V-Series Systems

Implementation Guide for EMC® Symmetrix® Storage

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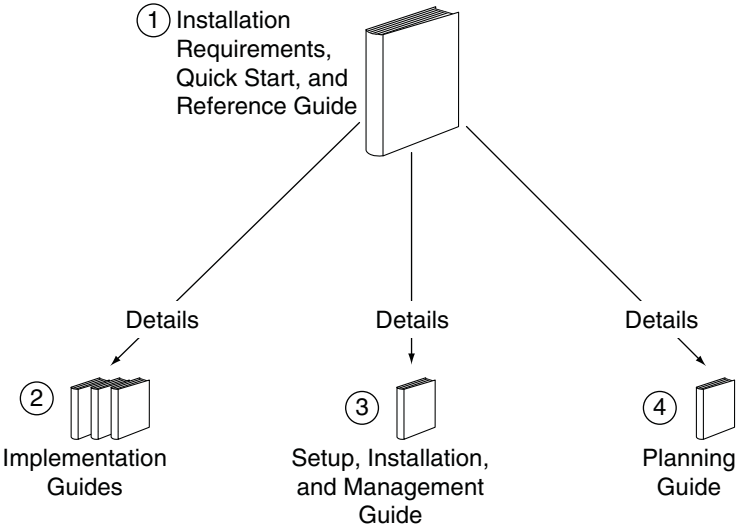
Preface

About this guide

This guide provides information about how to set up your storage array to work with a V-Series system running Data ONTAP® software, including configuration guidelines and sample configurations. The information in this guide pertains to all supported V-Series platforms.

Relationship of this guide to other guides

This guide is intended to be used in conjunction with other information in the V-Series library.



The following table describes the relationships between this guide and other V-Series documentation.

	Guide name	Information included
1	*Installation Requirements, Quick Start, and Reference Guide*	◆ General guidelines for creating and making array LUNs available to V-Series systems ◆ Quick start installation instructions ◆ Reference information

	Guide name	Information included
2	*Implementation Guides*	◆ Vendor-specific details ◆ More detailed configuration examples than are provided in the *Installation Requirements, Quick Start, and Reference Guide*
3	*Setup, Installation, and Management Guide*	Detailed steps for setting up the V-Series system and installing Data ONTAP software (for installers new to Data ONTAP setup and installation)
4	*Planning Guide*	Detailed background information, for example, about aggregate and Data ONTAP volume use, array LUN size and layout in aggregates, and checksums

Audience

This guide is for system administrators who are familiar with operating systems such as UNIX® and Windows® and who will be installing V-Series systems. This guide does not discuss basic system or network administration topics, such as IP addressing, routing, and network topology; it emphasizes the characteristics of the V-Series system.

Terminology

An *active/active configuration* is a pair of V-Series systems configured to serve data for each other if one of the two systems becomes impaired. In V-Series documentation, Data ONTAP documentation, and other information resources, active/active configurations are sometimes also referred to as *clusters*.

Special messages

This guide contains special messages that are described as follows:

Note

A note contains important information that helps you install or operate the system efficiently.

Attention

Attention contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data.

Implementation Overview 1

About this chapter

This chapter provides an overview of how to integrate V-Series systems with supported EMC® Symmetrix® (DMX) storage arrays.

Topics in this chapter

This chapter discusses the following topics:

Generic storage allocation terms used to in this document

Terminology for the same entity varies in EMC Symmetrix documentation and configuration and management tools. The following generic terms are used in this document.

logical device: A storage element that has not yet been mapped to an array port and, therefore, is not yet available to a host for storage. Some Symmetrix documentation and tools use the term *logical volume* for this element.

channel director, host director: A component in a DMX storage array that interfaces between the host channels and data storage.

array LUN: A logical device that has been mapped to an array host director port and, therefore, is available to a host for storage. If it is clear from the context that the LUN is on the array, *LUN* is used by itself.

Additional information to read

This guide is intended to be used in conjunction with other information in the V-Series library. In particular, refer to the additional documents in the following table.

For information about...	See...
Data ONTAP releases that support V-Series, supported switches, supported firmware, capacity, and maximum DMX array LUN count	V-Series *Support Matrix* at http://now.netapp.com **Note** The *Support Matrix* is the final authority on the storage array models and license code and firmware controller versions that V-Series supports.
Creating LUNs for V-Series systems on the storage array and setting up access (generic information for all vendors and storage arrays)	V-Series *Installation Requirements, Quick Start, and Reference Guide*
How to configure the V-Series system	V-Series *Installation Requirements, Quick Start, and Reference Guide* V-Series *Setup, Installation, and Management Guide* (detailed procedures)
How the V-Series system operates and what you need to plan for a successful deployment with V-Series	V-Series *Planning Guide*

DMX specific terminology

channel director — The component in a DMX storage array that interfaces between the host channels and data storage. It transfers data between the channel and global memory. The number of channel directors and total ports on each channel director varies on different DMX storage array models.

Some DMX models use another term for this component—for example, *host director* or *channel adapter.*

director — See *host director*, *channel director*, and *disk director.*

disk director — The component in the DMX storage array that interfaces between the global memory and the disk devices.

EMC ControlCenter (ECC) — An EMC application that can be used to monitor, configure, and control storage across platforms and environments.

Enginuity — The operating environment for the EMC Symmetrix Enterprise Storage Platforms. Enginuity provides functional services for its host Symmetrix systems and for the EMX storage application software.

