



Synchronous mirroring

SANtricity 11.6

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Table of Contents

- Synchronous mirroring 1
 - Concepts 1
 - How tos 9
 - FAQs 13

Synchronous mirroring

Concepts

How synchronous mirroring works

Synchronous mirroring replicates data volumes in real time to ensure continuous availability.



Mirroring is not available on the EF600 storage array.

Synchronous mirroring achieves a recovery point objective (RPO) of zero lost data by having a copy of important data available if a disaster happens on one of the two storage arrays. The copy is identical to production data at every moment because each time a write is done to the primary volume, a write is done to the secondary volume. The host does not receive an acknowledgment that the write was successful until the secondary volume is successfully updated with the changes that were made on the primary volume.

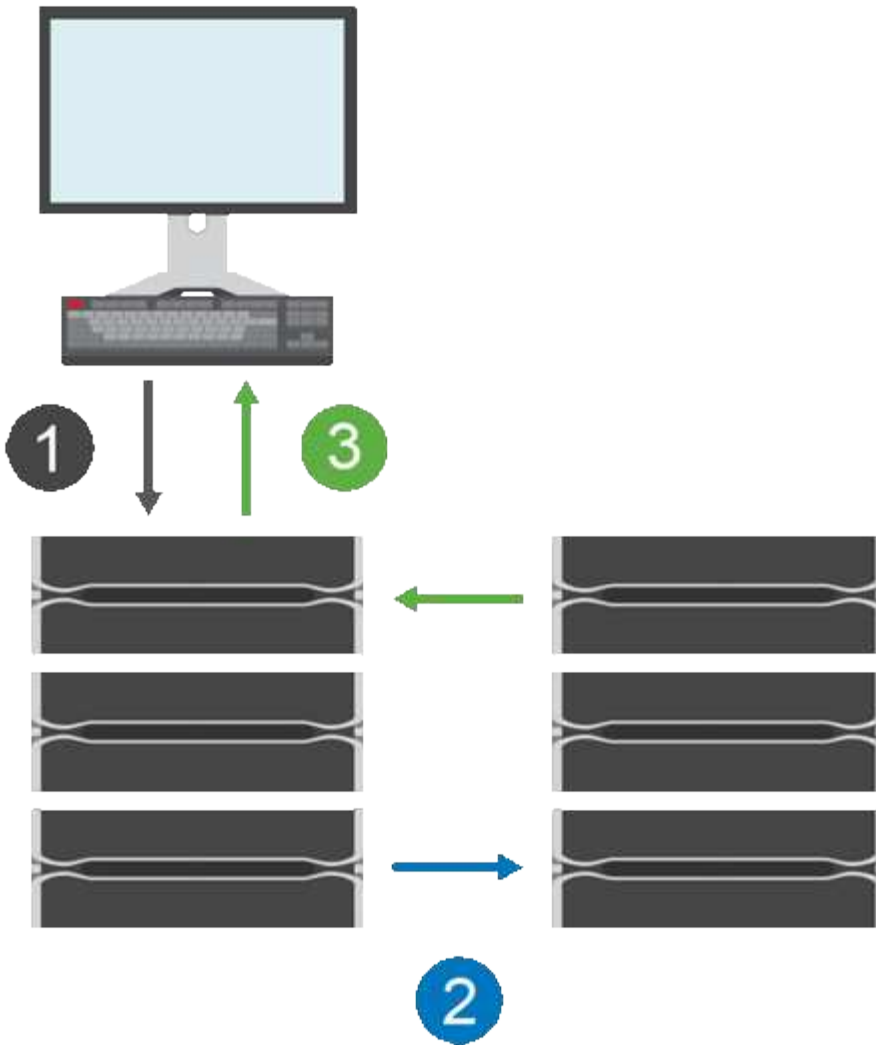
This type of mirroring is ideal for business continuity purposes such as disaster recovery.

Synchronous mirroring relationship

A synchronous mirroring relationship consists of a primary volume and a secondary volume on separate storage arrays. The storage array containing the primary volume is usually located at the primary site and serves the active hosts. The storage array containing the secondary volume is usually located at a secondary site and holds a replica of the data. The secondary volume is used if the primary volume's storage array is unavailable because of, for example, a complete power outage, a fire, or a hardware failure at the primary site.

