

Interfamily Connectivity

SRDF and NDM

Interfamily Connectivity Information

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This document defines the versions of PowerMaxOS, HYPERMAX OS, and Enginuity that can make up valid SRDF replication and SRDF/Metro configurations. In addition, there is information on the versions that can participate in Non-Disruptive Migration (NDM).

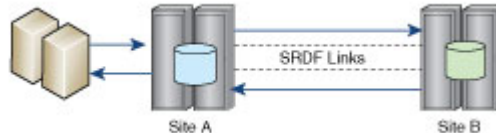
• SRDF	2
• NDM	13
• Point-to-point connections	14
• Requirements for performing system upgrades	15
• More information	16

SRDF

These sections show the valid combinations for SRDF remote replication and SRDF/Metro configurations.

Connectivity table

A SRDF configuration consists of one or more pairs of storage arrays.



This table shows the minimum, valid combinations of PowerMaxOS, HYPERMAX OS and Enginuity that can form a RDF pair in replication or SRDF/Metro configurations.

For VMAX systems running Enginuity, the version that is valid in a SRDF configuration depends on the version of Windows that runs on the Service Processor. The suffixes (WES7) and (XP) differentiate between these versions like this:

- (WES7): the Service Processor runs Windows 7
- (XP): the Service Processor runs another version of Windows

NOTICE

It is strongly recommended that both sides of the RDF pair run the latest GA Cumulative Epack. This ensures that both sides have the latest set of RDF-related patches.

Table 1 SRDF interfamily connectivity

When one array runs...	The minimum code level of an RDF partner is...	
	SRDF 2 and 3 site	SRDF/Metro ^a
PowerMaxOS 5978.221.221	PowerMaxOS 5978.144.144	PowerMaxOS 5978.144.144
	HYPERMAX OS 5977.952.892	HYPERMAX OS 5977.952.892
	Enginuity 5876.309.401 (WES7) Enginuity 5876.309.196 (XP) VMAX 20K in a Mainframe environment: see Knowledge Base article 516383	
PowerMaxOS 5978.144.144	PowerMaxOS 5978.144.144	PowerMaxOS 5978.144.144
	HYPERMAX OS 5977. 952.892	HYPERMAX OS 5977.952.892
	Enginuity 5876.309.401 (WES7) Enginuity 5876.309.196 (XP) VMAX 20K in a Mainframe environment: see Knowledge Base article 516383	
HYPERMAX OS 5977.1131.1131	PowerMaxOS 5978.144.144	PowerMaxOS 5978.144.144
	HYPERMAX OS 5977.814.786	HYPERMAX OS 5977.814.786

Table 1 SRDF interfamily connectivity (continued)

