_security <mover_name> -update -policy gpo
   domain=<domain_name>
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <domain_name> = domain name of the CIFS server.

   Example:

   To update the GPO settings for server_2 in domain NASDOCS, type:

   ```
   $ server_security server_2 -update -policy gpo domain=NASDOCS
   ```

   Output:

   ```
   server_2 : done
   ```

Disable GPO support

Group policy object (GPO) support is enabled per Data Mover and is enabled by default. When GPO support is disabled, VNX cannot access the Windows domain controller, and the related VNX functions automatically use their own default settings.

The *Parameters Guide for VNX for File* provides additional information about the `cifs gpo` parameter.

Note

Parameter and facility names are case-sensitive.

Procedure

1. To disable GPO support, use this command syntax:

   ```
   $ server_param <mover_name> -facility cifs -modify gpo
   -value 0
   ```

   Where:

   <mover_name> = name of the Data Mover

   Example:

   To disable GPO support on server_2, type:

   ```
   $ server_param server_2 -facility cifs -modify gpo -value 0
   ```

   Output:

   ```
   server_2 : done
   ```

Disable GPO caching

The Data Mover caches the group policy object (GPO) settings retrieved from the Windows domain controller. The GPO cache allows a Data Mover to quickly retrieve GPO settings even when the domain controller is inaccessible.

You can disable GPO caching if you do not want the Data Mover to use cached settings. If GPO caching is disabled, the Data Mover must retrieve the settings from the Windows domain controller.

The *Parameters Guide for VNX for File* provides additional information about the `cifs gpocache` parameter.

Note

If you disable GPO caching and VNX cannot access the Windows domain controller, the related VNX functions use their own default settings.

Note

Parameter and facility names are case-sensitive.

Procedure

1. To disable GPO caching, use this command syntax:

   ```
   $ server_param <mover_name> -facility cifs -modify gpocache
   -value 0
   ```

   Where:

   <mover_name> = name of the Data Mover

   Example:

   To disable GPO caching on server_2, type:

   ```
   $ server_param server_2 -facility cifs -modify gpocache -value 0
   ```

   Output:

   ```
   server_2 : done
   ```

Disable alternate data streams

Alternate Data Stream (ADS) support is controlled by the shadow stream parameter and is enabled by default. Although there are rare cases when you might want to disable ADS support, EMC generally recommends that alternate data stream support be enabled. Alternate datastream support on page 35 provides more information.

The *Parameters Guide for VNX for File* provides additional information about the `shadow stream` parameter.

Procedure

1. To disable ADS support, use this command syntax:

   ```
   $ server_param <mover_name> -facility shadow -modify stream
   -value 0
   ```

   Where:

   <mover_name> = name of the Data Mover.

   Example:

   To disable ADS support on server_2, type:

   ```
   $ server_param server_2 -facility shadow -modify stream -value 0
   ```

   Output:

   ```
   server_2 : done
   ```

Configure SMB signing

Perform these tasks to configure server message block (SMB) signing:

- Configure SMB signing with the smbsigning parameter on page 98
- Disable SMB signing on a data mover on page 98
- Configure SMB signing with GPOs on page 99
- Configure SMB signing with the Windows registry on page 99

SMB protocol support on page 36 provides conceptual information.

Configure SMB signing with the smbsigning parameter

The `cifs.smbsigning` parameter controls server message block (SMB) signing on the Data Mover and affects all CIFS servers on the Data Mover. This parameter is configured on the individual Data Mover or VNX, and controls the client-side and server-side signing.

Refer the *Parameters Guide for VNX for File* for additional information on using the `cifs.smbsigning` parameter.

Disable SMB signing on a Data Mover

Procedure

1. To disable SMB signing, use this command syntax:

   ```
   $ server_param <mover_name> -facility cifs -modify
   smbsigning -value 0
   ```

   Where:

<mover_name> = name of the Data Mover

Example:

To disable SMB signing support on server_2, type:

```
$ server_param server_2 -facility cifs -modify smbsigning -value 0
```

Output:

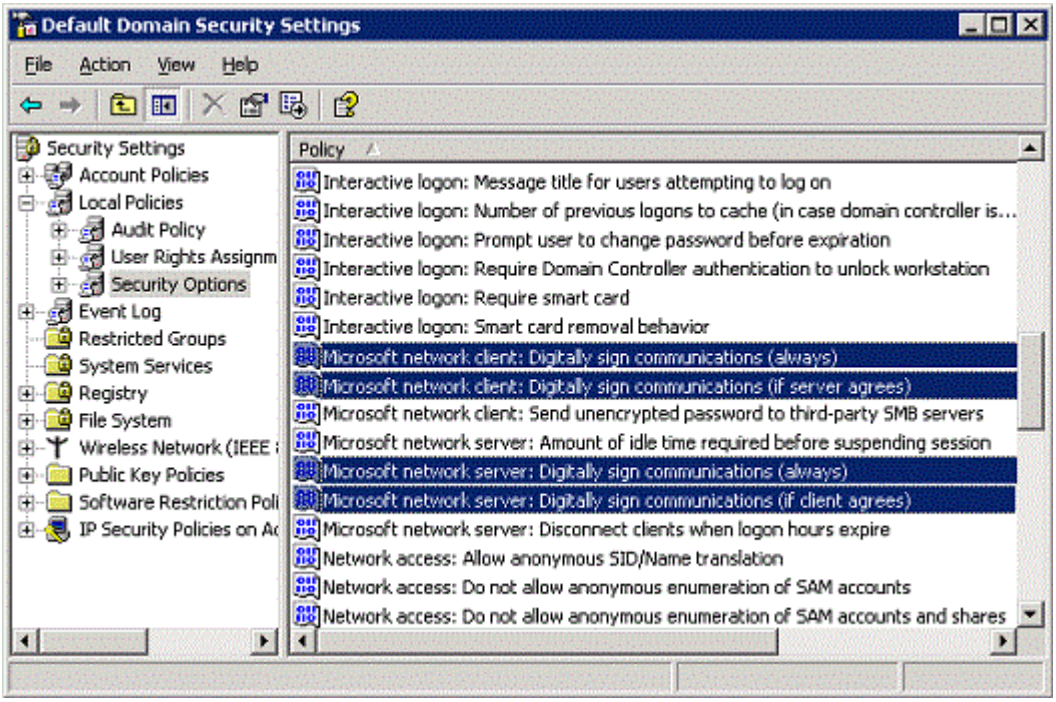
```
server_2: done
```

Configure SMB signing with GPOs

If you want independent control of server-side and client-side server message block (SMB) signing, you can configure the GPOs shown in Figure 5 on page 99. These group policy objects (GPOs) are found under the **Default Domain Security Settings** and can be configured from any domain controller.

To access **Default Domain Security Settings** go to **Start** › **Control Panel** › **Administrative Tools** › **Domain Security Policy**.

