

Dell EMC Unity: MetroSync and Home Directories

A detailed review

Abstract

This document describes how to configure and integrate home directories with MetroSync for Dell EMC™ Unity to create a synchronous disaster-recovery solution for file resources. This feature is available on Dell EMC Unity OE version 4.4 and later.

January 2019

Revisions

Date	Description
September 2018	Initial release
January 2019	MetroSync Manager feature support added

Acknowledgements

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Executive summary

Accessing the home directory data of users is critical to the daily operation of many organizations. MetroSync for Dell EMC™ Unity can help protect this user data stored in home directories. This replication solution enables data centers to avoid disruptions in business operations by providing a disaster recovery (DR) plan with additional redundancy.

This technical paper provides guidance for home-directory configuration and integration with MetroSync for Dell EMC Unity, a synchronous disaster recovery solution for file resources.

Audience

This technical paper is intended for IT planners, storage architects, system administrators, partners, Dell EMC™ employees, and any others involved in evaluating, acquiring, managing, operating, or designing a MetroSync environment using Dell EMC Unity systems.

Terminology

Bandwidth: The amount of data that can be transferred in a time period. Bandwidth is usually represented in bytes per second (Bps) or MB/s.

Fibre Channel protocol: A transfer protocol used to communicate SCSI commands over a Fibre Channel network.

NAS server: A Dell EMC Unity storage server that uses the SMB, NFS, or FTP/SFTP protocols to catalog, organize, and transfer files within designated file system shares. A NAS server, the basis for multi-tenancy, must be created before you can create file-level storage resources such as file systems or VMware® file datastores.

Network-attached storage (NAS): File-based storage for a wide range of clients and applications that access storage over IP connectivity.

Network File System (NFS): An access protocol that allows data access from Linux® or UNIX® hosts located on a network.

Recovery point objective (RPO): A defined time period in which data can be lost but an organization can continue operations. For example, if an organization determined that it could allow an RPO of 30 minutes, the business would be able to experience a disaster, lose 30 minutes of data, and still be able to perform operations normally.

Recovery time objective (RTO): The duration of time in which a business process must be restored after a disaster. For example, an RTO of one hour means that in case of a disaster, the data and business process need to be restored in one hour.

Server Message Block (SMB): An access protocol that allows data access from Microsoft® Windows® or Linux hosts located on a network. Also known as Common Internet File System (CIFS).

Synchronous replication: A replication mode in which the host initiates a write to the system at the local site. The data must be successfully stored in both the local and destination systems before an acknowledgement is sent back to the host.

Storage pool: A collection of physical drives organized in a logical grouping for use on Dell EMC Unity systems for storage resource provisioning.

Storage processor (SP): A storage node that provides the processing resources for performing storage operations as well as servicing I/O between storage and hosts.

Unisphere: A web-based Dell EMC management interface for creating storage resources, and configuring and scheduling protection for stored data. Dell EMC Unisphere™ is also used for managing and monitoring other storage operations.

Unisphere command-line interface (UEMCLI): An interface that allows a user to perform tasks on the storage system by typing commands instead of using the graphical user interface.

1 Introduction

This document describes how to configure Microsoft® Active Directory® (AD) home directories with MetroSync to create a disaster recovery (DR) solution for Dell EMC Unity file resources.

Most enterprise organizations that uses Microsoft-based servers use the Microsoft home directories feature. This enables users to store their files in a specific file-system directory on the storage system and simplifies storage and user administration. The home directory is mapped to a user's profile and when the user logs in, the home directory is automatically connected to a predefined network drive.

Using MetroSync for disaster recovery (DR) can protect user home directory files in case of server, storage, or data-center failure. MetroSync allows for synchronous replication of a NAS server and all its contents, as well as file systems, association of file systems to snapshot schedules, snapshots, SMB servers, exports, interfaces, and so on. It can be configured in either a uni-directional configuration with the source NAS servers constrained to one system, or a bi-directional configuration with each system having its own set of source NAS servers.

For more detailed information on MetroSync, refer to the [Dell EMC Unity: MetroSync](#) document.

1.1 Prerequisites

This section describes the requirements for MetroSync and Microsoft® Windows Server®.

1.1.1 MetroSync requirements

To use the MetroSync feature, two physical Dell EMC Unity systems must be configured as follows:

- Dell EMC Unity OE must be version 4.4 or later.
- Fibre Channel connectivity (direct connect or through a switch) is required between the two systems through the synchronous replication ports.
- The system time for both systems must be within five minutes of each other.
- The two Dell EMC Unity systems do not need to be the same model, but it is highly recommended to pair system models with the same default NFS transfer sizes.

1.1.2 Microsoft Windows requirements

To configure Microsoft AD on Dell EMC Unity systems, the following requirements must be met:

- Physical or virtual server with Windows Server 2008 R2, 2012, 2012 R2, or 2016.
- Active Directory installed and configured, and with network connectivity to both local and remote Dell EMC Unity systems

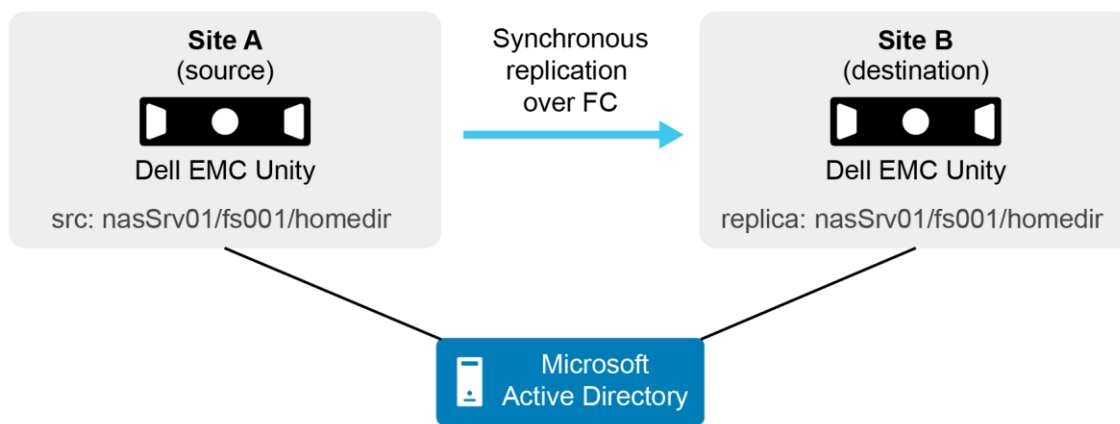


Figure 1 Main configuration using two sites with MetroSync synchronous replication sessions