FEBE Board — (Front-End-Back-End Board) Contains up to 16 ports with 8 front-end host ports and 8 back-end disk ports. The FEBE Board is the interface between the Fibre Channel director front-end host ports and back-end disk ports. Each FEBE Board contains 2 channel directors, with 8 ports per channel director.

Fibre Channel director — See *host director* and *channel director.*

gatekeeper

A DMX logical device, accessible by a host, through which SYMAPI or the ControlCenter agent communicates with the DMX storage array.

host director

A generic term for a component that manages host-facing I/0 and provides the logical mapping to ports that makes storage available. Terms used to refer to this component vary among storage array models; they include channel director, Fibre Channel director, and director.

Host Type Format

Each logical device in a DMX storage array is formatted using a specific format type. For logical devices that you intend to present to V-Series systems, you must use the default format type for Open Systems, which is "Server" in the ECC GUI, when you create the logical device. (See "Required DMX configuration settings" on page 8.)

hypervolume

A data unit on a single disk drive. Depending on its size, a physical disk can contain several hypervolumes. A RAID5 configuration, for example, is composed of four (3+1) or eight (7+1) hypervolumes.

You can combine multiple hypervolumes to create a *metavolume*.

logical device

A logical storage element that is configured on the storage array. Some Symmetrix documentation uses the term *logical volume* for this element. In the Symmetrix CLI, the term *SymmDev* is the equivalent term for logical device.

Logical devices cannot be accessed by hosts until after they have been mapped to a host-facing port on the storage array.

A logical device that has been mapped to an array host director port is often referred to as a *LUN*. The V-Series documentation uses the term *array LUN* to refer to a mapped logical device.

logical volume (LV)

A user-defined storage device. A user can define a physical disk device as one-to-eight logical volumes (logical devices). (This document used the term *logical device* instead of logical volume.)

logical unit number (LUN)

An encoded identifier for the logical unit of a SCSI device.

metavolume

A logical volume set created from individual physical disks to define logical volumes larger than the current DMX maximum hypervolume size. Physically, a metavolume is two or more DMX hypervolumes presented to a host as a single addressable device.

For example, you can create a pool of equal-sized DMX logical volumes in which each volume in the pool maps directly to a 72-GB metavolume. This 72-GB metavolume is composed of eight hypervolumes of 9 GB each.

Parity RAID, Parity RAID group

A DMX feature that provides parity data protection on the disk device level using physical parity volumes. A Parity RAID (3+1) group consists of three data drives and one parity drive. A Parity RAID (7+1) group consists of seven data drives and one parity drive.

In V-Series documentation, the generic term *RAID group* is used as the equivalent term to *Parity RAID group*.

SymmDev

In the CLI, the internal name for a logical device.

UWN

(Unique World Wide Name) In a DMX storage array, each Fibre Channel port used for host connectivity has a unique WWN.

volume (EMC)

In a DMX storage array, a general term referring to a storage device. A physical volume corresponds to a single disk device. A user can define a physical disk device as anywhere from one to eight logical volumes. (See also *logical volume*.)

Note

EMC DMX volumes are not the same as Data ONTAP volumes. A Data ONTAP volume is a logical entity that holds user data that is accessible through one or more of the access protocols supported by Data ONTAP, including Network File System (NFS), Common Internet File System (CIFS), HyperText Transfer Protocol (HTTP), Fibre Channel Protocol (FCP), and Internet SCSI (iSCSI). V-Series treats a DMX volume (logical device), hypervolume, or metavolume as a disk.

Supported EMC DMX storage arrays and firmware

Finding out which Data ONTAP release supports which storage arrays

This guide provides information about the storage arrays that V-Series supports at the time of publication. Not all models described in this guide are supported in all Data ONTAP releases. To determine which storage array models are supported in a particular Data ONTAP release, see the V-Series *Support Matrix*.

Note

The V-Series *Support Matrix* is the final authority about which Data ONTAP releases, storage arrays, firmware, switches, features, and so on that V-Series systems support.

Supported storage array models

V-Series systems support the following EMC DMX storage array platforms:

- Family 1
  - DMX3
- Family 2
  - DMX3000
  - DMX2000
  - DMX1000
  - DMX800

Note

In the context of this discussion, storage arrays in the same *family* share the same performance and failover characteristics. For example, members of the same family all perform active-active failover or they all perform active-passive failover. Storage arrays with 4 GB HBAs are not considered to be in the same family as storage arrays with 2 GB HBAs. When you set up a Data ONTAP aggregate, you cannot assign array LUNs from different storage array families or different vendors to the same aggregate.

Supported firmware versions

See the V-Series *Support Matrix* for information about supported firmware versions. The *Support Matrix* is the final authority on the firmware versions that V-Series supports.

Required DMX configuration settings

Enginuity level required

Symmetrix Enginuity is the operating environment for Symmetrix DMX systems. See the V-Series *Support Matrix* for the Enginuity level requirements.

You must set both parameters related to SCSI-3

You must set two different parameters related to SCSI-3—one at the port level and one at the logical device (LUN) level. The two SCSI-3 flags that you need to set are as follows:

- `SC3` Flag or `SCSI-3` Flag. You must set this flag on each host (channel) director port to which the V-Series system connects.
- `SCSI3_persist_reserv` or `PER` Flag. You must set this flag on each logical device that V-Series will use.

Attention

Both SCSI-3 parameters are required for V-Series system to work.