When one array runs...	The minimum code level of an RDF partner is...	
	SRDF 2 and 3 site	SRDF/Metro ^a
	Enginuity 5876.309.401 (WES7) Enginuity 5876.309.196 (XP) VMAX 20K in a Mainframe environment: see Knowledge Base article 516383	
HYPERMAX OS 5977.1125.1125	PowerMaxOS 5978.144.144	PowerMaxOS 5978.144.144
	HYPERMAX OS 5977.814.786 Enginuity 5876.309.401 (WES7) Enginuity 5876.309.196 (XP) VMAX 20K in a Mainframe environment: see Knowledge Base article 516383	HYPERMAX OS 5977.814.786
HYPERMAX OS 5977.952.892	PowerMaxOS 5978.144.144	PowerMaxOS 5978.144.144
	HYPERMAX OS 5977.691.684 (FBA) HYPERMAX OS 5977.811.784 (CKD and mixed)	HYPERMAX OS 5977.813.785
	Enginuity 5876.288.400 (WES7) Enginuity 5876.288.195 (XP)	
HYPERMAX OS 5977.945.890	HYPERMAX OS 5977.691.684 (FBA) HYPERMAX OS 5977.811.784 (CKD and mixed)	HYPERMAX OS 5977.813.785
	Enginuity 5876.288.400 (WES7) Enginuity 5876.288.195 (XP)	
HYPERMAX OS 5977.814.786	HYPERMAX OS 5977.691.684 (FBA) HYPERMAX OS 5977.811.784 (CKD and mixed)	HYPERMAX OS 5977.811.784
	Enginuity 5876.288.400 (WES7) Enginuity 5876.288.195 (XP)	
HYPERMAX OS 5977.813.785	HYPERMAX OS 5977.691.684 (FBA) HYPERMAX OS 5977.811.784 (CKD and mixed)	HYPERMAX OS 5977.811.784
	Enginuity 5876.288.400 (WES7) Enginuity 5876.288.195 (XP)	
HYPERMAX OS 5977.811.784	HYPERMAX OS 5977.691.684 (FBA) HYPERMAX OS 5977.811.784 (CKD and mixed)	HYPERMAX OS 5977.811.784
	Enginuity 5876.288.400 (WES7) Enginuity 5876.288.195 (XP)	
HYPERMAX OS 5977.810.784 FBA only	HYPERMAX OS 5977.691.684	HYPERMAX OS 5977.691.684
	Enginuity 5876.288.400 (WES7) Enginuity 5876.288.195 (XP)	
HYPERMAX OS 5977.691.684 FBA only	HYPERMAX OS 5977.596.583	HYPERMAX OS 5977.691.684
	Enginuity 5876.286.194	

Table 1 SRDF interfamily connectivity (continued)

When one array runs...	The minimum code level of an RDF partner is...	
	SRDF 2 and 3 site	SRDF/Metro ^a
HYPERMAX OS 5977.596.583 FBA Only	HYPERMAX OS 5977.596.583 If the RDF partner runs HYPERMAX OS 5977.691.684, HYPERMAX OS 5977.596.583 requires ePack 5457 that contains N-X connectivity fixes.	—
	Enginuity 5876.272.177	
Enginuity 5876.309.401	PowerMaxOS 5978.144.144	—
	HYPERMAX OS 5977.952.892	
	Enginuity 5876.288.195	
Enginuity 5876.309.196	PowerMaxOS 5978.144.144	—
	HYPERMAX OS 5977.952.892	
	Enginuity 5876.288.195	
Enginuity 5876.288.400	HYPERMAX OS 5977.810.784	—
	Enginuity 5876.159.102	
Enginuity 5876.288.195	HYPERMAX OS 5977.810.784	—
	Enginuity 5876.159.102	
Enginuity 5876.286.194	HYPERMAX OS 5977.591.684	—
	Enginuity 5876.159.102	
Enginuity 5876.272.177	HYPERMAX OS 5977.596.583	—
	Enginuity 5876.159.102	
Enginuity 5876.269.175	Enginuity 5876.154.130	—
Enginuity 5876.268.174	Enginuity 5876.154.130	—
Enginuity 5876.229.145	Enginuity 5876.154.130	—
Enginuity 5876.229.145	Enginuity 5876.154.130	—

a. SRDF/Metro is available with PowerMaxOS 5978 or HYPERMAX OS 5977.691.684 and later.

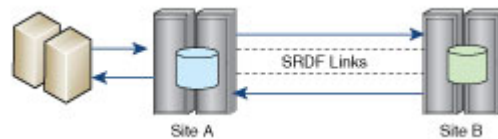
SRDF Remote Replication

Use this section to determine valid SRDF replication configurations and understand any limitations associated with those configurations.

How to determine valid SRDF configurations

These procedures show how to use [Table 1](#) on page 2 to determine valid configurations for 2-site and 3-site SRDF. Follow the appropriate procedure.