Figure 1 illustrates the configuration discussed in this technical paper. This document assumes the correct connection configuration has been already established. All prerequisites in section 1.1 must be established before continuing the configuration steps.

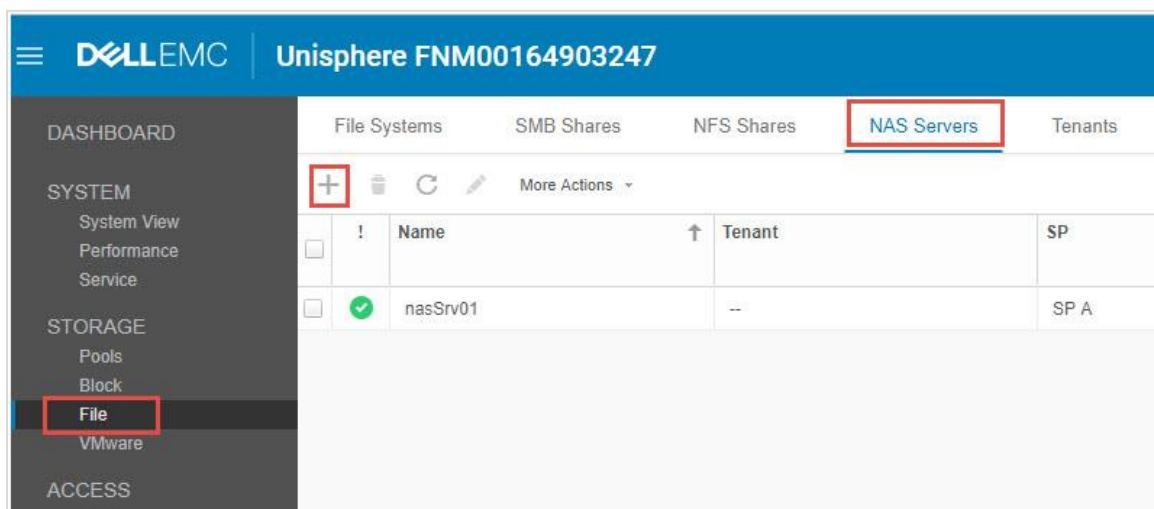
2 Enable home directories

To simplify administration of the home directories feature, Dell EMC Unity provides a Home Directories Management snap-in for Microsoft operating systems. This section demonstrates using the snap-in to prepare for MetroSync use.

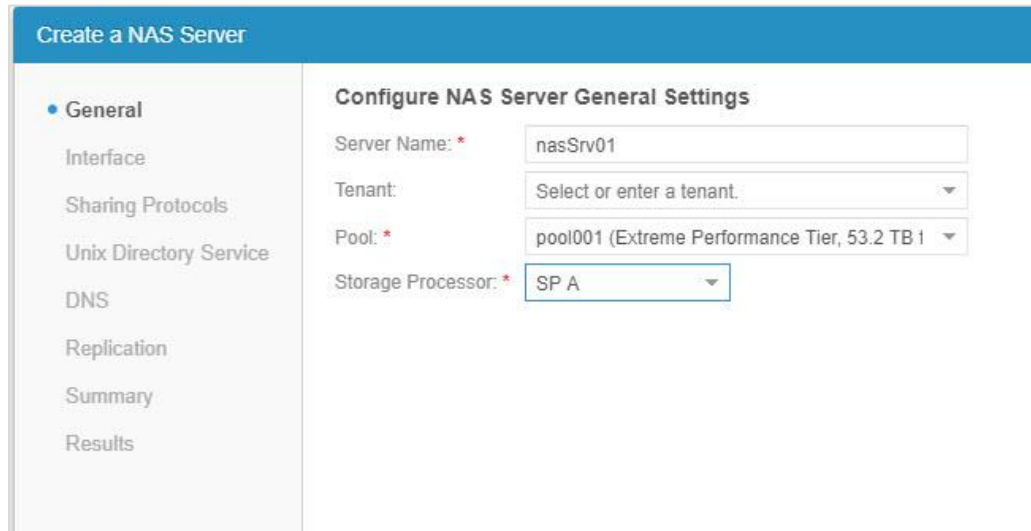
Note: The special share name HOME is reserved for the home directories feature. If a share named HOME already exists, the home directories feature cannot be enabled. In addition, if the home directories feature is enabled, creating a share named HOME is not allowed.

By default, the home directories feature is enabled. A NAS server and file system must be created on the storage system before we can use the home directories feature.

1. Create a NAS server on the source Dell EMC Unity storage device:
 - a. In Unisphere, under **Storage**, click **File**, click **NAS Servers**, and click the **+** sign.



- b. On the **Configure NAS Server** general settings screen, perform the following:
 - i. Enter a **Server Name** for the NAS server.
 - ii. Optionally, choose a **Tenant**.
 - iii. Choose the storage **Pool**.
 - iv. Choose the **Storage Processor** to run the NAS server on.
 - v. Click **Next**.