The `SCSI-3` flag enables the connecting port to understand the SCSI-3 "dialect" and semantics. In addition to the SCSI-3 flag being enabled, each LUN must have the ability to remember and enforce persistent reservations requested in the SCSI-3 "dialect"—the `SCSI3_persist_reserv` flag setting for each logical device enables each LUN to enforce the persistent reservations requests.

Parameters to set on a host (channel) director port basis

Configure the following settings for each host (channel) director port to which the V-Series system connects.

Note

Parameter names might be different depending on whether they appear in the GUI or CLI.

Parameter	Value to set	Comments
Common SN (Common Serial Number flag, also known as the C-bit Flag)	Enable this parameter so that each array LUN is presented across the various Fibre Channel director ports.	This parameter assigns a common serial number across the logical devices that are exposed through multiple target ports. **Note** Most multipathing software uses the LUN serial number to determine whether a LUN has multiple paths.
PP Flag (Point-to-Point flag)	Enable this flag on the DMX FA ports if the V-Series systems and DMX storage array are connected through switches.	Do not enable the PP Flag if the V-Series systems and the DMX storage array are directly connected.
SC3 Flag (SCSI-3)	Enable this flag.	Describes the command sets for block-oriented direct-access devices—for example, disk drives. V-Series supports SCSI-3 command blocks.
SPC-2 Flag (SCS2_Protocol_version, SCSI Primary Command 2 flag, or “Allow inquiry data to be compiled to the standard”)	Enable this flag.	Contains the second-generation definition of the basic commands for all SCSI devices. SPC-2 is used in conjunction with several standards for the specific device type, including SCSI-3 Block Commands (SBC-3).
UWN Flag (Unique World Wide Name flag)	Enable this flag for each target port so that each FA port that communicates with the V-Series system has a Unique World Wide Name.	—

Parameters to set for each logical device for V-Series

When you create a logical device that you intend to present to V-Series systems, you must set the values of the parameters in the following table as shown.

Parameter	Value to set	Comments
Host Type Format	Default format type for Open Systems, which is "Server" in the EMC ControlCenter.	Each logical device in a DMX storage array is formatted using a specific format type.
`SCSI3_persist_reserv` (Persistent Reservations flag or PER Flag)	Set this flag to `On`.	This flag, commonly known as SCSI-3 Persistent Reservations, is set on a DMX storage array to support hosts that require SCSI-3 persistent reservations. V-Series uses the "Write Exclusive Registrants Only" persistent reservation type.

Requirement for LUN access control

To eliminate the possibility of a non V-Series system overwriting DMX array LUNs owned by a V-Series system, or the reverse, you must present the DMX logical devices through the host (channel) director ports in one of the following ways:

Method 1: Present only the DMX logical devices for V-Series on specific DMX host (channel) director ports that are dedicated to V-Series use, and prevent the logical devices for V-Series from being mapped through other host (channel) director ports.

Method 2: Use the LUN masking capability to associate all DMX logical devices to all host (channel) director ports, but allow only the V-Series FC initiator ports to see the LUNs for V-Series.

If you are setting up a configuration in which you are using multiple array LUN groups for V-Series, you will set up a separate "host group" for each group of LUNs for V-Series (see "Fabric-attached configurations that optimize performance" on page 25 for an example of this type of configuration).

Attention

If you use Method 2, do not present the VCMDB (Volume Configuration Management DataBase) to all hosts by default. Configure the global setting to restrict visibility to the VCMDB unless it has been specifically made visible to a particular host.

The results of Method 2 are the same as Method 1. But the benefit is that masking is at the logical level (initiator port WWN) rather than at the physical or switch zone level.

Recommendation regarding port sharing

It is strongly recommended that you do not share DMX array ports between V-Series clients and non V-Series clients. The reason is that there is great potential for incompatible port requirements when DMX ports are shared between V-Series clients and non V-Series clients. Each host connecting to the DMX storage array has different requirements for port attribute settings, which can result in a configuration that is impossible to implement. If the ports on the DMX storage array cannot be dedicated to the V-Series system, confirm that the port requirements for all other clients using that port are compatible with V-Series port requirements.

Assignment of array LUNs to V-Series systems

Maximum number of array LUNs you can allocate to V-Series

The maximum number of array LUNs on the DMX system that you can allocate to V-Series is controlled by the following:

- The maximum LUN limit of the V-Series model
- The Data ONTAP-imposed limit of the maximum number of LUNs per host group

Data ONTAP imposes a maximum limit of 256 array LUNs per DMX host group. You cannot exceed the V-Series neighborhood maximum array LUN limit for the models of the V-Series systems in the neighborhood. The maximum number of array LUNs in a V-Series neighborhood is calculated by adding the number of LUNs presented to the V-Series systems in the neighborhood by all storage arrays. See the V-Series *Support Matrix* for information about the maximum neighborhood array LUN limit.

Required number of paths to an array LUN

V-Series systems expect a storage array to provide access to a specific array LUN on only two of the storage array host (channel) director ports: one is the primary path and the other is the alternate (secondary) path. A given LUN is accessed through only one host (channel) director port at a time. (See the V-Series *Planning Guide* for details about paths.)

When you map a DMX logical device, you select the two host (channel) director ports that the V-Series system can use to access the LUN. Ensure that the two director ports that you select to access a given LUN are from alternate FEBE Boards to avoid a single point of failure (SPOF). A SPOF would occur if the two director ports you selected were on the same FEBE Board and the board failed.

LUN numbers you can use with V-Series

Do not use a LUN with a LUN ID of 0.