Figure 5 SMB signing GPOs in default domain security settings



Note

Configuring SMB signing through GPOs affects all clients and servers within the domain and overrides individual Registry settings.

Configure SMB signing with the Windows Registry

Table 14 on page 100 explains the group policy objects available for SMB signing.

Table 14 SMB signing GPOs

GPO name	What it controls	Default setting for Data Mover
Microsoft network server: Digitally sign communications (always)	Whether the server-side SMB component requires signing	Disabled
Microsoft network server: Digitally sign communications (if client agrees)	Whether the server-side SMB component has signing enabled	Disabled
Microsoft network client: Digitally sign communications (always)	Whether the client-side SMB component requires signing	Disabled
Microsoft network client: Digitally sign communications (if server agrees)	Whether the client-side SMB component has signing enabled	Enabled

You can also configure server message block (SMB) signing through the Windows Registry. If there is no group policy object (GPO) service available, such as in a Windows NT environment, the Registry settings are used.

Registry settings affect only the individual server or client that you configure. Registry settings are configured on individual Windows workstations and servers and affects individual Windows workstations and servers. There are four Registry settings—two for server-side and two for client-side signing, and they function the same as the SMB signing GPOs.

Note

The following Registry settings pertain to Windows NT with SP 4 or later. These Registry entries exist in Windows Server, but should be set through GPOs.

Server-side signing

The server-side settings are located in:

```
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services
\lanmanserver\parameters\
```

Table 15 on page 100 shows the server-side SMB signing Registry entries.

Table 15 Server-side SMB signing Registry entries

Registry entries	Values	Purpose
`enablesecuritysignature`	• 0 disabled (default) • 1 enabled	Determines if SMB signing is enabled.
`requiresecuritysignature`	• 0 disabled (default) • 1 enabled	Determines if SMB signing is required.

Client-side signing

The client-side settings are located in:

```
HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services
\lanmanserver\parameters\
```

Table 16 on page 101 shows the client-side SMB signing Registry entries.

Table 16 Client-side SMB signing Registry entries

Registry entries	Values	Purpose
`enablesecuritysignature`	• 0 disabled • 1 enabled (default)	Determines if SMB signing is enabled.
`requiresecuritysignature`	• 0 disabled (default) • 1 enabled	Determines if SMB signing is required.

Manage SMB2 and SMB3 protocols

The tasks to manage SMB2 and SMB3 protocols are:

- Enable the SMB2 protocol on page 101
- Enable the SMB3 protocol on page 101
- Configure the Continuous Availability functionality on the Data Mover on page 102
- Disable the SMB2 and SMB3 protocols on page 103
- Create a symbolic link to a file with a relative path on page 103

SMB protocol support on page 36 provides conceptual information.

Enable the SMB2 protocol

Procedure

1. To enable the SMB2 protocol, use this command syntax:

   ```
   $ server_cifs <mover_name> -add security=NT,dialect=SMB2
   ```

   Where:

   <mover_name> = name of the Data Mover

   Example:

   To enable the SMB2 protocol on server_2, type:

   ```
   $ server_cifs server_2 -add security=NT,dialect=SMB2
   ```

   Output:

   ```
   done
   ```

Enable the SMB3 protocol

SMB3 is enabled by default for a fresh install. In case of an upgrade, if you have modified the MAX protocol dialect using the server_cifs command then the MAX protocol will not be default one. Perform this task to enable the SMB3 protocol:

To enable the SMB3 protocol, use this command syntax:

```
$ server_cifs <mover_name> -add security=<security_mode>
dialect=SMB3
```

Where:

<mover_name> = name of the Data Mover

<security_mode> = NT

Example:

To configure the max SMB dialect on server_2, type:

```
$ server_cifs server_2 -add security=NT dialect=SMB3
```

Output:

```
server_2: done
```

Note

- The keyword that is used for the dialect option in the `server_cifs` command indicates the maximum supported dialect. For example, when you enable SMB3, all protocol dialects up to SMB 3.0 are enabled, including NT1, SMB2.0, and SMB 2.1.
- To switch to SMB1, use NT1 dialect.
- SMB2 indicates the max dialect in SMB2 => SMB2.1. SMB2.0 or SMB2.1 can be specified explicitly.
- SMB3 indicates max dialect in SMB3 => SMB3.0. SMB 3.0 can be specified explicitly.

Configure the Continuous Availability functionality on the Data Mover

You must start by setting `smbca` capability on the file system (required for multiprotocol environment):

Procedure

1. To mount the `smbca` option on the file system, use this command syntax:

   ```
   $ server_mount <movername> -o smbca fs1
   ```

   Where:

   <movername>= name of the Data Mover

   Example:

   ```
   $ server_mount server_2 -o smbca fs1
   ```

   Output:

   ```
   server_2: done
   ```

2. To create a CIFS share, type:

   ```
   $ server_export server_2 -Protocol cifs -name ufs/fs1
   ```

   Output:

   ```
   server_2: done
   ```

3. To display the details of the CIFS share ufs, type:

   ```
   $ server_export server_2 -Protocol cifs -list -name usf
   ```

   Output:

   ```
   server_2 :
   ```

```
share "ufs" "/fs1" umask=022 maxusr=4294967295 type=Global  >>>>
share created as a global share
```

4. To display the specific share ufs, type:

   $ server_export server_2 -Protocol cifs -name ufs -option type=Global:CA /fs1 >>> Bit CA added

   Output:

   ```
   server_2: done
   ```

5. To list the CIFS entries, type:

   $ server_export server_2 -Protocol cifs -name ufs -list

   Output:

   ```
   server_2 :

   share "ufs" "/fs1" umask=022 maxusr=4294967295 type=Global  >>>>
   share created as a global share
   ```

Disable the SMB2 and SMB3 protocols

Note

To disable any one of the protocols (SMB2 or SMB3), mention the dialect as `NT1` in the `server_cifs` command.

Procedure

1. To disable both SMB3 and SMB2 protocols, enabling the SMB1 protocol, use this command syntax:

   `$ server_cifs <mover_name> -add security=NT,dialect=NT1`

   Where:

   <mover_name> = name of the Data Mover

   Example:

   To disable both SMB3 and SMB2 protocols, enabling the SMB1 protocol on server_2, type:

   $ server_cifs server_2 -add security=NT,dialect=NT1

   Output:

   ```
   done
   ```

Create a symbolic link to a file with a relative path

SMB2 support for symbolic links on page 38 provides conceptual information.

Note

The creation of symbolic link with an absolute path or an UNC path works the same way. When creating a symbolic link to a directory, use `mklink /d` to indicate a directory.

Procedure

1. To create a symbolic link from a MS DOS console on the SMB2 client, use this command syntax:

```
mklink <symlink> <target>
```

Where:

<symlink> = name of the symbolic link.

<target> = location and name of the target.