2 site

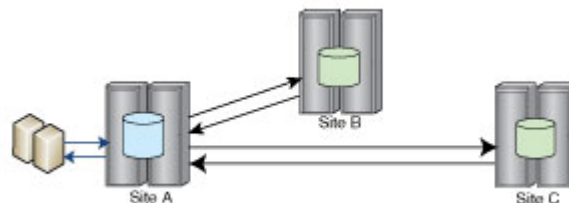


Procedure

1. Locate the version of PowerMaxOS, HYPERMAX OS, or Engenuity that one side runs in the **When one array runs** column.
2. The corresponding entries in the **SRDF 2 and 3 site** column show the minimum versions of PowerMaxOS, HYPERMAX OS, and Engenuity that can be on the other side. Choose one of those versions or one of its successors.

For example, one side of an FBA configuration runs HYPERMAX OS 5977.952.892. From [Table 1](#) on page 2 the minimum versions that other side can run are PowerMaxOS 5978.144.144, HYPERMAX OS 5977.691.684, Engenuity 5876.288.400 (when the Service Processor runs Windows 7), or Engenuity 5876.288.195.

3-site concurrent



Procedure

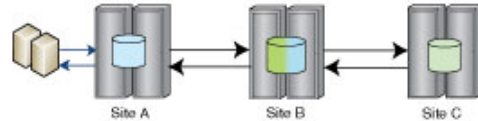
1. Locate the version of PowerMaxOS, HYPERMAX OS, or Engenuity that Site A runs in the **When one array runs** column.
2. The corresponding entries in the **SRDF 2 and 3 site** column show the minimum versions of PowerMaxOS, HYPERMAX OS, and Engenuity that can be on Sites B and C. Choose one of those versions or its successor for each site.

Sites B and C can run different versions of PowerMaxOS, HYPERMAX OS, and Engenuity.

For example, Site A in a FBA configuration runs HYPERMAX OS 5977.1125.1125. From [Table 1](#) on page 2 the minimum versions that Sites B and C can run are PowerMaxOS

5978.144.144 or later, HYPERMAX OS 5977.814.786 or later, Enginuity 5876.309.401 (when the Service Processor runs Windows 7), or Enginuity 5876.309.196.

3-site cascaded



Procedure

1. Locate the version of PowerMaxOS, HYPERMAX OS, or Enginuity that Site A runs in the **When one array runs** column.
2. The corresponding entries in the **SRDF 2 and 3 site** column show the minimum versions of PowerMaxOS, HYPERMAX OS, and Enginuity that can run at Site B. Choose one of those versions or one of its successors.
3. Locate the chosen Site B version of PowerMaxOS, HYPERMAX OS, or Enginuity in the **When one array runs** column.
4. The corresponding entries in the **SRDF 2 and 3 site** column show the minimum versions of PowerMaxOS, HYPERMAX OS, and Enginuity that can run at Site C. Choose one of those versions or one of its successors.

For example, Site A in a CKD environment runs HYPERMAX OS 5977.1131.1131. [Table 1](#) on page 2 shows that the minimum code levels at Site B are PowerMaxOS 5978.144.144, HYPERMAX OS 5977.814.786, Enginuity 5876.288.401 (when the Service Processor runs Windows 7), or Enginuity 5876.288.196.

Assume that Site B runs HYPERMAX OS 5977.952.892. Locating the row with that version in the **When one array runs** column of [Table 1](#) on page 2 shows that the minimum code level that Site C can run is PowerMaxOS 5978.144.144, HYPERMAX OS 5977.811.784, Enginuity 5876.288.400 (when the Service Processor runs Windows 7), or Enginuity 5876.288.195.

Limitations

There are some limitations to SRDF communications in these environments:

- 2 site
- Cascaded
- Concurrent

2 site

- R1 and RecoverPoint CDP co-existence is not supported on an array running Enginuity 5876 when the R2 device is on an array running PowerMaxOS 5978 or HYPERMAX OS 5977.

If the SRDF R1 device is tagged as a RecoverPoint CDP source device, disable RecoverPoint consistency before performing any SRDF operations that may cause data to flow from the R2 device to the R1 device.

An SRDF device cannot also be part of a RecoverPoint snapshot-based Replication configuration.