Synchronous mirroring session

The synchronous mirroring configuration process involves configuring volumes into pairs. After you create a mirrored pair, which consists of a primary volume on one storage array and a secondary volume on another storage array, you can start synchronous mirroring. The steps in synchronous mirroring are depicted below.



1. A write comes in from the host.
2. The write is committed to the primary volume, propagated to the remote system, and then committed to the secondary volume.
3. The primary volume's storage array sends an I/O completion message to the host system *after* both write operations have been successfully completed.

Reserved capacity is used to log information about the incoming write request from a host.

When the current controller owner of the primary volume receives a write request from a host, the controller first logs information about the write to the primary volume's reserved capacity. It then writes the data to the primary volume. Next, the controller initiates a remote write operation to copy the affected data blocks to the secondary volume at the remote storage array.

Because the host application must wait for the write to occur on the local storage array and across the network on the remote storage array, a very fast connection between the local storage array and remote storage array is required to maintain the mirror relationship without overly reducing local I/O performance.

Disaster recovery

Synchronous mirroring maintains a copy of data that is physically distant from the site where the data resides. If a disaster occurs at the primary site, such as a power outage or a flood, the data can be quickly accessed from the secondary site.

The secondary volume is unavailable to host applications while the synchronous mirroring operation is in progress, so, in the event of a disaster at the local storage array, you can fail over to the remote storage array. To fail over, promote the secondary volume to the primary role. Then the recovery host is able to access the newly promoted volume, and business operations can continue.

Synchronization settings

When you create a mirrored pair, you also define the synchronization priority and resynchronization policy that the mirrored pair uses to complete the resynchronization operation after a communication interruption.

If the communication link between the two storage arrays stops working, hosts continue to receive acknowledgements from the local storage array, preventing an access loss. When the communication link is working again, any unreplicated data can be automatically or manually resynced to the remote storage array.

Whether data is resynchronized automatically depends on the mirrored pair's resynchronization policy. An automatic resynchronization policy allows the mirrored pair to resynchronize automatically when the link is working again. A manual resynchronization policy requires you to manually resume synchronization after a communication problem. Manual resynchronization is the recommended policy.

You can edit the synchronization settings for a mirrored pair only on the storage array that contains the primary volume.

Unsynchronized data

The primary and secondary volumes become unsynchronized when the primary volume's storage array is unable to write data to the secondary volume. This can be caused by the following issues:

- Network problems between the local and remote storage arrays
- A failed secondary volume
- Synchronization being manually suspended on the mirrored pair

Orphaned mirrored pair

An orphaned mirrored pair volume exists when a member volume has been removed on one side (either the primary side or secondary side) but not on the other side.

Orphaned mirrored pair volumes are detected when inter-array communication is restored and the two sides of the mirror configuration reconcile mirror parameters.

You can remove a mirrored pair to correct an orphaned mirrored pair state.

Configuration and management

To enable and configure mirroring between two arrays, you must use the Unified Manager interface. Once mirroring is enabled, you can manage mirrored pairs and synchronization settings in System Manager.

Synchronous mirroring terminology

Learn how the synchronous mirroring terms apply to your storage array.

Term	Description
Local storage array	The local storage array is the storage array that you are acting upon. When you see Primary in the Local Role column, it indicates that the storage array contains the volume that holds the primary role in the mirror relationship. When you see Secondary in the Local Role column, it indicates that the storage array contains the volume that holds the secondary role in the mirror relationship.
Mirrored pair	A mirrored pair is comprised of two volumes, a primary volume and a secondary volume.
Primary volume	The primary volume of a mirrored pair is the source volume to be mirrored.
Recovery point objective (RPO)	Recovery Point Objective (RPO) represents an objective that indicates the difference considered acceptable between the primary volume and secondary volume in a mirrored pair. An RPO of zero indicates that no difference between the primary volume and secondary volume can be tolerated. An RPO greater than zero indicates that the secondary volume is less current or lags behind the primary volume.
Remote storage array	The remote storage array is usually designated as the secondary site, which usually holds a replica of the data in a mirroring configuration.
Reserved capacity	Reserved capacity is the physical allocated capacity that is used for any copy service operation and storage object. It is not directly readable by the host.
Role change	Role change is assigning the primary role to the secondary volume and vice versa.
Secondary volume	The secondary volume of a mirrored pair is usually located at a secondary site and holds a replica of the data.
Synchronization	Synchronization occurs at initial synchronization between the local storage array and the remote storage array. Synchronization also occurs when the primary and secondary volumes become unsynchronized after a communication interruption. When the communication link is working again, any unreplicated data is synchronized to the secondary volume's storage array.