Example:

To create a symbolic link target1 that points to a file with an absolute pathname from a MS DOS console on the SMB2 client, type:

```
mklink target1 myData\applicationData\file1.txt
```

Output:

```
d:\temp>mklink link0.txt report.txt
symbolic link created for link0.txt <<===>>
report.txt
d:\temp>
```

Change the default symbolic link behavior

To modify the default behavior of symbolic links:

- Enable symbolic links with absolute paths on page 105
- Enable symbolic links with target paths on page 104

Enable symbolic links with target paths to parent directories

By default, the Data Mover does not resolve symbolic links that have a pathname that refers upward using the ".." component.

NOTICE

Enabling the `shadow followdotdot` parameter so that the Data Mover follows symbolic links upwards on behalf of Windows clients might create infinite loops in the namespace presented to Windows clients. Applications that perform a search of the namespace have the risk of getting stuck in an infinite loop.

Procedure

1. To enable the Data Mover to follow symbolic links with the '..' component in the target pathnames, use this command syntax:

   ```
   $ server_param <movername> -facility shadow -modify
   followdotdot -value 1
   ```

   Where:

   <movername> = name of the Data Mover

   Example:

   To enable symbolic links with target paths to parent directories on server_2, type:

   ```
   $ server_param server_2 -facility shadow -modify followdotdot
   -value 1
   ```

   Output:

   ```
   server_2 : done
   ```

Enable symbolic links with absolute paths

By default, the Data Mover will not follow symbolic links that contain absolute paths (full pathnames).

Note

When the `shadow followabsolutpath` parameter is enabled to follow absolute paths, the target is interpreted by the Data Mover. The Data Mover can only resolve paths that are relative to the root file system on the Data Mover. If this is a Virtual Data Mover, this path must be the root of the VDM (for example, `/mountpoint/directory`); otherwise, a Windows client is unable to access the target.

Note

With NFS, clients read a symbolic link target path and try to access the target by doing a local lookup on the client. NFS clients must have the same mount point as the Data Mover to access targets with absolute paths.

Procedure

1. To enable the Data Mover to follow symbolic links when the target is an absolute path, use this command syntax:

   ```
   $ server_param <movername> -facility shadow -modify
   followabsolutpath -value <new_value>
   ```

   Where:

   <movername> = name of the Data Mover or VDM

   <new_value> = Bit list, where:

Bit 0	• 0 = does not allow symbolic links that contain an absolute path • 1 = allows symbolic links that contain an absolute path to be followed
Bit 1	• 0 = allows only absolute symbolic links owned by root (UID 0) to be followed • 1 = allows any absolute symbolic links to be followed

Note

Setting Bit 1 creates a potential security issue for NFS access because the NFS client can create an absolute symbolic link to any location in the Data Mover. If Bit 1 is not set, only links owned by the root (uid 0) are followed.

Example:

To enable symbolic links when the target is an absolute path, type:

```
$ server_param server_2 -facility shadow -modify followabsolutpath
-value 1
```

Output:

```
server_2 : done
```

Access symbolic links through CIFS clients

You must have root privileges to create a symbolic link.

Perform the following steps using the Control Station and an NFS client.

Procedure

1. Set the `shadow followabsolutpath` parameter to enable symbolic links with absolute paths.

   Example:

   To enable server_2 to follow symbolic links when the target is an absolute path, type:

   $ server_param server_2 -facility shadow -modify followabsolutpath -value 1

2. Mount the file systems.

   Example:

   To mount ufs1 and ufs2, type:

   $ server_mount server_2

   ```
   server_2 :
   root_fs_2 on / uxfs,perm,rw
   root_fs_common on /.etc_common uxfs,perm,ro
   ufs1 on /ufs1 uxfs,perm,rw
   ufs2 on /ufs2 uxfs,perm,rw
   ```

3. Create a share to the top-level file system.

   Example:

   To create a share to ufs1, type:

   $ server_export server_2

   ```
   server_2 :
   export "/ufs1"
   share "ufs1" "/ufs1" netbios=NS700-JB1 maxusr=4294967295 umask=22
   ```

4. Mount the top-level file system on an NFS client.

   Example:

   To mount ufs1 on an NFS client, type:

   # mount 192.168.101.238:/ufs1 /ufs1 # mount 192.168.101.238:/ufs1 on /ufs1 type nfs (rw,addr=192.168.101.238)

5. Create a symbolic link to the second file system.

   Example:

   To create a symbolic link from ufs1 to ufs1, type:

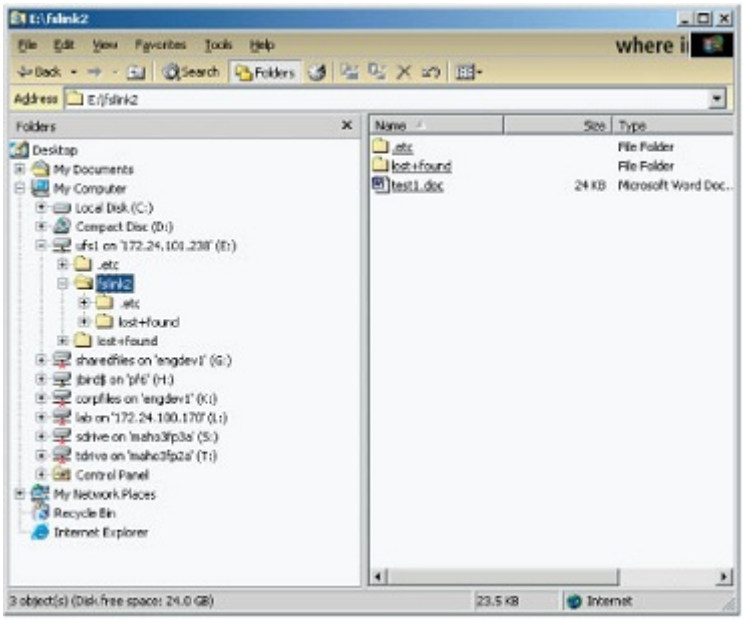
   # ln -s /ufs2 fslink2 # ls -l

   ```
   total 8
   lrwxrwxrwx    1 root    root    5 Jun 10  2004 fslink2 -> /ufs2
   drwxr-xr-x    2 root    root    8192 Jun  9 12:14 lost+found
   ```

Note

Checkpoints of a linked file system do not appear under the top-level file system. You must be in the linked file system directory to view these checkpoints.

The command `ln -s /ufs2 fslink2` links fslink2 to the path /ufs2 as it applies to the Data Mover. CIFS clients accessing the ufs1 share can view fslink2 as one of its directories, as shown in the following illustration.



Note

NFS clients cannot access fslink2 because the client has no knowledge of its path on the Data Mover.

Configure automatic computer password changes

You can activate computer password changes by doing one of the following:

- Setting a group policy object (GPO) to a password change interval. The Data Mover retrieves this policy and applies it to all CIFS servers within the domain.
- Setting the `cifs srvpwd.updtMinutes` parameter that is overridden by the GPO policy.
- Changing the password change interval for a particular CIFS server by using the srvpwd interface that is overridden by any GPO policy.