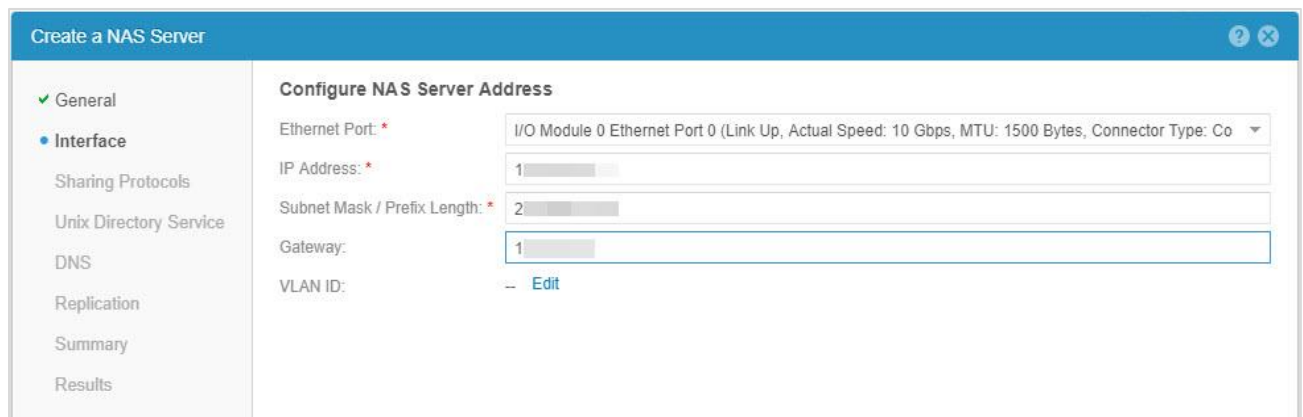


The screenshot shows the 'Create a NAS Server' window with the 'General' tab selected. The 'Configure NAS Server General Settings' section contains the following fields:

- Server Name:** * nasSrv01
- Tenant:** Select or enter a tenant. (dropdown menu)
- Pool:** * pool001 (Extreme Performance Tier, 53.2 TB 1 (dropdown menu)
- Storage Processor:** * SP A (dropdown menu)

The left sidebar shows the following navigation options: General (selected), Interface, Sharing Protocols, Unix Directory Service, DNS, Replication, Summary, and Results.

- c. Choose the **Ethernet Port** and provide the IP information.



The screenshot shows the 'Create a NAS Server' window with the 'Interface' tab selected. The 'Configure NAS Server Address' section contains the following fields:

- Ethernet Port:** * I/O Module 0 Ethernet Port 0 (Link Up, Actual Speed: 10 Gbps, MTU: 1500 Bytes, Connector Type: Co (dropdown menu)
- IP Address:** * 1 (text input)
- Subnet Mask / Prefix Length:** * 2 (text input)
- Gateway:** 1 (text input)
- VLAN ID:** - Edit (text input)

The left sidebar shows the following navigation options: General (checked), Interface (selected), Sharing Protocols, Unix Directory Service, DNS, Replication, Summary, and Results.

- d. Choose the **Windows Shares (SMB, CIFS)** and provide the information to join the domain.

The screenshot shows the 'Create a NAS Server' configuration page. On the left is a sidebar with navigation links: General (checked), Interface (checked), Sharing Protocols (selected), Unix Directory Service, DNS, Replication, Summary, and Results. The main content area is titled 'Configure Sharing Protocols'. It has a checkbox for 'Multiprotocol' (unchecked) and a checked checkbox for 'Windows Shares (SMB, CIFS)'. Under this, there are two radio buttons: 'Standalone' (unchecked) and 'Join to the Active Directory domain' (checked). Below these are several text input fields: 'SMB Computer Name: *' with the value 'nasSrv01', 'SMB Server Description:' (empty), 'Windows Domain: *' (empty), 'Domain Privileged Username: *' with the value 'Administrator', and 'Password: *' (masked with dots). At the bottom, there is a link 'Advanced (Using defaults)' and a checkbox for 'Linux/Unix shares (NFS)' (unchecked). Below that are two more unchecked checkboxes: 'Enable VVols' and 'Enable NFSv4'. At the very bottom, there is a link 'Configure secure NFS (Not Configured)'.

- e. On the next screen, enter the **Domain** name, and in the **Servers** field, add the IP address of the DNS server(s). Click **Next**.

The screenshot shows the 'Create a NAS Server' configuration page, specifically the 'Configure NAS Server DNS' section. The sidebar on the left is the same as in the previous screenshot, but now 'DNS' is selected. The main content area is titled 'Configure NAS Server DNS'. It has a checked checkbox for 'Enable DNS'. Below this is a 'Domain: *' text input field (empty). Below that is a 'Servers: *' section which consists of a table with one row containing a blue placeholder box. To the right of this table are four buttons: 'Add', 'Move Up', 'Move Down', and 'Remove'.

At this point, replication is not configured but will be completed later.

- f. Click **Next** to review the summary information.

Create a NAS Server

- General
- Interface
- Sharing Protocols
- DNS
- Replication**
- Summary
- Results

Provide a Replication Mode and RPO

☐ Enable Synchronous Replication

Replicate To: FNM00164903270 (100.88.135.103)

Destination Configuration (Using defaults)

☒ Enable Asynchronous Replication

Replication Mode: Asynchronous

RPO: 60 minutes

Replicate To: Local

Destination Configuration (Using defaults)

Selecting a longer RPO may result in a larger data loss in the case of a failure. A shorter RPO may impact performance.

To create a remote replication connection, navigate to the Protection & Mobility > Replication > Connections section.

To create interfaces for use with remote replication, navigate to the Protection & Mobility > Interfaces section.