Workflow for mirroring a volume synchronously

You configure synchronous mirroring using the following workflow.



This feature is not available on the EF600 storage system.

1. Perform the initial configuration in Unified Manager:
 - a. Select a local storage array as the source for the data transfer.
 - b. Select a primary volume from the local storage array.

- c. Select a remote storage array as the destination for the data transfer, and then select a secondary volume.
 - d. Select synchronization and resynchronization priorities.
 - e. Begin the initial data transfer from the primary volume to the secondary volume. Depending on the volume size, this initial transfer could take several hours.
2. Check the progress of the initial synchronization:
 - a. In Unified Manager, launch System Manager for the local array.
 - b. In System Manager, view the status of the mirroring operation. When mirroring is complete, the status of the mirrored pair is "Optimal." The two arrays attempt to stay synchronized through normal operations. Only new and changed blocks are transferred from the primary volume to the secondary volume.
 3. **Optional:** You can change synchronization settings in System Manager.



Because synchronous replication is continuous, the replication link between the two sites must provide sufficient bandwidth capabilities.

Requirements for using synchronous mirroring

If you plan to use synchronous mirroring, keep the following requirements in mind.

SANtricity Unified Manager

To enable and configure mirroring between two arrays, you must use the Unified Manager interface. Unified Manager is installed on a host system along with the Web Services Proxy.

- The Web Services Proxy service must be running.
- Unified Manager must be running on your local host through an HTTPS connection.
- Unified Manager must be showing valid SSL certificates for the storage array. You can accept a self-signed certificate or install your own security certificate using Unified Manager and navigating to **Certificate > Certificate Management**.

Storage arrays



Mirroring is not available on the EF600 storage array.

- You must have two storage arrays.
- Each storage array must have two controllers.
- The two storage arrays must be discovered in Unified Manager.
- Each controller in both the primary array and secondary array must have an Ethernet management port configured and must be connected to your network.
- The storage arrays have a minimum firmware version of 7.84. (They can each run different OS versions.)
- You must know the password for the local and remote storage arrays.
- You must have enough free capacity on the remote storage array to create a secondary volume equal to or greater than the primary volume that you want to mirror.
- Your local and remote storage arrays are connected through a Fibre Channel fabric.

Supported connections

Communication for synchronous mirroring is supported only on controllers with Fibre Channel (FC) host ports.

Synchronous mirroring uses the highest numbered host port on each controller on both the local storage array and the remote storage array. Controller host bus adapter (HBA) host port 4 is typically reserved for mirror data transmission.

Mirrored volume candidates

- RAID level, caching parameters, and segment size can be different on the primary and secondary volumes of a synchronous mirrored pair.
- The primary and secondary volumes in a synchronous mirrored pair must be standard volumes. They cannot be thin volumes or snapshot volumes.
- The secondary volume must be at least as large as the primary volume.
- Only the primary volume may have snapshots associated with it and/or be the source or target volume in a volume copy operation.
- A volume can participate in only one mirror relationship.
- There are limits to the number of volumes that are supported on a given storage array. Make sure that the number of configured volumes on your storage array is less than the supported limit. When synchronous mirroring is active, the two reserved capacity volumes that are created count against the volume limit.

Reserved capacity

- Reserved capacity is required for a primary volume and for a secondary volume for logging write information to recover from controller resets and other temporary interruptions.
- The reserved capacity volumes are created automatically when synchronous mirroring is activated. Because both the primary volume and the secondary volume in a mirrored pair require reserved capacity, you must ensure that you have enough free capacity available on both storage arrays that are participating in the synchronous mirror relationship.