The system parameter `cifs srvpwd.updtMinutes` lets you configure the time interval at which the Data Mover changes passwords with the domain controller.

The *Parameters Guide for VNX for File* provides additional information about the `cifs srvpwd.updtMinutes` parameter.

Change time interval for password changes

Note

When configured for automatic computer account password updates, the CIFS server initiates an attempt to change the password at 80 percent of the configured time limit. This is done to provide time for a retry. It also gives the administrator an advanced warning in case of any problem in the environment before the password expires, to prevent any access issues.

Procedure

1. To change the password change time interval, use this command syntax:

   ```
   $ server_param <mover_name> -facility cifs
   -modify srvpwd.updtMinutes -value <new_value>
   ```

   Where:

   <mover_name> = name of the Data Mover.

   <new_value> = minimum time interval between CIFS server password changes. Value 0 allows server password change after 7 days minus 1 hour. Value 720 allows server password change after 12 hours. Value 1440 allows server password change after 24 hours.

   Example:

   To set the password interval to one day (1440 minutes), type:

   ```
   $ server_param server_2 -facility cifs -modify srvpwd.updtMinutes
   -value 1440
   ```

   Output:

   ```
   server_2: done
   ```

Change the location of the Windows security log

By default, each Data Mover stores its Windows security log at C:\security.evt, which has a size limit of 512 KB. You can access this security log through the C$ share of each Data Mover:

```
\\<netbiosnameofdatamover>\C$\security.evt
```

On a Windows Server, the security log is located at: `C:\WINNT\System32\config\security.evt`. If an application tries to access the Windows security log of a Data Mover at this location, it fails. However, you can change the location and the size limit of the Data Mover's Windows security log.

NOTICE

Incorrectly modifying the Registry might cause serious system-wide problems that require you to reinstall the system. Use this tool at your own risk.

You can access the Windows security log for a Data Mover in one of the following two ways:

Procedure

1. Create a file system to store the security log in its new location.
2. Mount the file system on the Data Mover on a mount point called `/WINNT` and share it.
3. From a CIFS client, connect to the new WINNT share on the Data Mover and create the folder structure `System32\config` under the WINNT directory. This enables you to access the path `\\<netbiosnameofdatamover>\C$\WINNT\System32\config`.
4. As the domain administrator, perform the following steps using the Windows Registry Editor:
   a. Run the Registry Editor (regedt32.exe).
   b. From the **Registry** menu, select **Select Computer**, and then select the Data Mover NetBIOS name.
   c. From the **Window** menu, select the `Hkey Local Machine on Local Machine` subtree, and go to the key `System\CurrentControlSet\Services\Eventlog\Security`.
   d. Select the string `[File: REG_EXPAND_SZ:c:\security.evt]`.
   e. From the **Edit** menu, select **String**.
   f. Edit the string that has information `c:\WINNT\System32\config\security.evt`.
   g. Click **OK** and quit the Registry Editor. All Windows security events on the Data Mover are now logged to the new security event log location.

Join a CIFS server to a Windows domain—Advanced Procedures

Before you begin

The configuration prerequisites are based on Microsoft Knowledge Base article 258503: DNS Registration Errors 5788 and 5789 when DNS Domain and AD Domain Name Differ. This article explains how to set domain-level permissions.

The configuration prerequisites explained in Microsoft Knowledge Base article 258503 are required only if the DNS domain name on the CIFS client has changed and if the new DNS domain name does not match the active directory (AD) domain name for the CIFS client.

Perform these tasks for add and join procedures:

- Create a CIFS server for Windows server environments on page 53
- Join a CIFS server to a Windows domain for a disjoint namespace and a delegated join on page 110
- Join a CIFS server to a Windows domain for the same namespace and a delegated join on page 111
- Add the user performing the join to the local Administrators group on page 111

The procedure for creating and joining a CIFS server to a Windows domain differs when:

- DNS domain name is disjoint with the Windows domain name of the computer.
- User account is delegated.

Note

Delegating joins on page 32 provides conceptual information. The article explaining Disjoint Namespace at Microsoft Technet website provides detailed information.

Join a CIFS server to a Windows domain for a disjoint namespace and a delegated join

Note

The *<comp_name>* value must match the fully qualified domain name (FQDN) of the interface of the CIFS server. For example, if the Windows domain is win.com, the DNS primary suffix is abc.net, and the CIFS server is server1, the command would be `server_cifs <mover_name> -Join compname=server1.abc.net,domain=win.com`.

Procedure

1. To join the CIFS server to the Windows domain, use this command syntax:

   `$ server_cifs <mover_name> -Join compname=<comp_name.FQDN>, domain=<full_domain_name>,admin=<user_name>@realm`

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <comp_name> = name for the CIFS server's account in the Active Directory. For disjoint namespaces, you must type compname.FQDN; otherwise, the AD attributes are not updated. For example: compname=dm32-cge0.nasdocs.emc.com.

   <full_domain_name> = full domain name for the Windows environment.

   <user_name>`@realm` = delegated user login name and domain name of the Active Directory.

   Example:

   To join the CIFS server dm32-ana0 to the universe.com domain, type:

   `$ server_cifs server_2 -Join compname=dm32-cge0.nasdocs.emc.com, domain=universe.com,admin=user@universe.com`

   Output:

```
CIFS Server SERVER1[WIN] RC=2
Full computer name=server1.win.com
realm=WIN.COM
Comment='EMC-SNAS:T5.6.43.0'
if=cge0 l=172.24.100.47
b=172.24.100.255 mac=0:60:16:4:43:ed
FQDN=server1.abc.net (Updated to DNS)
Password change interval: 720 minutes
Last password change: Thu Feb 26
10:28:23 2009 GMT
Password versions: 53, 52
```

Note

The user account and user password are used to create the account in the Active Directory, and are not stored after adding the machine account.

Join a CIFS server to a Windows domain for the same namespace and a delegated join

Procedure

1. To join the CIFS server to the Windows domain, use this command syntax:

   ```
   $ server_cifs <mover_name> -Join compname=<comp_name>,
   domain=<full_domain_name>,admin=<user_name>@realm
   ```

   Where:

   <mover_name> = name of the Data Mover or VDM.

   <comp_name> = name for the CIFS server account in the Active Directory.

   <full_domain_name> = full domain name for the Windows environment.

   <user_name>`@realm` = delegated user login name and domain name of the Active Directory.

   Example:

   To join the CIFS server dm32-ana0 to the universe.com domain, type:

   ```
   $ server_cifs server_2 -Join compname=dm32-cge0,
   domain=universe.com,admin=user@universe.com
   ```

   Output:

   ```
   server_2 : Enter Password: *******
   done
   ```

   Note

   The user account and user password are used to create the account in the Active Directory, and are not stored after adding the machine account.