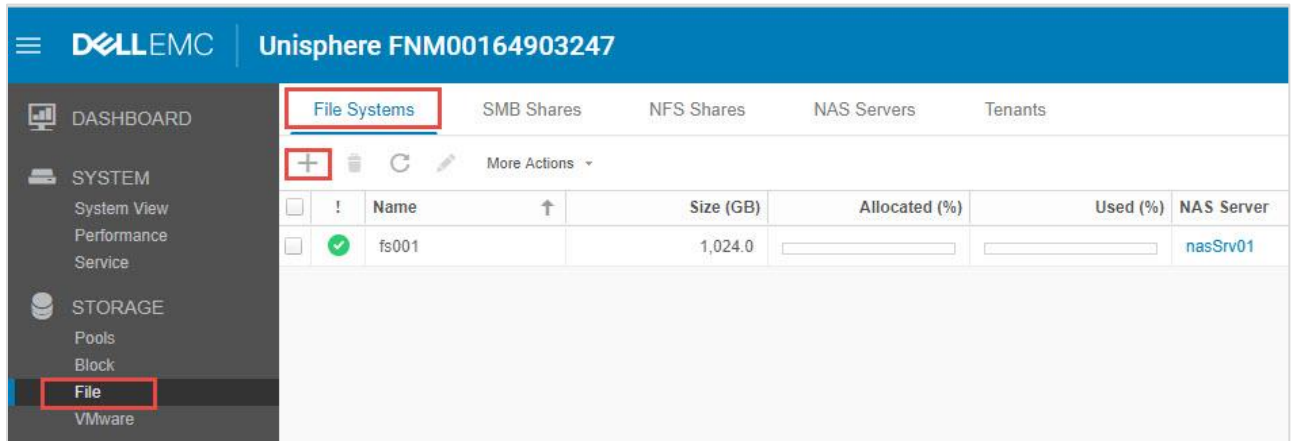
Cancel Back Next

- g. Click **Finish**. Once the job completes, the NAS server will be created.

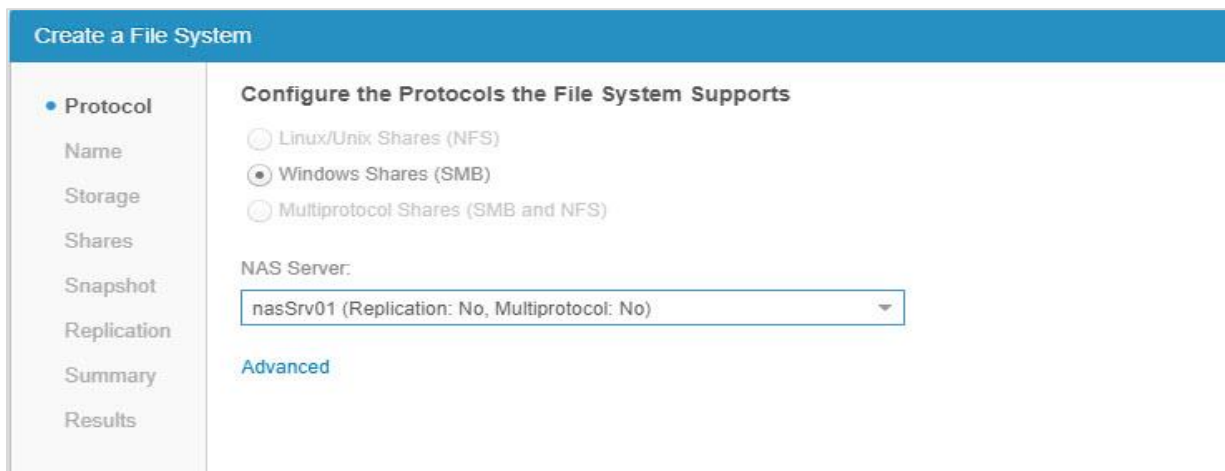
Now that the NAS server is configured, the next step is to create a file system and SMB share to host the home directories user files and folders. This step demonstrates how to create a NAS file system and an SMB share. Note that in the following steps, snapshots schedules and replication are not configured and will be detailed later in the document.

2. Create a file system and SMB share for home directories.

- a. To create a file system Unisphere, under **Storage**, click **File**, click **File Systems**, and click the + sign.



- b. Choose the NAS server configured previously.



- c. Provide a **Name** and **Description** (optional) for the file system.

Create a File System

- ✓ Protocol
- Name
- Storage
- Shares
- Snapshot
- Replication
- Summary
- Results

Provide a Name and Description

Name: *

Description:

- d. Choose the **Pool**, **Size**, and other attributes for the file system.

Create a File System

- ✓ Protocol
- ✓ Name
- Storage
- Shares
- Snapshot
- Replication
- Summary
- Results

Configure the File System Storage Characteristics

Pool: *

Size:

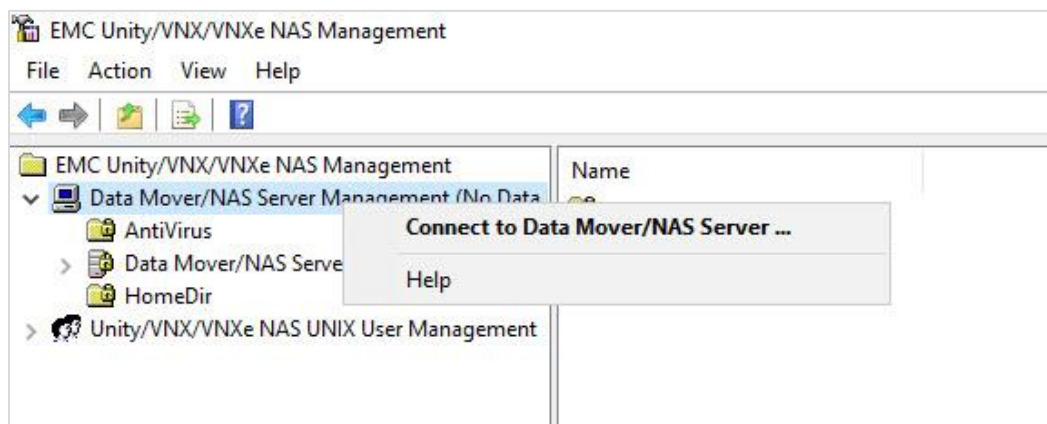
☒ Thin
☐ Data Reduction

- e. Create an **SMB Share** for the home directories.