Drive Security feature

- If you are using secure-capable drives, the primary volume and the secondary volume must have compatible security settings. This restriction is not enforced; therefore, you must verify it yourself.
- If you are using secure-capable drives, the primary volume and the secondary volume should use the same drive type. This restriction is not enforced; therefore, you must verify it yourself.
 - If the primary volume uses Full Disk Encryption (FDE) drives, the secondary volume should use FDE drives.
 - If the primary volume uses Federal Information Processing Standards 140-2 (FIPS) validated drives, the secondary volume should use FIPS 140-2 validated drives.
- If you are using Data Assurance (DA), the primary volume and the secondary volume must have the same DA settings.

Synchronous mirroring status

A synchronous mirrored pair's status indicates whether the data on the primary volume and on the secondary volume is synchronized. A mirror status is independent of the component status of the volumes in the mirrored pair.



This feature is not available on the EF600 storage system.

Synchronous mirrored pairs can have one of the following statuses:

- **Optimal**

Indicates that the volumes in the mirrored pair are synchronized, which means that the fabric connection between the storage arrays is operational and each volume is in the desired working condition.

- **Synchronizing**

Shows the progress of the data synchronization between the mirrored pairs. This status will also be shown during the initial synchronization.

After a communication link interruption, only the blocks of data that have changed on the primary volume during the link interruption are copied to the secondary volume.

- **Unsynchronized**

Indicates that the primary volume's storage array is unable to write incoming data to the remote array. The local host can continue to write to the primary volume, but remote writes do not take place. Different conditions can prevent the primary volume's storage array from writing incoming data to the secondary volume, such as:

- The secondary volume is not accessible.
- The remote storage array is not accessible.
- The fabric connection between the storage arrays is not accessible.
- The secondary volume cannot be updated with a new World Wide Identifier (WWID).

- **Suspended**

Indicates that the synchronous mirroring operation has been suspended by the user. When a mirrored pair is suspended, no attempt is made to contact the secondary volume. Any writes to the primary volume are persistently logged in the mirror reserved capacity volumes.

- **Failed**

Indicates that the synchronous mirroring operation is unable to operate normally due to a failure with the primary volume, secondary volume, or the mirror reserved capacity.

Volume ownership

You can change the preferred controller owner in a mirrored pair.



This feature is not available on the EF600 storage system.

If the primary volume of the mirrored pair is owned by controller A, then the secondary volume will also be owned by controller A of the remote storage array. Changing the primary volume's owner will automatically change the owner of the secondary volume to ensure that both volumes are owned by the same controller. Current ownership changes on the primary side automatically propagate to corresponding current ownership changes on the secondary side.

For example, a primary volume is owned by controller A, and then you change the controller owner to controller B. In this case, the next remote write changes the controller owner of the secondary volume from controller A to B. Because controller ownership changes on the secondary side are controlled by the primary side, they do not require any special intervention by the storage administrator.

Controller resets

A controller reset causes a volume ownership change on the primary side from the preferred controller owner to the alternate controller in the storage array.

Sometimes a remote write is interrupted by a controller reset or a storage array power cycle before it can be written to the secondary volume. The controller does not need to perform a full synchronization of the mirrored pair in this case.

When a remote write has been interrupted during a controller reset, the new controller owner on the primary side reads information stored in a log file in the reserved capacity volume of the preferred controller owner. The new controller owner then copies the affected data blocks from the primary volume to the secondary volume, eliminating the need for a full synchronization of the mirrored volumes.

Role change between volumes in a mirrored pair

You can change the role between volumes in a mirrored pair. You can do this by demoting the primary volume to the secondary role or promoting the secondary volume to the primary role.



This feature is not available on the EF600 storage system.

Review the following information about the role change operation:

- When a primary volume is demoted to the secondary role, the secondary volume in that mirrored pair is promoted to the primary role and vice versa.
- When the primary volume is demoted to the secondary role, hosts that have been assigned to that volume no longer have write access to it.
- When the secondary volume is promoted to the primary role, any hosts that are accessing that volume are now able to write to it.
- If the local storage array is unable to communicate with the remote storage array, you can force the role change on the local storage array.

Force role change

You can force a role change between volumes in a mirrored pair when a communication problem between the local storage array and the remote storage array is preventing the promotion of the secondary volume or the demotion of the primary volume.

You can force the volume on the secondary side to transition to the primary role. Then the recovery host can access the newly promoted volume, and business operations can continue.



When the remote storage array has recovered and any communication problems have been resolved, a Synchronous Mirroring - Primary Volume Conflict condition occurs. The recovery steps include resynchronizing the volumes. Use the Recovery Guru to recover from this error.