Add the user performing the join to the local administrators group

Each CIFS server contains a set of built-in user groups: Administrators, Users, Guests, Power Names, Account Operators, Backup Operations, and Replicator. The Administrators group contains the users and groups authorized to manage the CIFS server. By default, the Administrators group contains one entry for the Domain Admins group, which gives each member of the Domain Admins group the authority to manage the CIFS server.

To add the user to the local administrative group for the user to be able to manage the CIFS server, set the `cifs djAddAdminToLg` parameter to 1. The *Parameters Guide for VNX for File* provides additional information.

Customize file filtering pop-up messages

Following are the error codes that can be used with the cifsmsg.txt file:

- FileDeletedByVC
- FileRenamedByVC
- FileModifiedByVC
- File_ReservedName

- Remote
- NoSpace
- QuotaExceeded
- GroupQuotaExceeded
- TreeQuotaExceeded

Procedure

1. Log in to the Control Station as root.
2. Copy the cifsmsg.txt file from the Data Mover to the Control Station by using this command syntax:

   ```
   # server_file server_<x> -get cifsmsg.txt cifsmsg.txt
   ```

   Where:

   <x> = Data Mover that has the cifsmsg.txt file that you want to copy to the Control Station and edit.

   Example:

   To copy the file from server_2, type:

   ```
   # server_file server_2 -get cifsmsg.txt cifsmsg.txt
   ```

   Note

   If this file does not exist, you must create it and specify the information shown in the next steps. If you do not create this file, VNX uses default messages in the pop-up windows.

3. Open the cifsmsg.txt file with a text editor. To change an error message, use this syntax:

   ```
   $ error.<error.condition.code>=

   <popup message line 1>
   .
   .
   .
   <popup message line n>
   .
   ```

   Where:

   <error.condition.code> = condition upon which you want the message to be sent.

   <pop-up message line> = message that you want to send (such as the nature of the condition, contact information, and suggested action).

   NOTICE

   The last line must be a period (.).

   All pop-up messages also contain the share name and filename.

Note

To avoid repeating the same text for different messages, use the following syntax:
`$ error.<error.condition.code3>=$ error.<error.condition.code2>`

4. Save and close the file, and then type:

   $ server_file server_2 -put cifsmsg.txt cifsmsg.txt

5. To implement the changes that you made to the cifsmsg.txt file, restart (stop and start) the CIFS service on the Data Mover (*<x>*) by using this command syntax:

   $ server_setup server_<x> -P cifs -o stop

   $ server_setup server_<x> -P cifs -o start

CHAPTER 6

Troubleshooting

As part of an effort to continuously improve and enhance the performance and capabilities of its product lines, EMC periodically releases new versions of its hardware and software. Therefore, some functions described in this document may not be supported by all versions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

If a product does not function properly or does not function as described in this document, contact your EMC Customer Support Representative.

Problem Resolution Roadmap for VNX contains additional information about using EMC Online Support and resolving problems.

Topics included in this chapter are:

- EMC E-Lab Interoperability Navigator 116
- VNX user customized documentation 116
- Known problems and limitations 116
- Symbolic link limitations 119
- Error messages 120
- EMC Training and Professional Services 120
- GPO conflict resolution 120
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- SMB signing resolution 122
- DNS issues 123
- MS Event Viewer snap-in 124

EMC E-Lab Interoperability Navigator

The EMC E-Lab™ Interoperability Navigator is a searchable, web-based application that provides access to EMC interoperability support matrices. It is available on EMC Online Support at http://Support.EMC.com. After logging in, in the right pane under **Product and Support Tools**, click **E-Lab Navigator**.

VNX user customized documentation

EMC provides the ability to create step-by-step planning, installation, and maintenance instructions tailored to your environment. To create VNX user customized documentation, go to: https://mydocs.emc.com/VNX.

Known problems and limitations

Table 17 on page 116 describes known problems that might occur when managing VNX for Windows environment and presents workarounds.

Table 17 Windows environment known problems and workarounds

Known problem	Symptom	Workaround
With NT user authentication, certain Windows 95 clients might not be able to map drives from the Data Mover.	The domain name sent to the Data Mover by the client was incorrectly specified, or the username.domain is not mapped in the passwd file on the Data Mover.	Verify that the client is sending the correct domain name to the passwd file on the Data Mover. To verify that the client is sending the correct domain: 1. In the Network option in the Control Panel, double-click the network client (Client for Microsoft Networks). 2. Under General properties, verify that the correct domain name is shown.
With NT user authentication, the error message `Incorrect password or unknown username` appears after attempts to connect to the server, and the username and password window appears.	The Windows NT user account might be missing from the PDC domain, or the Data Mover was unable to determine a UID to use for this user.	Add the Windows NT user to the PDC of the domain and map the user to a UNIX username and UID.
Unable to create files or directories in a share that is mapped to a client.	UNIX permission bits are not set to grant permission for the user to write to the shared directory.	Change the access policy or mount the directory over NFS on the Control Station or any other UNIX client, and use chmod to set the appropriate UNIX permission to allow the user to be able to write to it.

Table 17 Windows environment known problems and workarounds (continued)

Known problem	Symptom	Workaround
	Note This situation occurs if the access policy is set incorrectly. *Managing a Multiprotocol Environment on VNX* provides more information.	
Windows clients cannot connect to a server by using clear text passwords. (For example, this might occur when VNX is in UNIX mode.) The following error message might appear: `The Account is not authorized to login from this station`	The SMB redirector handles unencrypted passwords differently than previous version of Windows NT. The SMB redirector does not send an unencrypted password unless you add a Registry entry to enable unencrypted passwords.	You must modify the Registry to enable unencrypted passwords: **NOTICE** Incorrectly modifying the Registry might cause serious system-wide problems that might require you to reinstall the system. Use this tool at your own risk. 1. Run Registry Editor (Regedt32.exe). 2. From the HKEY_LOCAL_MACHINE subtree, go to the following key: `System\CurrentControlSet\Services\rdr\parameters` a. Under this key, create a new DWORD Registry key named `EnablePlainTextPassword`. b. Set its value to **1**. c. Restart the computer. 3. Select **Add Value** on the **Edit** menu. 4. Add the following: Value Name: `EnablePlainTextPassword` Data Type: REG_DWORD Data: 1 5. Click **OK** and quit Registry Editor. 6. Shut down and restart Windows NT. **Note** Use GPOs for Windows Server clients. This procedure was adapted from Article ID: Q166730 of the Microsoft Knowledge Base.
With NT user authentication, clients are unable to connect to the server, and the window to prompt for username and password does not appear on the client side.	No domain controller found for the domain.	Check if PDC or BDC is up. Check if Data Mover can access a WINS server that knows about the PDC domain, or have the PDC or BDC in the same local subnet as the Data Mover.
	The server's NetBIOS name is not registered as a computer account on	Add a computer account to the PDC. If the computer account does exist, remove it and add it again before retrying the command. Microsoft NT server 4.0