- There is no support for FAST coordination propagation between a VMAX3 array running HYPERMAX OS 5977 and Enginuity 5876.
- An update operation on the source (R1) side after a failover where the target (R2) side is still operational to the hosts is not supported when the R1 side is a VMAX 10K, 20K, or 40K array running Enginuity 5876.
- Remote Pair FlashCopy for CKD devices is not supported between a VMAX3 array running HYPERMAX OS 5977 and an array running Enginuity 5876.
- Thick-to-thin connectivity requires at least Enginuity 5876.159.102 on VMAX arrays.
- In thin-to-thick and thick-to-thin configurations of arrays running Enginuity 5876 and PowerMaxOS 5978 or HYPERMAX OS 5977, the thick devices reside on the array running Enginuity 5876.

Cascaded

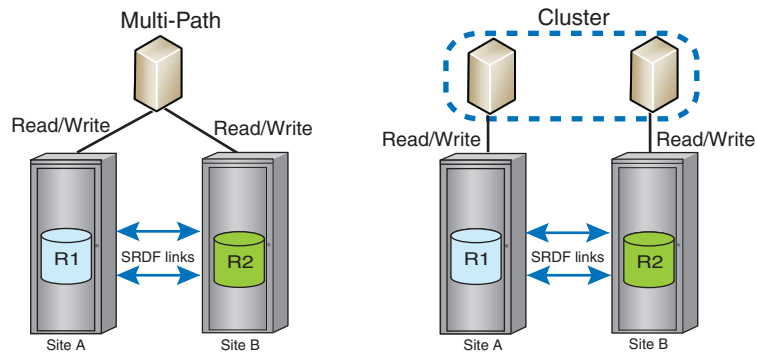
- When a VMAX 10K is part of a configuration, it must run at least Enginuity 5876.159.102 to connect to thick FBA devices on VMAX 40K, VMAX 20K, or VMAX arrays running 5876.159.102 or later.
- When the R21 site is a VMAX 10K it must run Enginuity 5876.159.102 or later.

Concurrent

- In SRDF/A mode, you cannot move dynamic SRDF devices between groups.
- Arrays running Enginuity 5876 with CKD zBoost require additional fixes to be able to connect to HYPERMAX OS 5977.811.784 and 5977.813.785. Contact your Dell EMC representative for more information.

SRDF/Metro

Use this section to determine valid SRDF/Metro configurations.



How to determine valid SRDF/METRO configurations

Procedure

1. Locate the version of PowerMaxOS or HYPERMAX OS that one side runs in the **When one array runs** column of [Table 1](#) on page 2.
2. The corresponding entries in the **SRDF/Metro** column show the minimum versions of PowerMaxOS or HYPERMAX OS that can be on the other side. Choose one of those versions or its successors.

For example, one side runs PowerMaxOS 5978.144.144. From [Table 1](#) on page 2 the minimum versions that the other side can run are PowerMaxOS 5978.144.144 or HYPERMAX OS 5977.952.892.

Application host support

The [host support matrix](#) lists the hosts that are supported for each combination of operating environment.