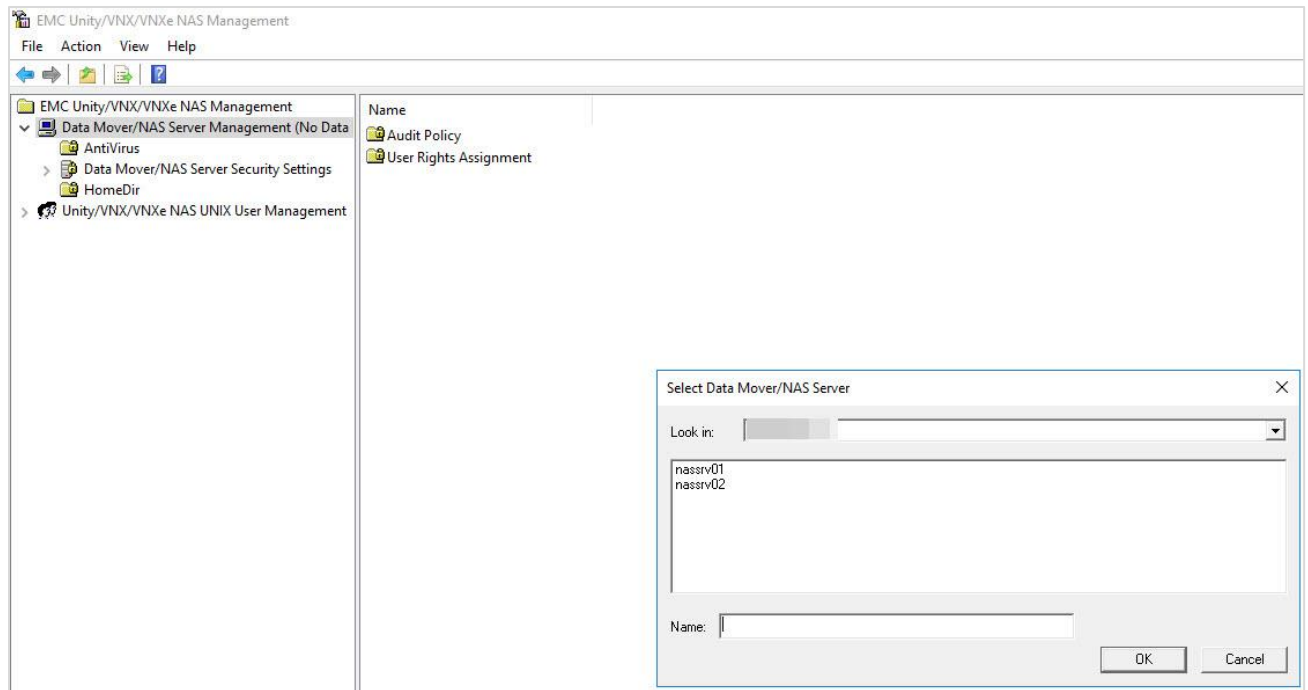
The screenshot shows the 'Create a File System' wizard with the 'Configure the Initial Share' step selected. The 'SMB Share (Windows)' checkbox is checked. The 'Name' field is highlighted with a red box and contains the text 'homedir'. The 'Local Path' is 'fs002/'. The 'SMB Share Path' is '\nassrv01.osprey.local\homedir'. The 'Description' field is empty.

Configure the Initial Share	
☒ SMB Share (Windows)	
NAS Server:	nasSrv01
SMB Server:	nassrv01.osprey.local
File System:	fs002
Name:	homedir
Description:	
Local Path:	fs002/
SMB Share Path:	\nassrv01.osprey.local\homedir
:	\\10.10.133.20\homedir

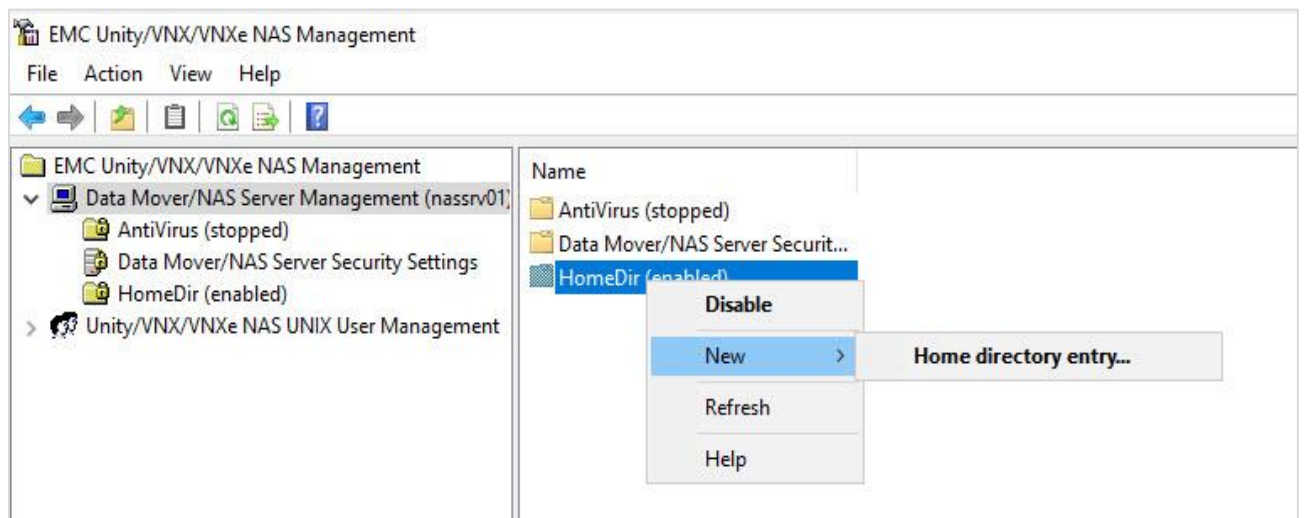
3. Use the MMC snap-in to enable home directories.
 - a. To enable home directories feature, install the **NAS Management MMC** snap-in on a Windows VM that is on the same domain as the NAS server.
 - b. Once installed, start the NAS Management MMC snap-in, right-click **Data Mover/NAS Server Management**, and click **Connect to Data Mover/NAS Server**.