Table 17 Windows environment known problems and workarounds (continued)

Known problem	Symptom	Workaround
	the PDC domain or a trust relationship has not been established between the client and server domains. The following message might appear in the server_log: `The SAM database on the Windows NT server does not have a complete account for this workstation trust`	documentation provides information on how to set up a trust relationship between domains.
After joining a CIFS server to a domain, the following error appears in the `server_cifs` output, indicating the system cannot update the DNS record: `FQDN=dm4-a140-ana0.c1t1.pt1.c3lab.nsgprod.emc.com (Update of "A" record failed during update: Operation refused for policy or security reasons)`	The DNS Server zone might include the same fully qualified domain name (FQDN) for another computer account.	• Check whether the DNS server accepts the dynamic updates for the zone (property of the zone). • Verify that the DNS Server zone does not have the same FQDN with a different IP address for another computer account. • If the zone accepts only secured dynamic updates, verify the content of the security tab for the record and check if the access control list includes an entry with "S-1-5..." as owner name. Such a security entry indicates that the record belongs to a deleted computer account. The DNS record must be removed manually.

When attempting to join a CIFS server to a domain, the following error message appears:
 	
`Error 4020: server_2 : failed to complete command Possible server_log error`
 	
`messages: 2004-03-11 13:42:29: SMB: 3:`
 	
`DomainJoin:: getAdminCreds: gss_acquire_cred_ext failed: Miscellaneous failure. Clients credentials have been revoked.`
 	
`2004-03-11 13:42:29: ADMIN: 3: Command failed: domjoin`
 	
`compname=dm3-A121-ana0 domain=c1t1.pt1.c3lab.nsgprod.emc.com admin=c1t1admin password=6173399 D179D3999673D init`
	Domain administrator account was locked out. Typically, this happens when another user is logged in with the same administrator account on another system.	Clear the Account is locked out checkbox on the Account tab of the User Account Properties window.

Table 17 Windows environment known problems and workarounds (continued)

Known problem	Symptom	Workaround
If you create the computer without enabling **Allow pre-Windows 2000 computers to use this account** option, the following error message appears: `0xC0000022 2004-04-26 10:49:40: SMB: 3: Srv=<Celerra_netbios_name> buildSecureChanel=Authenticate2 InvalidReply E=0xc`	Access is denied because the computer was created on the domain controller without enabling the **Allow pre-Windows 2000 computers to use this account** option on the **Windows New Object - Computer** dialog box.	Delete the computer and then recreate it with the **Allow pre-Windows 2000 computers to use this account** option enabled.
After upgrading from a Windows NT domain to Windows 2000, unable to change the original domain suffix during Windows 2000 setup.	Unable to change domain suffix because it was hardcoded in DDNS.	Before upgrading, change the domain suffix.
Access is denied to Internet Information Services (IIS) 6.0 when attempting to connect to the web directory on a VNX share. In the IIS web log, the error: `bad user name or password` appears even though the username and password are in the local user database.	For a stand-alone CIFS server with local user support enabled, the username and password must be the same on IIS 6.0, the Data Mover, and the client.	Specify the same username and password on IIS 6.0, the Data Mover, and the client.
When logged in as administrator, if the home directory feature is enabled for a new user you are creating, the following error occurs: `The home folder could not be created because: The network name cannot be found.`	The path is not accessible because you are logged in as administrator, and the user's directory is not created yet.	Use the `\\server\HOME` path when creating the new user profile. When the new user first connects, the home directory is created on the server, and the user will be able to access his home directory by using both `\\server\HOME` and `\\server\<username>` paths.

Symbolic link limitations

The limitations of file linking are:

- When a user follows a link from the top-level file system to a subordinate file system, the access-checking policy on the top-level file system is applied to the subordinate file system.
- The file system size of the top-level file system (from where the user is connecting) does not reflect the size of the subordinate file systems.
- Quotas are always reported per file system. If there are users or groups or trees on subordinate file systems, each file system is reported individually.
- If notification requests are set on the top-level file system with the WatchTree bit, changes to subordinate file systems do not trigger notification.
- Some requests return the full pathname of open files. If an open file is on a file system accessed through a symbolic link, the path returned might not be the path expected.

- When traversing file systems through symbolic links, invoking the command cd .. might not return the directory containing the symbolic link (this is not an issue using Microsoft Windows Explorer).
- When restoring files from backups into linked file systems, always restore symbolic links first; otherwise, the entire restore is done to the top-level file system.
- If a subordinate file system is not mounted on a Data Mover, the symbolic link appears as a directory to CIFS clients. This directory is the root file system of the Data Mover.

Error messages

All event, alert, and status messages provide detailed information and recommended actions to help you troubleshoot the situation.

To view message details, use any of these methods:

- Unisphere software:
  - Right-click an event, alert, or status message and select to view Event Details, Alert Details, or Status Details.
- CLI:
  - Type nas_message -info ‹MessageID›, where ‹MessageID› is the message identification number.
- *Celerra Error Messages Guide*:
  - Use this guide to locate information about messages that are in the earlier-release message format.
- EMC Online Support:
  - Use the text from the error message's brief description or the message's ID to search the Knowledgebase on EMC Online Support. After logging in to EMC Online Support, locate the applicable **Support by Product** page, and search for the error message.

EMC Training and Professional Services

EMC Customer Education courses help you learn how EMC storage products work together within your environment to maximize your entire infrastructure investment. EMC Customer Education features online and hands-on training in state-of-the-art labs conveniently located throughout the world. EMC customer training courses are developed and delivered by EMC experts. Go to EMC Online Support at http://Support.EMC.com for course and registration information.

EMC Professional Services can help you implement your system efficiently. Consultants evaluate your business, IT processes, and technology, and recommend ways that you can leverage your information for the most benefit. From business plan to implementation, you get the experience and expertise that you need without straining your IT staff or hiring and training new personnel. Contact your EMC Customer Support Representative for more information.

GPO conflict resolution

Audit policies are resolved by combining settings from the multiple servers on the Data Mover and using the most secure setting. The CIFS servers are processed in the order in which they were joined to the domain. Event log policies are resolved by using the most

secure setting of all the related settings on the CIFS server. For example, for the maximum application log size setting, the system looks at the log size setting of each server on the Data Mover, and then uses the largest size. Table 18 on page 121 lists the GPO settings requiring conflict resolution.