Requirements for matching LUN IDs

The LUN number used to map the array LUNs must be the same on each host director port in the port pair, or data corruption can occur. (*Port pair* refers to the two redundant storage array ports that are used to access the same LUN.)

Format of DMX LUN IDs

DMX LUN IDs are in hexadecimal format. Data ONTAP LUN IDs are in decimal format. To correlate DMX LUN IDs and Data ONTAP LUN IDs, you must convert the hexadecimal numbers to decimal.

Caution about using the VCMDB LUN

For VCMDB (Volume Configuration Management DataBase) to be enabled, the VCMDB LUN must exist. The VCMDB LUN is a "command" type LUN, not a storage LUN. VCMDB is typically mapped to LUN 0. However, the VCMDB LUN can be an array LUN other than LUN 0.

If you map the VCMDB LUN to the V-Series system, the V-Series system periodically logs a message that the VCMDB LUN is less than the minimum size required, and it marks the VCMDB LUN as failed. The V-Series system continues to function normally after logging this error message.

Caution about using a gatekeeper LUN

If a gatekeeper logical device (LUN) is presented, do not map it to the V-Series system. A V-Series system cannot use a gatekeeper LUN. A gatekeeper LUN is smaller than V-Series can handle. You cannot assign the gatekeeper LUN to the V-Series system with the `disk assign` command.

Note

A gatekeeper is a DMX logical device, accessible by a host, through which SYMAPI or the ControlCenter agent communicates with the DMX storage array.

Guidelines for array LUN sizing

V-Series minimum and maximum array LUN sizes

The size of the array LUNs that you can create on the storage array is limited by the minimum and maximum array LUN sizes that V-Series supports. The Data ONTAP definition of a gigabyte (GB) might not match the definition of a GB for your storage array.

The Data ONTAP definition of a GB is that one GB is equal to 1000 x 1024 x 1024 bytes.

Attention

The minimum array LUN size shown in the following table does not apply to the array LUN for the root volume. It is strongly recommended that you do not set the size of a root volume below the minimum root volume size shown in the V-Series *Installation Requirements, Quick Start, and Reference Guide*. The reason is that you want to ensure that there is sufficient space in the root volume for system files, log files, and core files. If a system problem occurs, you need to provide these files to technical support.

The following table shows the V-Series minimum and maximum array LUN sizes.

Data ONTAP release	Minimum array LUN size	Maximum array LUN size
7.24 and later	1 GB	1 TB Calculated as: 1000 * 1000 * 1024 * 1024 = 1,048,576,000,000 bytes
7.2.3	1 GB	750 GB Calculated as: 750 * 1000 * 1024 * 1024 = 786,432,000,000 bytes
Prior to 7.2.3	1 GB	500 GB Calculated as: 500 * 1000 * 1024 * 1024 = 524,288,000,000 bytes

Minimum and maximum array LUN sizes with EMC DMX storage arrays

EMC calculates units of measure differently than Data ONTAP. The minimum and maximum usable values shown in this section are based on the assumption that the units of measurement for your storage array are calculated as follows.

Unit	Formula for calculating
GB	1024 x 1024 x 1024 bytes
MB	1024 x 1024 bytes
KB	1024 bytes

If you plan to use a large-sized LUN that is close to the maximum capacity that Data ONTAP supports, ensure that the size you specify does not exceed the size shown in the "Maximum usable value" column in the following tables.

Note

Storage arrays vary as to how you can specify LUN size (that is, in GB, MB, or 512-byte blocks).

See the V-Series *Planning Guide* for guidelines about the implications of different size array LUNs on Data ONTAP storage.

Values for Data ONTAP 7.2.4 and later:

If you are specifying in...	Minimum usable value	Maximum usable value
GB	2 GB	976 GB
MB	1,049 MB	975,000 MB
512-byte blocks	2,048,001 512-byte blocks	2,047,500,000 512-byte blocks

Values for Data ONTAP 7.2.3:

If you are specifying an...	Minimum usable value	Maximum usable value
EMC GB	2 GB	732 GB
EMC MB	1,049 MB	749,000 MB
512-byte blocks	2,048,001 512-byte blocks	1,535,500,000 512-byte blocks

Values for Data ONTAP 7.2.2 and earlier:

If you are specifying an...	Minimum usable value	Maximum usable value
EMC GB	2 GB	488.281 GB
EMC MB	1,049 MB	500,000 MB
512-user blocks	2,048,001 512-byte blocks	1,024,000,000 512-byte blocks

Best practice logical device size recommendation

Creating one large logical device or metavolume from multiple hypervolumes spanning multiple disks is recommended.

Supported Configurations 2

About this chapter

This chapter discusses the supported configurations for all supported EMC DMX storage arrays. Use the configurations in this chapter as guidelines for connecting your V-Series system to your storage array and setting up zoning.

Topics in this chapter

This chapter discusses the following topics:

About the examples in this chapter

The examples in this chapter show DMX800 storage arrays. The number of host (channel) directors and director ports varies between different DMX models.