When is a forced promotion allowed and not allowed?

Forced promotion of a volume in a mirrored pair is not allowed under the following conditions:

- Any of the volumes in a mirrored pair are in the process of an initial synchronization.
- The mirrored pair is in the Failed, Role-Change-Pending, or Role-Change-In-Progress states or if any of the associated reserved capacity volumes are failed.

Role change in-progress state

If two storage arrays in a mirroring configuration become disconnected, and the primary volume of a mirrored pair is force demoted to a secondary role, and the secondary volume of a mirrored pair is force promoted to a primary role, then when communication is restored, the volumes on both storage arrays are placed in the Role-Change-In-Progress state.

The system will complete the role change process by transferring the change logs, re-synchronizing, setting the mirrored pair state back to a normal operating state, and continuing with synchronizations.

How tos

Manage synchronous mirrored pairs

Test communication for synchronous mirroring

You can test the communication between a local storage array and a remote storage array to diagnose possible communication problems for a mirrored pair that is participating in synchronous mirroring.

About this task

Two different tests are run:

- **Communication** — Verifies that the two storage arrays have a communication path. The communication test validates that the local storage array can communicate with the remote storage array and that the secondary volume associated with the mirrored pair exists on the remote storage array.
- **Latency** — Sends a SCSI test unit command to the secondary volume on the remote storage array associated with the mirrored pair to test the minimum, average, and maximum latency.

Steps

1. Select **Storage > Synchronous Mirroring**.
2. Select the mirrored pair that you want to test, and then select **Test Communication**.
3. Review the information displayed in the Results window, and, if necessary, follow the corrective action indicated.



If the communication test fails, the test continues to run after you close this dialog until communication between the mirrored pair is restored.

Suspend and resume synchronization for a mirrored pair

You can use the Suspend option and Resume option to control when to synchronize the

data on the primary volume and the secondary volume in a mirrored pair.

About this task

If a mirrored pair is manually suspended, the mirrored pair will not synchronize until it is manually resumed.

Steps

1. Select **Storage › Synchronous Mirroring**.
2. Select the mirrored pair that you want to suspend or resume, and then select either **More › Suspend** or **More › Resume**.

The system displays a confirmation.

3. Select **Yes** to confirm.

Results

System Manager performs the following actions:

- Either suspends or resumes data transfer between the mirrored pair without removing the mirror relationship.
- For a *suspended* mirrored pair:
 - Displays **Suspended** in the Mirrored Pair table.
 - Logs any data that was written to the primary volume of the mirrored pair while synchronization is suspended.
- For a *resumed* mirrored pair, writes the data automatically to the secondary volume of the mirrored pair when synchronization is resumed. A full synchronization is not required.

Change role between volumes in a mirrored pair

You can perform a role reversal between the two volumes in a mirrored pair that are participating in synchronous mirroring. You change the role between volumes in a mirrored pair for administrative purposes or in the event of a disaster on the local storage array.

About this task

You can either demote the primary volume to the secondary role or promote the secondary volume to the primary role. Any hosts that are accessing the primary volume have read/write access to the volume. When the primary volume becomes a secondary volume, only remote writes initiated by the primary controller are written to the volume.

Steps

1. Select **Storage › Synchronous Mirroring**.
2. Select the mirrored pair that contains the volumes for which you want to change the role, and then select **More › Change role**.

The system displays a confirmation.

3. Confirm that you want to change the role of the volumes, and then select **Change Role**.



If the local storage array cannot communicate with the remote storage array, the system displays the **Cannot Contact Storage Array** dialog box when a role change is requested, but the remote storage array cannot be contacted. Click **Yes** to force the role change.

Results

System Manager performs the following action:

- If the associated volume in the mirrored pair can be contacted, the roles between the volumes change. System Manager promotes the secondary volume in the mirrored pair to the primary role or demotes the primary volume in the mirrored pair to the secondary role (depending on your selection).

Change synchronization settings for a mirrored pair

You can change the synchronization priority and resynchronization policy that the mirrored pair uses to complete the resynchronization operation after a communication interruption.

About this task

You can edit the synchronization settings for a mirrored pair only on the storage array that contains the primary volume.