Table 18 GPO settings requiring conflict resolution

Setting name	Shared across CIFS server (Yes/No)	Requires conflict resolution (Yes/No)	Possible values
Audit:			
Audit account logon events	Yes	Yes	“No Audit”, “Success”, “Failure”, “Success, Failure”
Audit account management	Yes	Yes	“No Audit”, “Success”, “Failure”, “Success, Failure”
Audit directory service access	Yes	Yes	“No Audit”, “Success”, “Failure”, “Success, Failure”
Audit logon events	Yes	Yes	“No Audit”, “Success”, “Failure”, “Success, Failure”
Audit object access	Yes	Yes	“No Audit”, “Success”, “Failure”, “Success, Failure”
Audit policy change	Yes	Yes	“No Audit”, “Success”, “Failure”, “Success, Failure”
Audit privilege use	Yes	Yes	“No Audit”, “Success”, “Failure”, “Success, Failure”
Audit process tracking	Yes	Yes	“No Audit”, “Success”, “Failure”, “Success, Failure”
Audit system events	Yes	Yes	“No Audit”, “Success”, “Failure”, “Success, Failure”
Event logs:			
Maximum application log size	Yes	Yes	64 - 4194240
Maximum security log size	Yes	Yes	64 - 4194240
Maximum system log size	Yes	Yes	64 - 4194240
Restrict guest access to application log	Yes	Yes	“Enabled”, “Disabled”
Restrict guest access to security log	Yes	Yes	“Enabled”, “Disabled”
Restrict guest access to system log	Yes	Yes	“Enabled”, “Disabled”
Retain application log	Yes	Yes	“Overwrite events by days”, “Overwrite events as needed”, “Do not overwrite events”

Table 18 GPO settings requiring conflict resolution (continued)

Setting name	Shared across CIFS server (Yes/No)	Requires conflict resolution (Yes/No)	Possible values
Retain security log	Yes	Yes	"Overwrite events by days", "Overwrite events as needed", "Do not overwrite events"
Retain system log	Yes	Yes	"Overwrite events by days", "Overwrite events as needed", "Do not overwrite events"
Retention method for application log	Yes	Yes	0 - 365
Retention method for security log	Yes	Yes	0 - 365
Retention method for system log	Yes	Yes	0 - 365

LDAP signing and encryption

The domain controller requires LDAP message signing. The following error message is logged if this does not occur:

```
00002028: LdapErr: DSID-0C090169, comment: The server requires
binds to turn on integrity checking if SSL\TLS are not already
active on the connection.
```

If you experience any problems with LDAP signing or encryption, do the following:

Procedure

1. On the domain controller, set either the LDAP security policy (Windows Server 2003) or the LDAP Registry setting (Windows 2000) to **no signing**.
2. Set the ldap SecurityLayer parameter to 0.
3. Reboot the Data Mover.

SMB signing resolution

In Windows domains, you can separately configure server-side and client-side SMB signing settings:

- Required — Client or server requires that SMB signing is used in all transactions.
- Enabled — Client or server supports SMB signing but does not require it for transactions.
- Disabled — Client or server does not support any SMB signing.

The SMB signature is activated on a CIFS connection as per the criteria on the Data Mover and the CIFS client. The criteria are an addition of the two bits; enabled and required. The criteria are computed according to the following three values on the Data Mover:

1. `cifs.smbSigning` parameter

2. GPO settings
3. Registry values

The CIFS client executes its own algorithm to define its own bits: enabled and required. The matrix explained in Table 19 on page 123 and Table 20 on page 123 is applied to determine if the signature is activated for that connection or not.

Table 19 Resolution matrix for SMB1 signing

	Client			
Server	SMB1	Required	Enabled	Disabled
	Required	Signed	Signed	Fail
	Enabled	Signed	Signed	Not signed
	Disabled	Fail	Not signed	Not signed

Table 20 Resolution matrix for SMB2 signing

	Client		
Server	SMB2	Required	Enabled
	Required	Signed	Signed
	Enabled	Signed	Not signed

Note

The default value of the `cifs.smbSigning` parameter should not be changed.

DNS issues

You might encounter the following DNS issues while configuring VNX:

- With the Windows Server environment, the domain controller does not register itself into DNS when the domain is a top-level domain, for example, .com or .org. You can change this rule from the Windows Registry or by enabling the group policy Update Top Level Domain Zones option.

  Note

  The Data Mover does not have an equivalent of this Registry entry and does not use the group policy because the Data Mover only updates the DNS zone for host entries and not for service entries.

- When two Windows-based DNS servers are working in the same DNS zone, their content might vary for several minutes. In DNS environments that have AD integrated zones, replication of the resource records is dependent on the AD replication, which occurs periodically. Replication might not occur immediately when changes are made; this is a Microsoft limitation.

MS Event Viewer snap-in

VNX CIFS servers support the MS Event Viewer snap-in for viewing logs on a VNX CIFS server. *Using Windows Administrative Tools on VNX* provides steps to connect the MMC to a CIFS server.

When you connect an Event Viewer to a CIFS server from a Windows Vista or Windows Server 2008, and experience problems with the Event Viewer help, perform the following:

Procedure

1. Download and install the old executable for .hlp files from the Microsoft support website Windows Help program (WinHlp32.exe) is no longer included with Windows.
2. Retrieve the C:\Windows\Help\els.hlp file from a Windows Server 2003 or Windows XP machine and install it on the Windows Vista or Windows Server 2008 machine.

APPENDIX A

Additional Home Directory Information

This section provides additional information regarding the optional home directory feature described in Enable and manage home directories on page 92. The information in this section is intended for users who are creating or maintaining home directory configurations:

- Home directory database format 126
- Wildcards 127
- Regular expressions 127
- Parsing order 128
- Guest accounts 129

Home directory database format

This section outlines the format of the entries in the home directory database.

EMC recommends that you use the home directory Microsoft Management Console (MMC) snap-in to create and maintain the home directory. The snap-in validates entries and helps to ensure that the entries are correct and complete.

Basic home directory database format

The database contains an entry for each user and uses the following format:

`<domain>:<username>:</path> [:regex][:create][:ro][:<umask>]`

Where:

`<domain>` = Windows domain name (must be the NetBIOS name not the FQDN).

`<username>` = user's Windows username.

`</path>` = UNIX path of the parent home directory.

`create` = target directory will be created if it does not already exist.

`regex` = domain and username are regular expressions.

`ro` = read-only file access (the default is read/write).

`<umask>` = user file-creation ‹mask› for the umask allowing NFS permissions to be determined for the share.

The database might contain comments. Comments start with a # on a new line.

Example:

The following is an example of a database:

```
# Comment - These entries specify users in the galaxy
domain.
galaxy:glenn:/mnt1/usr1
galaxy:grissom:/mnt2/usr2
galaxy:armstrong:/mnt2/usr3
```

Where:

= character that precedes comment text

`galaxy` = Windows domain

glenn, grissom, and armstrong = usernames

/mnt1/usr1,/mnt/usr2, and /mnt/usr3 = individual home directories for glenn, grissom, and armstrong, respectively.

Wildcards

Map files can contain wildcard entries. Wildcards on page 127 provides more information.