- c. Choose the NAS server and click **OK**.

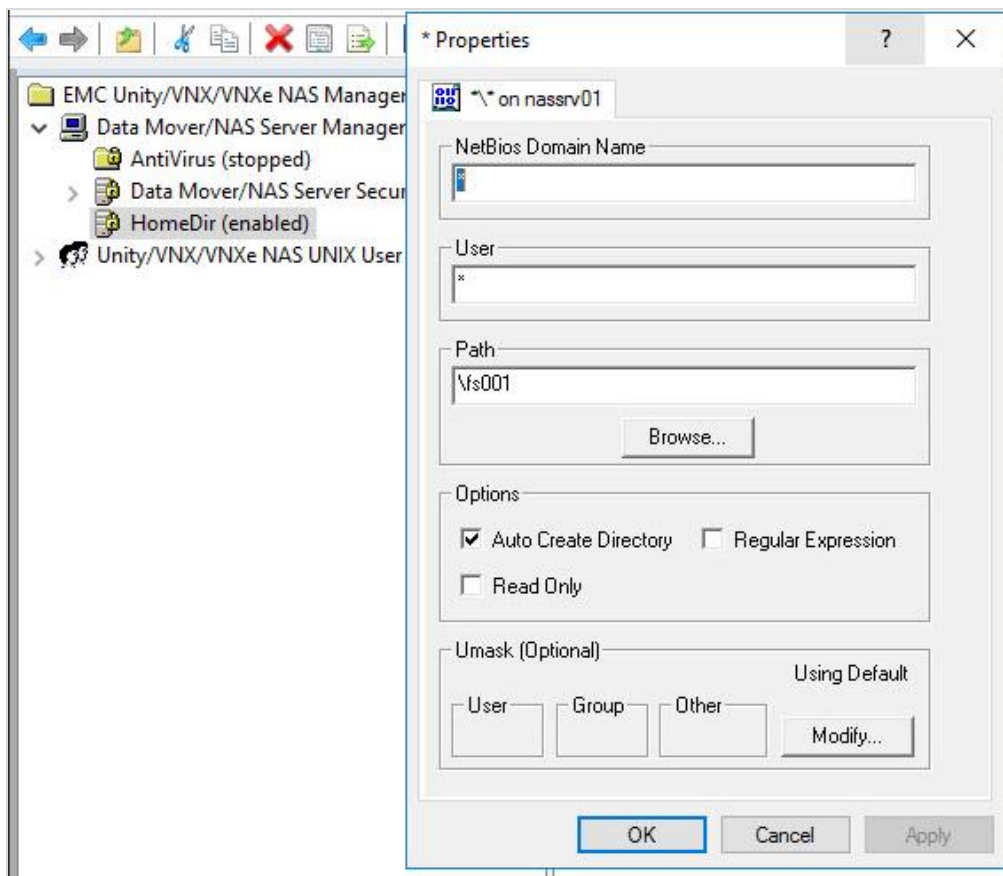


- d. Right-click **HomeDir**, select **New**, and click **Home directory entry**.



e. Enter the following:

- **NetBios Domain Name:** Enter the domain name or use wildcards. For example, * allows all domains.
- **User:** Enter the user or use wildcards. For example, *a enables this home directory path for all users with a username that starts with **a**.
- **Path:** Enter or browse to the file system path. For example, `\\fs001\\<d>\\<u>` uses the path `\\fs001\\company\\Bob` for user **Bob** in domain **company**.
- **Options:**
 - > **Auto Create Directory:** Automatically creates the directory if it does not exist already.
 - > **Regular Expression:** Enables using regular expression for the path. For example, `[a-d].*` for any usernames that start with **a**, **b**, **c**, or **d**.
 - > **Read Only:** Users do not have write privileges to the home directory.
- **UMASK (optional):** Configures the default permissions for **User**, **Group**, and **Other** on the home directory.



3 Configure replication

Now that the NAS server, file system, and home directories are configured, the next step is to configure the replication between the two storage systems.

For a more detailed explanation and configuration for designing and deploying MetroSync for Dell EMC Unity replication, refer to the [Dell EMC Unity: MetroSync](#) document.

Perform the following tasks to configure synchronous replication between the two Dell EMC Unity storage systems:

1. Configure the synchronous replication management interfaces:
 - a. In Unisphere, under **Protection & Mobility**, click **Interfaces** and click the + sign.
 - b. On the next screen, in the **Ethernet Port** field, make sure **Sync Replication Management Port** is selected.
 - c. Enter the IP information for both **SPA** and **SPB**. When this is complete, configure the synchronous replication management interfaces on the second Dell EMC Unity storage system.