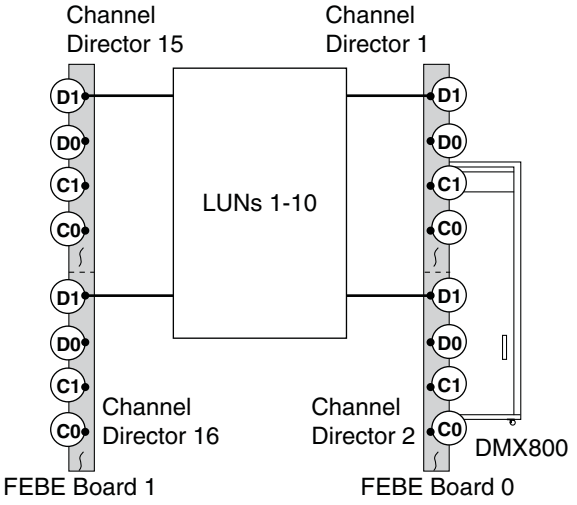
Your guide to interpreting the illustrations

How redundant paths and port pairs are shown

Illustration of redundant paths and port pairs for storage arrays: In each illustration in this chapter, the port pairs on the storage array are shown in relation to the array LUNs mapped to the port, with the ports on alternate channel directors and FEBE Boards.

Note

You might choose to use more host (channel) director ports than are shown in the illustrations in this chapter.



Note

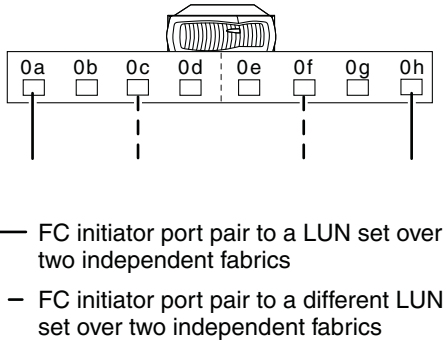
For simplicity, the following illustration does not show the DMX back-end target ports A0, A1, B0, and B1.

See the V-Series *Planning Guide* for rules for setting up redundant ports and examples of valid and invalid configurations.

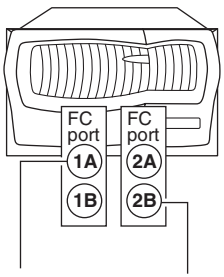
Illustration of redundant paths and port pairs for the V-Series systems: On some V-Series models, the FC initiator ports are on cards. On other models, the FC initiator ports are onboard ports and are labeled 0a, 0b, and so on. Redundancy is achieved on the V-Series system because each port in a pair

is on a different bus or on a different card. (For more information about selecting redundant ports on the different V-Series models with onboard FC initiator ports, see the V-Series guide *Connecting Your V-Series System*.)

The following illustration shows a V6000 model, which has both onboard FC initiator ports and cards. In this example, two different redundant port pairs are used on the V-Series system. To use multiple V-Series port pairs to access LUNs on a DMX storage array, as shown in the illustration, each port in a V-Series port pair must access a different fabric.



The following illustration shows a redundant port pair on a V-Series model that uses cards.



One port on each of two different cards is configured to ensure redundancy to the port pair on the storage array. Then, if one card fails, the port on the other card is used. You can use either port on a card.

Note

The illustration shows two cards, one with FC initiator ports 1A and 1B and the other with FC initiator ports 2A and 2B. The number represents the slot.

Direct-attached configurations

Requirement for direct-attached configurations

In a direct-attached V-Series active/active configuration, one port pair *per node* is required. You avoid a single point of failure by creating a redundant port pair. Then, if one path from a V-Series node fails, the other path from the node is used; takeover does not occur. (The way you create a redundant port pair differs according to V-Series model.) For models with adapters, choose one port from each adapter. For models with onboard ports, choose one port from each bus. See the guide *Connecting Your V-Series System* for more information.

Direct-attached with one 4-port LUN group

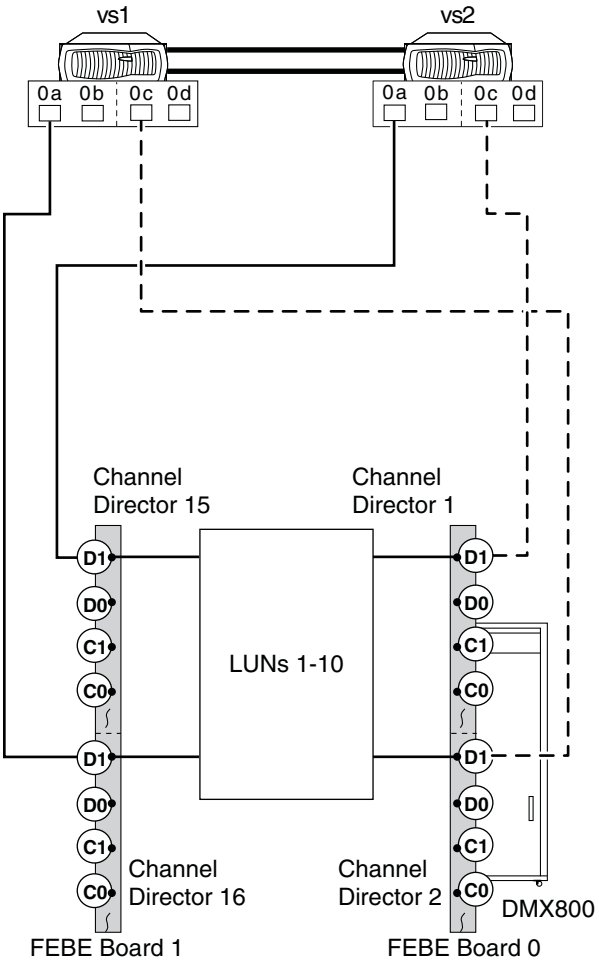
The following illustration shows a deployment with a V-Series active/active configuration that is directly connected to a DMX800 storage array. The number of host (channel) directors and ports and their layout on the storage array might vary between DMX models.