Limitations

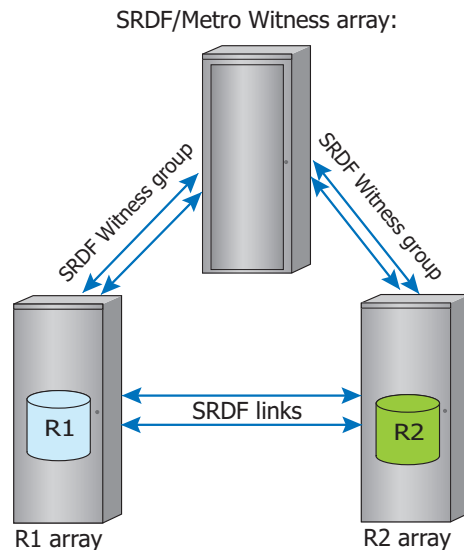
- SRDF/Metro does not support:
 - CKD device pairs
 - Online device expansion
 - ProtectPoint
 - CloudArray
 - Some Mobility Safe ID with ALUA environments
See the [E-Lab Interoperability Navigator](#) for more information.
 - Microsoft ODX
 - Microsoft Cluster with non-uniform connection (without cross-connects)
 - RecoverPoint snapshot-based replication
 - SRDF with Consistency with ODX
 - FCoE front-end capabilities
- A R2 device cannot be larger than its corresponding R1 device.
- You cannot change the SRDF Consistency state once it is enabled for all SRDF devices.
- Consistency Group (CG) SRDF control and set operations are allowed on one SRDF group at a time.
- VAAI commands are available with PowerMaxOS 5978.144.144 and later or HYPERMAX OS 5977.811.784 and later, except for xCopy/ODX which is available in PowerMaxOS 5978.144.144 and later or HYPERMAX 5977.952.892 and later.
- SCSI 2 and 3 reservations are available on PowerMaxOS 5978.144.144 and later or HYPERMAX OS 5977.811.784 and later only.

Array Witness

If one or more device pairs become Not Ready or connectivity is lost between the arrays, SRDF/Metro must decide which side of the pair remains accessible to the hosts. One of the available methods is the Array Witness which uses a third array to help choose the side that remains available.

Note

It is important to deploy the array witness in a failure domain that is separate from the failure domains that contain the two SRDF/Metro arrays. This ensures that a single failure impacts only one of these entities and guarantees continuous availability to the applications.