Create Interface

Ethernet Port: * Sync Replication Management Port (Link I)

Storage Processor: SPA

IP Address: * 1

Subnet / Prefix Length: * 2

Gateway: 1

Storage Processor: SPB

IP Address: * 1

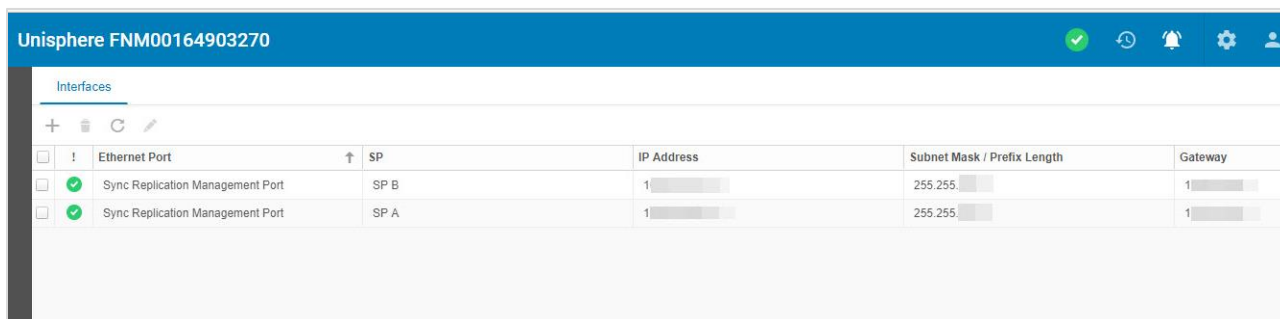
Subnet / Prefix Length: * 2

Gateway: 1

VLAN ID: Set

Cancel OK

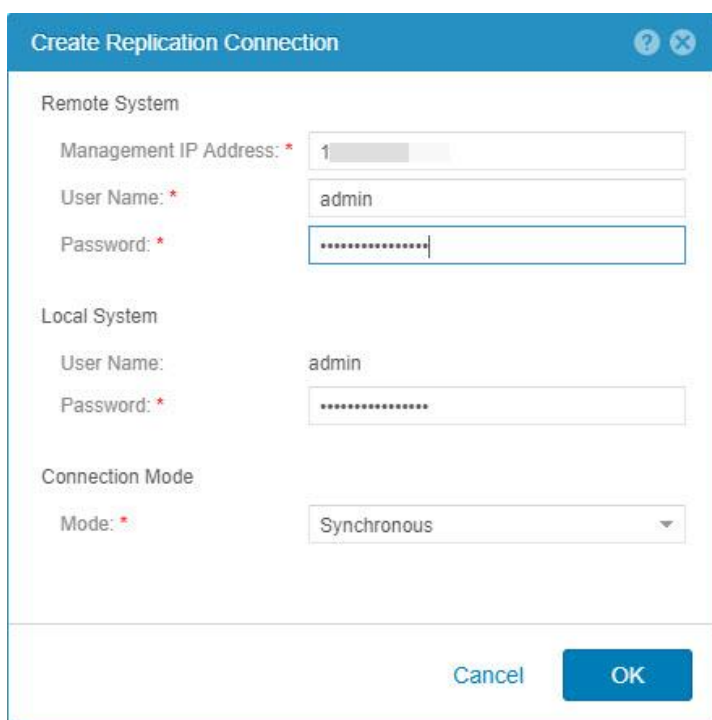
Once complete, the **Interfaces** screen shows both ports configured successfully.



	Port	SP	IP Address	Subnet Mask / Prefix Length	Gateway
☐	Ethernet Port				
☒	Sync Replication Management Port	SP B	1	255.255.	1
☒	Sync Replication Management Port	SP A	1	255.255.	1

2. Create a connection between the two Dell EMC Unity storage systems:

- a. In Unisphere, under **Protection & Mobility**, click **Replication**, click **Connections**, and click the + sign.
- b. Enter the following information:
 - Remote System: Management IP Address, User Name, and Password
 - Local System: Password
 - Connection Mode: Synchronous or Both



Create Replication Connection

Remote System

Management IP Address: * 1

User Name: * admin

Password: *

Local System

User Name: admin

Password: *

Connection Mode

Mode: * Synchronous

Cancel OK

- c. Once complete, click **Verify and Update** to test the connection.

Sessions				
Connections				
+ 🗑️ ↺ ✎ Verify and Update				
☒	!	Remote System Name	↑	System Type
				Mode
☒	✓	FNM00164903270	Unity 350F	Synchronous Replication

4 Test failover

It is a best practice to periodically test the DR plan by simulating failure scenarios such as source-storage-system failure. Testing this kind of failure involves a failover and failback of the source Dell EMC Unity storage system (SN 3247) to the destination Dell EMC Unity storage system (SN 3270).

The following example shows a failover of nasSrv01 from the Dell EMC Unity storage system (SN 3247) to the destination site Dell EMC Unity storage system (SN 3270).

nasSrv01 Properties

General

Network

Naming Services

Sharing Protocols

Protection & Events

Security

Replication

+

More Actions

1 item

☒		Name	Replication Mode	Destination		State
				System	NAS Server	
☒		rep_sess_nas_3_nas_4_FNM00164903247_FNM0016490...	Synchronous	FNM00164903270	nasSrv01	Active

1. On the source side, in Unisphere, under **Storage**, click **File**, click **NAS Servers**, edit the **Source NAS Server (nasSRV01)**, and click the **Replication** tab.
2. Select the **Replication Session**, click **More Actions**. On the next screen, verify the destination system and click **Failover**.

Failover NAS Server and File System Session

Failover will be initiated from the source storage resource.

- Pause I/O to the source storage resource because the failover will block access for replication use.
- The destination storage resource will be made available in read/write mode.
- The role of both storage resources will be switched.

The following associated file systems sessions will also be failed over:

Source		Resource Ty...	Destination	
	Resource		System	Resource
Item	fs001 (nas...	File System	FNM00164903270	fs001 (nasSrv01)

☐ Skip pre-check on file systems

Do you want to failover replication sessions?