In this configuration, four front-end DMX target ports are used to connect to the V-Series systems. The DMX logical devices are mapped to the D1 port on Channel Directors 1, 2, 15, and 16.

For redundancy, each V-Series FC initiator port is connected to a separate DMX target port, with each of the target ports on a different channel director (as this example shows). This is a best practice recommendation.

Note

For simplicity, the following illustration does not show the DMX back-end target ports A0, A1, B0, and B1.



Direct-attached with two 4-port LUN groups

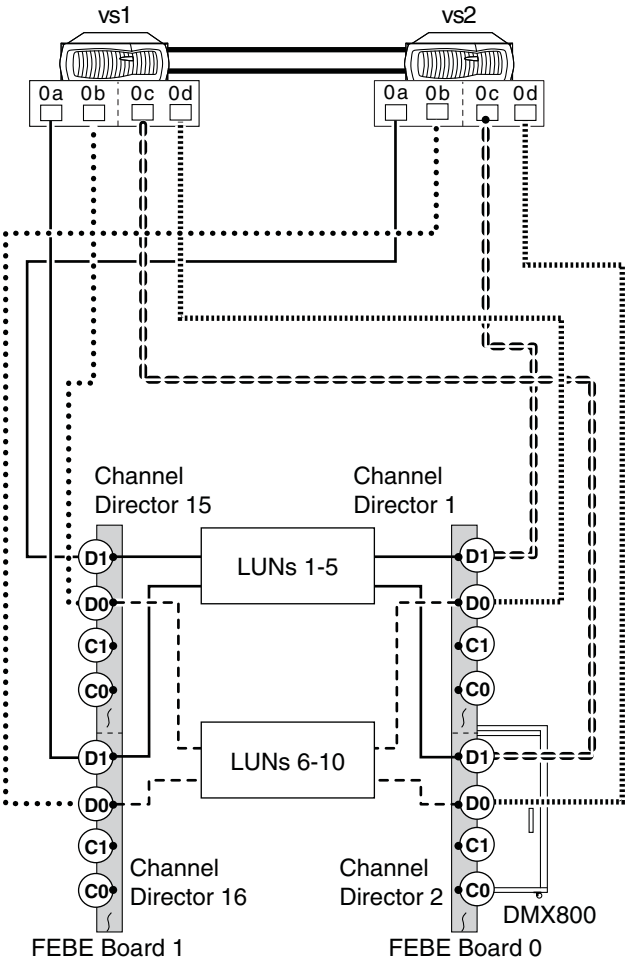
This direct-attached configuration example provides additional port bandwidth because it uses eight front-end DMX target ports to connect to the V-Series systems instead of the four ports shown in the previous configuration example.

To implement this type of configuration, the DMX logical devices are mapped as follows:

- Half of the DMX logical devices for the V-Series systems are mapped to four front-end target ports (D1), one on each of Channel Directors 1,2, 15, and 16.
- The other half of the DMX logical devices are mapped to four other front-end target ports (D0), one on each of Channel Directors 1,2, 15, and 16.

Attention

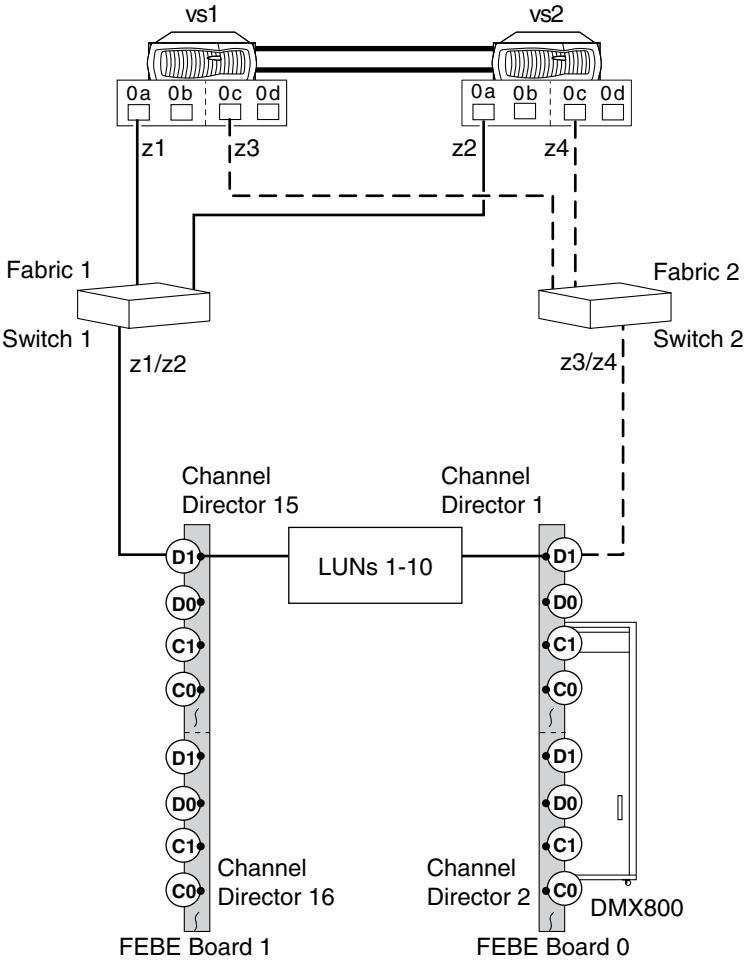
In this type of configuration, do not map all DMX logical devices to all connected target ports.