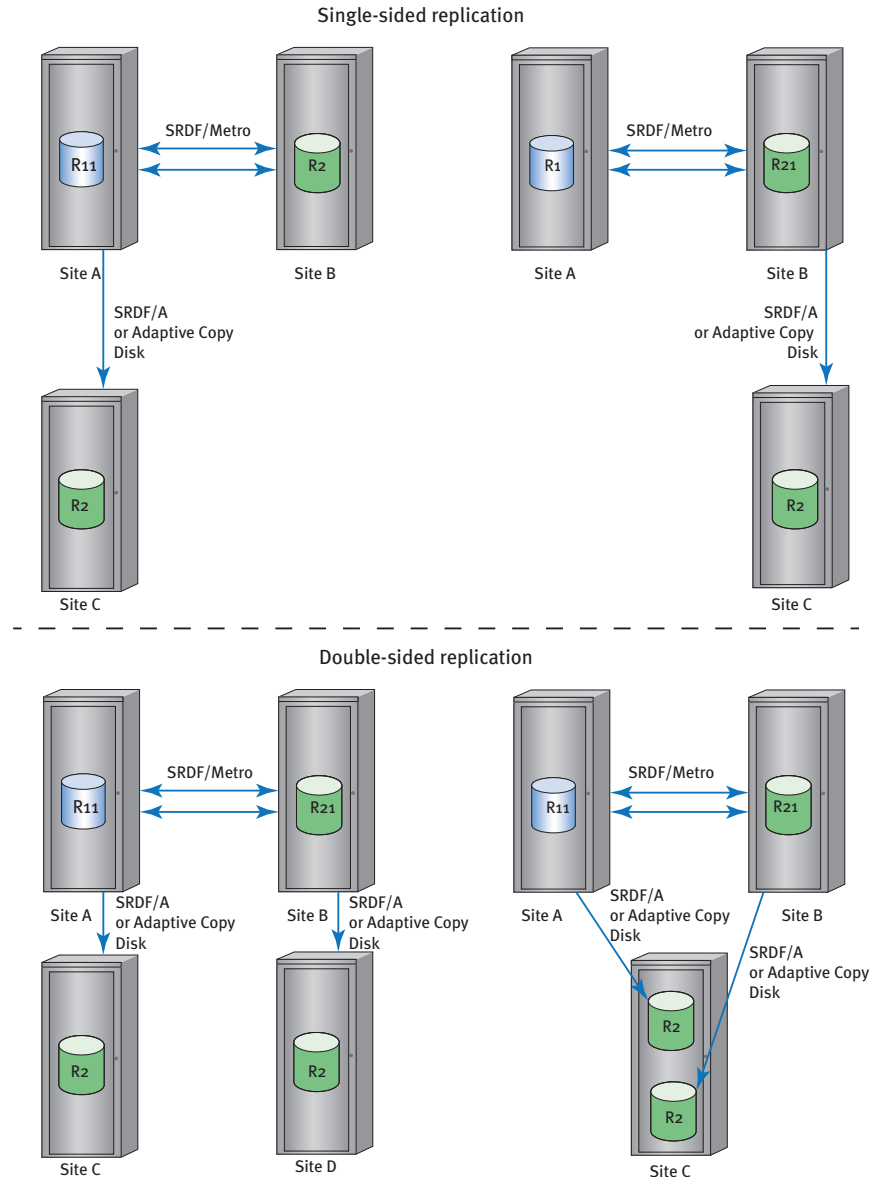


The version of PowerMaxOS, HYPERMAX OS, or Enginuity that runs on the witness array must be compatible with that running on each SRDF/Metro array. The rules for SRDF connectivity between an SRDF/Metro array and an Array Witness are the same as a regular [2 site SRDF replication configuration](#). However, the version of the operating environment that runs on the Array Witness must be compatible with the versions that run on both SRDF/Metro arrays.

For example, the R1 and R2 sides both run HYPERMAX OS 5977.811.784. [Table 1](#) on page 2 shows that the Array Witness can run HYPERMAX OS 5977.691.684 or later, Enginuity 5876.288.400 (when the Service Processor runs Windows 7), or Enginuity 5876.288.195.

Disaster recovery

In PowerMaxOS 5978 and HYPERMAX OS 5977.945.890 or later, you can attach disaster recovery (DR) arrays to a SRDF/Metro configuration. Either or both sides of the configuration can replicate to another array:



The version of PowerMaxOS, HYPERMAX OS, or Enginuity that runs on the disaster recovery array or arrays must be compatible with that running on the SRDF/Metro array it is connected to. The rules for SRDF connectivity between a SRDF/Metro array and a DR array are the same as a regular [2 site SRDF replication configuration](#). When both sides of the SRDF/Metro pair connect to the same DR array, the version of the operating environment on the DR array must be compatible with both the versions running on the SRDF/Metro pair. If each SRDF/Metro array is connected to its own DR array, treat each side as a separate, 2-site configuration.

For example, a double-sided configuration replicates the SRDF/Metro arrays at Sites A and B to a shared array at Site C. Also, both the SRDF/Metro partners run HYPERMAX OS 5977.952.892. [Table 1](#) on page 2 shows that the disaster recovery array can run PowerMaxOS 5978.144.144, HYPERMAX OS 5977.691.684 or later, Enginuity 5876.309.400 (when the Service Processor runs Windows 7), or Enginuity 5876.309.195.

NDM

NDM uses SRDF to migrate data from:

- An array that runs HYPERMAX OS 5977 to one that runs PowerMaxOS 5978
- An array that runs Enginuity 5876 to one that runs PowerMaxOS 5978
- An array that runs Enginuity 5876 to one that runs HYPERMAX OS 5977

Data is migrated from the *source array* to the *target array*.

NDM does not affect the operation of the application host, allowing applications to continue to run while the migration takes place. Once the migration is complete, the application host switches to using the target array. A typical use of NDM is when a data center has a technology refresh and replaces an existing array with a new one.

This table shows the versions of PowerMaxOS 5978, HYPERMAX OS 5977, and Enginuity 5876, along with the essential fixes (if any), that can participate in NDM.

NOTICE

It is strongly recommended that both sides have the latest GA cumulative Epacks installed since they contain the essential fixes listed in the table.