Example:

The following example is a database with wildcard entries:

```
*:*:/mnt3/guest
galaxy:*:/mnt3/CIFS
galaxy:glenn:/mnt1/usr1
galaxy:grissom:/mnt2/usr2
galaxy:armstrong:/mnt2/usr3
```

Create

Map files can indicate that directories should be created automatically. The parent directory must exist. In following example, the directory sales must exist before the directory usr1 can be created.

Example:

The following is an example of a database with a directory entry that will be created automatically:

```
galaxy:glenn:/mnt1/sales/usr1:create
```

Regular expressions

Map file entries can contain regular expressions. Regular expressions on page 127 provides more information. The VNX Management MMC plug-in online help provides a complete discussion on regular expressions.

Example:

The following is an example of a database with regular expression entries:

```
nasdocs:*:/ufs/user4/<d>/<u>:regex:create
 nasdocs:^[a-g]:/ufs/user1/<d>/<u>:regex:create
 nasdocs:^[h-p]:/ufs/user2/<d>/<u>:regex:create
 nasdocs:^[q-z]:/ufs/user3/<u>/<u>:regex:create
```

Umask

Map files can contain an NFS permissions mask that sets the permissions on newly created directories and files. This mask does not affect the CIFS ACL.

Note

Each field in the database must be separated by the ":" delimiter.

Wildcards

Map files can contain wildcards (*) for the domain and username fields. Wildcards let you assign home directories to multiple users without making individual entries for each user in the database.

For example, if the username field contains a wildcard, all users from the specified domain match the wildcard entry. In this situation, a directory with the user's Windows username in its path becomes the user's home directory.

Therefore, if the database contains galaxy:*:/mnt3/CIFS/, all users in the galaxy domain can access home directories under /mnt3/CIFS/ that match their usernames. For example, user1 in the galaxy domain can access the home directory /mnt3/CIFS/user1, and user2 can access the home directory /mnt3/CIFS/user2. Wildcard entries should be put at the beginning of the database, with specific entries following. Parsing order on page 128 provides more information.

Regular expressions

When defining Home Directory database entries using only alphanumeric characters and wild cards, it can sometimes be very difficult to encode the patterns you need. This often results in the use of an excessive number of home directory database entries to achieve something that should have been relatively simple. Home Directory solves this problem by giving you the enormous flexibility of using regular expressions when specifying the

domain name and username of a database entry. Table 21 on page 128 shows examples of how regular expressions can be used in the Home Directory database to simplify Home Directory management.

Table 21 Examples of regular expression use in the Home Directory database

Domain Name	Username	Matches	Does not match
[ENGINEERING|FINANCE]	.*	All users in the domains ENGINEERING and FINANCE	Users in any other domain
.*	[wdc|moc].*	All users in all domains whose names are prefixed with the contractor designations 'wdc' (Widget Development Corp) or 'moc' (Manufacturing Operations Consultants)	Users whose names are not prefixed with one of the two designations
.*	.* [2] [0-9] {3}.*	All users in all domains that have four sequential numeric characters in the username where the first digit is 2; for example, joe2006	Users whose names do not have the required sequence of digits

Regular expressions should be used to simplify your Home Directory management. However, care must be taken to consider whether a given regular expression may unintentionally match users other than those you designed it for.

Note

EMC recommends using the VNX Management MMC plug-in to create and edit usernames and directories when you are using regular expressions. The MMC plug-in validates the regular expressions as you type them. If you create or edit the .homedir file and type incorrect regular expressions, the home directory environment might become unusable.

The VNX Management MMC plug-in online help provides additional information about the implementation of regular expressions on VNX.

Parsing order

The Data Mover parses the database from top to bottom. If you use wildcards, there might be multiple matches for a domain:user pair. When the Data Mover finds a match for a domain:user pair, it then searches the path for the user's directory. If there is a user directory under the path, that directory is mapped as the home directory of the user. If there is no matching directory, the Data Mover continues parsing the database looking for the user's home directory.

For example, you have a database that contains the following wildcard entries:

galaxy:*:/homes1/

galaxy:*:/homes2/

galaxy:*:/homes3/

You are trying to map a HOME directory for user1 and you have the following directory structures:

/homes1/user1 – does not exist

/homes2/user1 – does exist

/homes3/user1 – does not exist

If the Data Mover looked only for a galaxy:user1 match, it would stop parsing at the first map entry. However, the Data Mover, after finding a galaxy:user1 match, searches the path for a user1 directory—if it does not find a user1 directory, the Data Mover continues parsing the database. In the example above, the Data Mover would find the match under the second entry, and then map that directory as the home directory for user1.

Guest accounts

For occasional or guest users, you can specify a guest directory in the database. Users who log in from domains not listed in the database are directed to the guest directory. A guest directory entry contains wildcards for the domain and the username as shown in the following example:

```
*:*:/mnt3/guest
```

APPENDIX B

MMC Snap-ins and Programs

VNX supports a set of Microsoft Management Console (MMC) snap-ins and programs for managing VNX users and Data Mover security settings from a Windows Server or Windows XP computer. *Installing Management Applications on VNX for File* includes details about MMC snap-ins.

EMC recommends that you use Microsoft Services for UNIX (SFU) or Identity Management for UNIX (IMU).

Topics include:

- Data Mover Management snap-in 132
- AntiVirus Management 132
- Home Directory Management snap-in 132
- Data Mover Security Settings snap-in 132

Data Mover Management snap-in

The Data Mover management comprises several MMC snap-ins. You can use these snap-ins to manage virus-checking, home directories, and security settings on Data Movers from a Windows Server or Windows XP computer.

AntiVirus Management

You can use the AntiVirus Management snap-in to manage the virus-checking parameters (viruschecker.conf file) used with Common AntiVirus Agent (CAVA) and third-party antivirus programs. CAVA and a third-party antivirus program must be installed on the Windows Server. *Using the Common Event Enabler for Windows* provides more details about CAVA.

Home Directory Management snap-in

You can use the home directory management snap-in to associate a username with a directory that then acts as the home directory of the user. The home directory feature simplifies the administration of personal shares and the process of connecting to them.

Data Mover Security Settings snap-in

The Data Mover Security Settings comprises the Audit Policy node and the User Rights Assignment node.

Audit Policy
You can use the Audit Policy node to determine which Data Mover security events are logged in the Security log. You can then view the Security log by using the Windows Event Viewer. You can log successful attempts, failed attempts, both, or neither. The audit policies that appear in the Audit Policy node are a subset of the policies available as GPOs in active directory users and computers (ADUC). Audit policies are local policies and apply to the selected Data Mover. You cannot use the Audit Policy node to manage GPO audit policies.

User Rights Assignment
You can use the User Rights Assignment node to manage which users and groups have login and task privileges to a Data Mover. The user rights assignments that appear in the User Rights Assignment node are a subset of the user rights assignments available as group policy objects (GPOs) in active directory users and computers (ADUC). User rights assignments are local policies and apply to the selected Data Mover. You cannot use the User Rights Assignment node to manage GPO policies.

The online help for a snap-in or program provides more information.

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