Cancel
Failover

- To verify that all I/O is now going to the destination Dell EMC Unity storage system (SN 3270), close the current replication window, open it again by clicking **Edit** (pen symbol), and click **Replication**. The window now shows the active configuration with all I/O going to the destination system.

nasSrv01 Properties

General | Network | Naming Services | Sharing Protocols | Protection & Events | Security | **Replication**

Session Name: rep_sess_nas_3_nas_4_FNM00164903247_FNM00164903270
Mode: Synchronous
Local Role: Destination
Sync State: Consistent
Time of Last Refresh: 7/24/2018, 1:44:19 PM

I/O

Active

ENM00164903270 (MicroStorage) nasSrv01

Local System nasSrv01

[View Associated File System Sessions](#)

Delete | Pause | Resume | Sync | **Failover** | Failover with sync | Failback | Refresh Configuration

- Test accessibility to the home directories from a Microsoft Windows desktop or server. You will not notice any changes, but all user files and directories are served from the destination Dell EMC Unity storage system (SN 3270).

5 Test failback

Now that the roles are reversed, the next step performs the operation on the destination Dell EMC Unity storage system (SN 3270).

1. In Unisphere, under **Storage**, click **File**, click **NAS Servers**, edit the **Source NAS Server (nasSRV01)**, and click the **Replication** tab.
2. Select the Replication Session, click More Actions, and click Failover.

nasSrv01 Properties						
General		Network	Naming Services	Sharing Protocols	Protection & Events	Security
Replication						
+ 🗑️ ↺ ✎ More Actions ▾						1 item
✓	!	Name	Replication Mode	Destination		State
				System	NAS Server	
✓	✓	rep_sess_nas_3_nas_4_FNM00164903247_FNM00164903270	Synchronous	FNM001649...	nasSrv01	Active

3. The new destination is the original source Dell EMC Unity storage system (SN 3247). Click **Failover**.

Failover NAS Server and File System Session

?

Failover will be initiated from the source storage resource.

- Pause I/O to the source storage resource because the failover will block access for replication use.
- The destination storage resource will be made available in read/write mode.
- The role of both storage resources will be switched.

The following associated file systems sessions will also be failed over:

!	Source		Resour...	Destination	
	System	Resource		System	Resource
✓	Local System	fs001 (nas...	File Sy...	FNM00164903247	fs001 (nasSrv01)

☐ Skip pre-check on file systems

Do you want to failover replication sessions?

Cancel

Failover

After the failover is complete, verify it from either the source or destination.

4. To verify from the source Dell EMC Unity storage system (SN 3247), in Unisphere, under **Storage**, click **File**, click **NAS Servers**, edit the **Source NAS Server (nasSRV01)**, and click the **Replication** tab. The properties window now shows the active configuration with all I/O going to the source system.

nasSrv01 Properties

General Network Naming Services Sharing Protocols Protection & Events Security **Replication**

Session Name: rep_sess_nas_3_nas_4_FNM00164903247_FNM00164903270 ✎
Mode: Synchronous
Local Role: Source
Sync State: Consistent

I/O ↓

Active

Local System nasSrv01

FNM00164903270 (1) nasSrv01

[View Associated File System Sessions](#)

Delete Pause Resume Sync **Failover** Failover with sync Failback

6 Unplanned failover

In very rare cases, a real disaster occurs and requires a failover to the remote site. In this case, failover is initiated from the destination system. MetroSync fails over to the remote site but replication stops since the source system is no longer available.

When the source site becomes available again, a full synchronization is required to restart replication. If the original source system is recovered and is available again after an unplanned failover is completed, users have the option to run a **Failback** or **Resume** operation. A **Failback** operation initiates a full synchronization and then switches the replication roles to make the original source and destination reprise their roles again. A **Resume** operation imitates a full synchronization to the original source system and continues to replicate new writes in the same direction.

6.1 MetroSync Manager

MetroSync Manager is available starting with Dell EMC Unity OE version 4.5. This is an optional Microsoft® Windows® application that monitors the systems participating in synchronous replication for critical failures or outages. If a failure or outage is detected, MetroSync Manager automatically initiates a cabinet-level failover to simultaneously fail over all synchronously replicated NAS servers and associated VMware vSphere NFS datastores to the peer system in parallel. Just as MetroSync synchronous replication works bi-directionally between two systems, MetroSync Manager does as well. If either system fails or becomes unavailable, MetroSync Manager performs the necessary cabinet-level failover to the surviving system. Like manual failover, when a system becomes unavailable, synchronous replication between it and the destination system stops.

Note: Along with the proper system monitoring configuration, the Unity MetroSync Manager Service must be in a **Running** status and the **Service State** in the MetroSync Manager application must be **Started** for MetroSync Manager to perform an automatic cabinet-level failover for a failed system.

For more information on Dell EMC Unity MetroSync and MetroSync Manager, refer to the [Dell EMC Unity: MetroSync](#) document.

7 Conclusion

The MetroSync feature is a zero-data-loss replication solution designed for customers that demand continuous data availability. MetroSync can be used to protect user home directory data and much more.

This document discusses only one use case of MetroSync. For more information about all the features supported by MetroSync, refer to the [Dell EMC Unity: MetroSync](#) document.

A Technical support and resources

[Dell EMC Support](#) is focused on meeting customer needs with proven services and support.

[Storage technical documents and videos](#) on Dell.com provide expertise that helps to ensure customer success on Dell EMC storage platforms.

A.1 Related resources

The following references can be found on [Dell EMC Support](#):

- Dell EMC Unity: DR Access and Testing
- Dell EMC Unity: Introduction to the Platform
- Dell EMC Unity: Unisphere Overview
- Dell EMC Unity: NAS Capabilities
- Dell EMC Unity: Snapshots and Thin Clones
- Dell EMC UnityVSA
- Dell EMC Unity: MetroSync