Steps

1. Select **Storage > Synchronous Mirroring**.
2. Select the mirrored pair that you want to edit, and then select **More > Edit settings**.

The system displays the View/Edit Settings dialog box.

3. Use the slider bar to edit the synchronization priority.

The synchronization priority determines how much of the system resources are used to complete the resynchronization operation after a communication interruption as compared to service I/O requests.

More about synchronization rates

There are five synchronization priority rates:

- Lowest
- Low
- Medium
- High
- Highest

If the synchronization priority is set to the lowest rate, I/O activity is prioritized, and the resynchronization operation takes longer. If the synchronization priority is set to the highest rate, the resynchronization operation is prioritized, but I/O activity for the storage array might be affected.

4. Edit the resynchronization policy as appropriate.

You can resynchronize the mirrored pairs on the remote storage array either manually or automatically.

- **Manual** (the recommended option) — Select this option to require synchronization to be manually resumed after communication is restored to a mirrored pair. This option provides the best opportunity for recovering data.
- **Automatic** — Select this option to start resynchronization automatically after communication is restored to a mirrored pair.

5. Select **Save**.

Remove synchronous mirror relationship

You remove a mirrored pair to remove the mirror relationship from the primary volume on the local storage array and the secondary volume on the remote storage array.

About this task

You can also remove a mirrored pair to correct an orphaned mirrored pair state. Review the following information about orphaned mirrored pairs:

- An orphaned mirrored pair exists when a member volume has been removed on one side (local/remote) but not on the other side.
- Orphaned mirrored pairs are detected when inter-array communication is restored.

Steps

1. Select **Storage** › **Synchronous Mirroring**.
2. Select the mirrored pair that you want to remove, and then select the **Uncommon Tasks** › **Remove**.

The **Remove Mirror Relationship** dialog box appears.

3. Confirm that you want to remove the mirrored pair, and then click **Remove**.

Results

System Manager performs the following actions:

- Removes the mirror relationship from the mirrored pair on the local storage array and on the remote storage array.
- Returns the primary volume and the secondary volume to host-accessible, non-mirrored volumes.
- Updates the Synchronous Mirroring tile with the removal of the synchronous mirrored pair.

Deactivate synchronous mirroring

You can deactivate the Synchronous Mirroring feature on a storage array to re-establish normal use of host bus adapter (HBA) host port 4, which was reserved for mirror data transmission.

Before you begin

You must have deleted all synchronous mirror relationships. Verify that all mirrored pairs have been deleted from the storage array.

Steps

1. Select **Storage** › **Synchronous Mirroring**.

2. Select **Uncommon Tasks > Deactivate**.

The system displays a confirmation.

3. Select **Yes** to confirm.

Results

- The controller's HBA host port 4, which was dedicated for synchronous mirroring communication, can now accept host read and write requests.
- The reserved capacity volumes on the storage array are deleted.

FAQs

How does synchronous mirroring differ from asynchronous mirroring?

The Asynchronous Mirroring feature differs from the Synchronous Mirroring feature in one essential way: it captures the state of the source volume at a particular point in time and copies just the data that has changed since the last image capture.

With synchronous mirroring, the state of the primary volume is not captured at some point in time, but rather reflects all changes that were made on the primary volume to the secondary volume. The secondary volume is identical to the primary volume at every moment because, with this type of mirror, each time a write is done to the primary volume, a write is done to the secondary volume. The host does not receive an acknowledgment that the write was successful until the secondary volume is successfully updated with the changes that were made on the primary volume.

With asynchronous mirroring, the remote storage array is not fully synchronized with the local storage array, so if the application needs to transition to the remote storage array due to a loss of the local storage array, some transactions could be lost.