Simple fabric-attached configuration

Active/active configuration with one 2-port LUN group

The following example shows a simple fabric-attached 2-port configuration—two front-end target ports are used on the DMX storage array. To ensure availability, use a redundant port pair on each V-Series system (that is, a port from each bus or adapter). Then, if one path from a V-Series node fails, the other path from the node is used; V-Series controller takeover does not occur.



Note

Best practice recommendation is that you connect all the V-Series FC initiator "0a" ports to Fabric 1 and all the V-Series FC initiator "0c" ports to Fabric 2. It makes it easier to visualize the deployment if you connect the ports to the fabrics in this manner.

Zoning: The following table shows the single-initiator zoning for this example with a V3xxx active/active configuration.

Note

Each pair of ports (the FC initiator port on the V-Series system and the channel director target port on the DMX storage array) must be in its own fabric zone so that it cannot see other devices or ports.

Zone	V-Series system		Storage array		
Switch 1					
z1	V-Series system 1	Port 0a	FEBE Board 1	Channel Director 15	Port D1
z2	V-Series system 2	Port 0a	FEBE Board 1	Channel Director 15	Port D1
Switch 2					
z3	V-Series system 1	Port 0c	FEBE Board 0	Channel Director 1	Port D1
z4	V-Series system 2	Port 0c	FEBE Board 0	Channel Director 1	Port D1

Fabric-attached configurations that optimize performance

How performance is optimized

As the examples in this section illustrate, you can optimize performance by spreading the I/O across the Parity RAID groups on the storage array. You set up your configuration so that different port pairs on a V-Series system access different groups of LUNs on the DMX storage array.

Different port pairs on a V-Series system accessing different LUN groups on a DMX storage array works because each port on a DMX storage array has its own WWN and, on DMX storage arrays, you map DMX logical devices to ports. The V-Series system sees any given array LUN over only two paths because a given logical device is mapped to only two alternate ports on the storage array.

Different LUN groups are accessed through different ports. Each number used to identify a logical device must be unique on the same storage array, but numbers presented to hosts to identify LUNs (external numbers) can be duplicated on different ports.

Attention

This configuration example of using two port pairs on a V-Series system to access two different device groups on the DMX storage array does not work with all vendors' storage arrays. If the configuration is valid for a particular vendor's storage arrays, the V-Series *Implementation Guide* for that vendor includes the configuration example.

In the examples in this section, two V-Series port pairs and four target ports on the DMX array are used. Each V-Series port pair sees a different LUN group.

Rules for implementing this type of configuration

To implement this type of configuration, you need to do the following:

- On the storage array, use as many ports as possible to provide access to the LUNs that you allocated for V-Series.

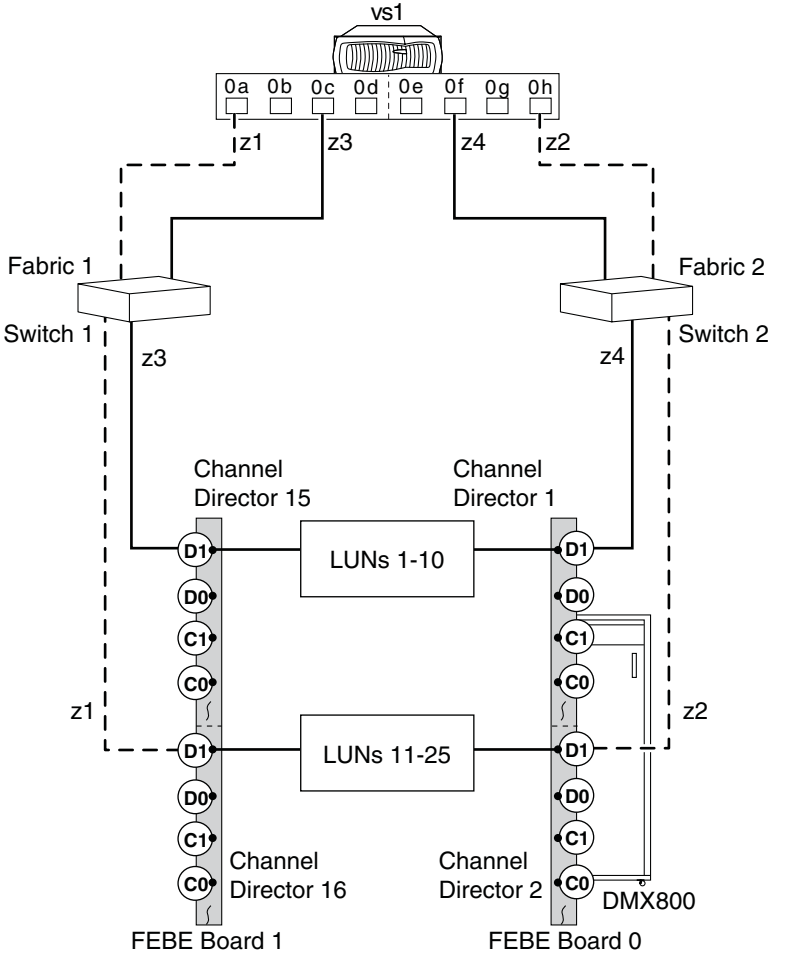
  In this example, half of the DMX logical devices for V-Series are mapped to two front-end target ports (D1) on redundant channel directors and the other half of the DMX logical devices are mapped to two other DMX front-end target ports (D1) on different redundant channel directors.
- On the V-Series system, use multiple port pairs. Each port pair accesses a different group of LUNs on the DMX storage array through redundant paths.