Table 2 Non-disruptive migration

Source array	Target array
HYPERMAX OS 5977.1131.1131 with fix 99609	PowerMaxOS 5978.221.221 (no additional fixes required)
Enginuity 5876.309.xxx with fix 98368	PowerMaxOS 5978.221.221 (no additional fixes required)
HYPERMAX OS 5977.1131.1131 with fix 99609	PowerMaxOS 5978.144.144 with fix 100394
Enginuity 5876.309.xxx with fix 98368	PowerMaxOS 5978.144.144 with fix 100394
Enginuity 5876.309.xxx with fix 98368	HYPERMAX OS 5977.1131.1131 with fix 99609

Application host support

The [host support matrix](#) lists the hosts that are supported for each combination of operating environment.

Mixed VMAX 20K migrations

Migrating a mixed FBA and CKD VMAX 20K to HYPERMAX OS 5977.1125.1125 requires Enginuity 5876.309.401 or Enginuity 5876.288.400. Refer to the Knowledgebase article [303996](#) for more information.

Disaster recovery

For disaster recovery (DR) purposes, either or both arrays in an NDM configuration can be connected to additional arrays using SRDF. The rules for SRDF connectivity between a NDM array and a DR array are the same as a regular [2-site SRDF replication configuration](#). When both sides of the NDM configuration are connected to other arrays, treat each side as a separate, 2-site configuration.

Point-to-point connections

This table show the types of point-to-point connection that are available for SRDF operations.

Configuration	Types of connection	Maximum number of RDF groups per connection
Both sides run PowerMaxOS 5978 or HYPERMAX OS 5977	FC	250
	Gige	250
One side runs PowerMaxOS 5978 or HYPERMAX OS 5977 and the other side runs Enginuity 5876	Gige ^a	250

- a. Point-to-point is not available for FC because:
- Dynamic RDF on Enginuity 5876 does not support point-to-point fiber.
 - Static RDF is not available in PowerMaxOS 5978 and HYPERMAX OS 5977.

The information in the table applies to configurations for disaster recovery or high-availability purposes. The information does not apply to NDM configurations since Solutions Enabler does not allow point-to-point RDF groups that are part of an NDM operation.

Requirements for performing system upgrades

When upgrading PowerMaxOS or HYPERMAX OS in any SRDF configuration, ensure that the arrays remain in a supported scenario throughout the upgrade process. For example, in a 2-site configuration upgrading Site A to HYPERMAX OS 5977.811.784 or later leaving Site B running HYPERMAX OS 5977.596.583 is not supported.

To avoid unsupported configurations, use an upgrade path similar to the following example of a 3-site SRDF configuration. Initially, all sites are running HYPERMAX OS 5977.596.583 and the aim is to upgrade to HYPERMAX OS 5977.814.786.

1. Upgrade Site A to HYPERMAX OS 5977.691.684.
2. Upgrade Site B to HYPERMAX OS 5977.691.684.
3. Upgrade Site C to HYPERMAX OS 5977.691.684.
4. Upgrade Site A to HYPERMAX OS 5977.814.786.
5. Upgrade Site B to HYPERMAX OS 5977.814.786.
6. Upgrade Site C to HYPERMAX OS 5977.814.786.

More information

These PowerMax, VMAX All Flash, VMAX3, and VMAX documents contain information on SRDF and NDM.

PowerMax series:

- *Dell EMC PowerMax Family Product Guide*

VMAX All Flash series:

- *Dell EMC VMAX All Flash Product Guide for VMAX 250F, 450F, 850F, 950F with HYPERMAX OS*

VMAX3 series:

- *EMC VMAX3 Family Product Guide for VMAX 100K, VMAX 200K, VMAX 400K with HYPERMAX OS*

VMAX series:

- *Symmetrix Remote Data Facility (SRDF) Product Guide*

All systems:

- FBA environments: *Dell EMC Solutions Enabler SRDF Family CLI User Guide*
- CKD environments: *Dell EMC Mainframe Enablers SRDF Host Component for z/OS Product Guide*

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