Comparison between mirroring features

Asynchronous Mirroring	Synchronous Mirroring
Replication method	
<ul style="list-style-type: none"> • Point-in-Time <p>Mirroring is done on demand or automatically according to a user-defined schedule. Schedules can be defined at the granularity of minutes. The minimum time between syncs is 10 minutes.</p>	<ul style="list-style-type: none"> • Continuous <p>Mirroring is automatically executed continuously, copying data from every host write.</p>
Reserved capacity	
<ul style="list-style-type: none"> • Multiple <p>A reserved capacity volume is required for each mirrored pair.</p>	<ul style="list-style-type: none"> • Single <p>Single reserved capacity volume is required for all mirrored volumes.</p>
Communication	
<ul style="list-style-type: none"> • iSCSI and Fibre Channel <p>Supports iSCSI and Fibre Channel interfaces between storage arrays.</p>	<ul style="list-style-type: none"> • Fibre Channel <p>Supports only Fibre Channel interfaces between storage arrays.</p>
Distance	
<ul style="list-style-type: none"> • Unlimited <p>Support for virtually unlimited distances between the local storage array and the remote storage array, with the distance typically limited only by the capabilities of the network and the channel extension technology.</p>	<ul style="list-style-type: none"> • Restricted <p>Typically must be within about 10 km (6.2 miles), of the local storage array to meet the latency and application performance requirements.</p>

Synchronous mirroring - Why don't I see all my volumes?

When you are selecting a primary volume for a mirrored pair, a list shows all the eligible volumes.

Any volumes that are not eligible to be used do not display in that list. Volumes might not be eligible for any of the following reasons:

- The volume is a non-standard volume, such as a snapshot volume or thin volume.

- The volume is not optimal.
- The volume is already participating in a mirroring relationship.

Synchronous mirroring - Why don't I see all the volumes on the remote storage array?

When you are selecting a secondary volume on the remote storage array, a list shows all the eligible volumes for that mirrored pair.

Any volumes that are not eligible to be used, do not display in that list. Volumes might not be eligible for any of the following reasons:

- The volume is a non-standard volume, such as a snapshot volume or thin volume.
- The volume is not optimal.
- The volume is already participating in a mirroring relationship.
- If you are using Data Assurance (DA), the primary volume and the secondary volume must have the same DA settings.
 - If the primary volume is DA enabled, the secondary volume must be DA enabled.
 - If the primary volume is not DA enabled, the secondary volume must not be DA enabled.

Synchronous mirroring - What do I need to know before creating a mirrored pair?

You configure mirrored pairs in the Unified Manager interface, and then manage the pairs in System Manager.

Before creating a mirrored pair, follow these guidelines:

- You must have two storage arrays.
- Each storage array must have two controllers.
- Each controller in both the primary array and secondary array must have an Ethernet management port configured and must be connected to your network.
- Your local and remote storage arrays are connected through a Fibre Channel fabric.
- The storage arrays have a minimum firmware version of 7.84. (They can each run different OS versions.)
- You must know the password for the local and remote storage arrays.
- You must have enough free capacity on the remote storage array to create a secondary volume equal to or greater than the primary volume that you want to mirror.
- You have installed the Web Services Proxy and Unified Manager. Mirrored pairs are configured in the Unified Manager interface.
- The two storage arrays are discovered in Unified Manager.

What impact does synchronization priority have on synchronization rates?

The synchronization priority defines how much processing time is allocated for synchronization activities relative to system performance.

The controller owner of the primary volume performs this operation in the background. At the same time, the

controller owner processes local I/O writes to the primary volume and associated remote writes to the secondary volume. Because the resynchronization diverts controller processing resources from I/O activity, resynchronization can have a performance impact to the host application.

Keep these guidelines in mind to help you determine how long a synchronization priority might take and how the synchronization priorities can affect system performance.

About synchronization priority rates

These priority rates are available:

- Lowest
- Low
- Medium
- High
- Highest

The lowest priority rate supports system performance, but the resynchronization takes longer. The highest priority rate supports resynchronization, but system performance might be compromised.

These guidelines roughly approximate the differences between the priorities.

Priority rate for full synchronization	Time elapsed compared to highest synchronization rate
Lowest	Approximately eight times as long as at the highest priority rate.
Low	Approximately six times as long as at the highest priority rate.
Medium	Approximately three-and-a-half times as long as at the highest priority rate.
High	Approximately twice as long as at the highest priority rate.

Volume size and host I/O rate loads affect the synchronization time comparisons.

Why is it recommended to use a manual synchronization policy?

Manual resynchronization is recommended because it lets you manage the resynchronization process in a way that provides the best opportunity for recovering data.

If you use an Automatic resynchronization policy and intermittent communication problems occur during resynchronization, data on the secondary volume could be temporarily corrupted. When resynchronization is complete, the data is corrected.

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