- Create one big aggregate (in the Data ONTAP configuration), assigning the array LUNs from multiple Parity RAID groups to the aggregate. By doing so, the I/O is spread across more disks.

The combination of spreading I/O across the Parity RAID groups and creating one large aggregate results in a significant performance boost.

Stand-alone with two 2-port LUN groups

The following illustration shows a configuration with a stand-alone V6xxx system. One V-Series port pair accesses LUNs in one LUN group on the storage array and a different V-Series port pair accesses LUNs in a different LUN group on the storage array.



The relationship between the V-Series port pairs, storage array port pairs, and LUN groups is summarized in the following table.

Redundant V-Series port pair	Redundant storage array port pair to which the DMX logical devices are mapped	LUN group
0a and 0h	Channel Director 16, port D1 Channel Director 2, port D1	LUNs 11-15
0c and 0f	Channel Director 15, port D1 Channel Director 1, port D1	LUNs 1-10

Zoning for this stand-alone configuration: The following table shows single-initiator zoning for this example with a V6xxx active/active configuration.

Note

Each pair of ports (the FC initiator port on the V-Series system and the channel director target port on the DMX storage array) must be in its own fabric zone so that it cannot see other devices or ports.

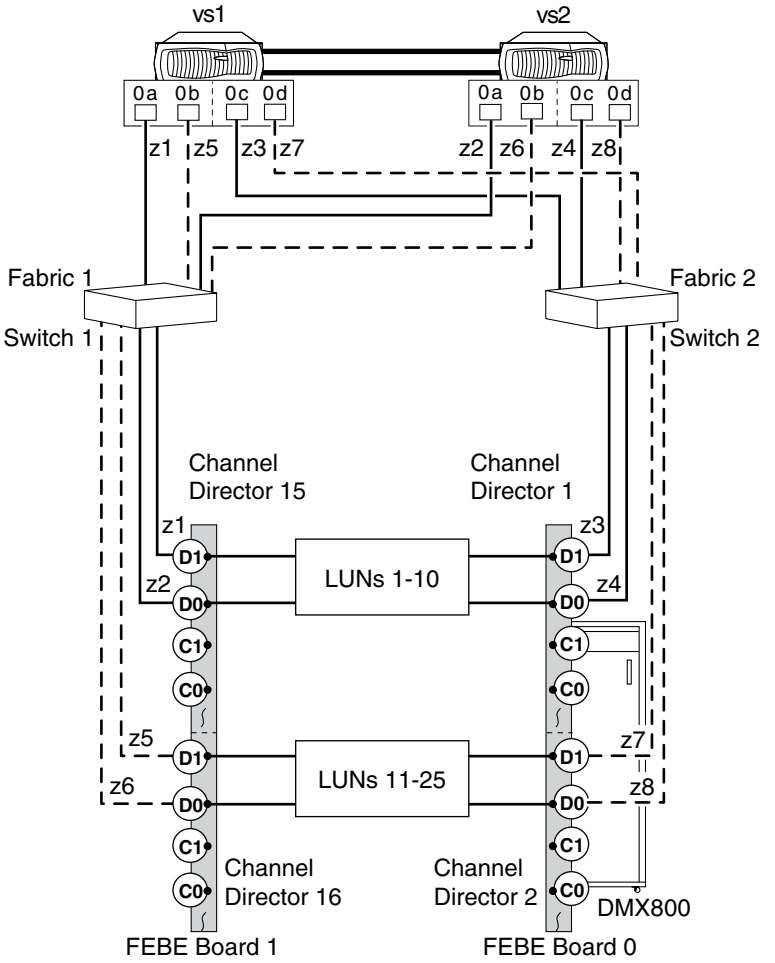
Zone	V-Series system port	Storage array			
Switch 1					
z1	0a	FEBE Board 1	Channel Director 16	Port D1	LUNs 11 - 25
z3	0c	FEBE Board 0	Channel Director 15	Port D1	LUNs 1 - 10
Switch 2					
z2	0h	FEBE Board 0	Channel Director 2	Port D1	LUNs 11 - 25
z4	0f	FEBE Board 1	Channel Director 1	Port D1	LUNs 1-10

Active/active configuration with two 4-port LUN groups

The following illustration shows a configuration with a V-Series active/active configuration with V3xxx V-Series systems. On each V-Series system, two V-Series port pairs are used to optimize performance. The V-Series port pairs are as follows.

- 0a and 0c
- 0b and 0d

Each V-Series port pair accesses a separate device group on the storage array.



The following table summarizes the zoning for this configuration.

Zone	V-Series system and port	Storage array			
Switch 1					
z1	vs1-0a	FEBE Board 1	Channel Director 15	Port D1	LUNs 1 - 10
z2	vs2-0a	FEBE Board 1	Channel Director 15	Port D0	LUNs 1 - 10
z5	vs1-0b	FEBE Board 1	Channel Director 16	Port D1	LUNs 11 - 25
z6	vs2-0b	FEBE Board 1	Channel Director 16	Port D0	LUNs 11 - 25
Switch 2					
z3	vs1-0c	FEBE Board 0	Channel Director 1	Port D1	LUNs 1 - 10
z4	vs2-0c	FEBE Board 0	Channel Director 1	Port D0	LUNs 1 - 10
z7	vs1-0d	FEBE Board 0	Channel Director 2	Port D1	LUNs 11 - 25
z8	vs2-0d	FEBE Board 0	Channel Director 2	Port D0	LUNs 11 - 25

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