

V-Series Systems Implementation Guide for EMC® CLARiiON 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.

Note

Data ONTAP software runs on multiple hardware platforms. This documentation might describe features that are not supported on your platform.

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 HA pair 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, HA pairs are sometimes also referred to as clusters or active/active configurations.

Relationship of this guide to other guides

This guide is intended to be used in conjunction with other information in the V-Series and Data ONTAP libraries. The following table describes the relationships between this guide and other documentation.

Guide name	Information includes...
<i>Installation Requirements and Reference Guide</i>	<ul style="list-style-type: none">◆ General guidelines for creating and making array LUNs available to V-Series systems.◆ Quick start installation instructions for connecting devices together and for installing Data ONTAP on a V-Series system that uses only third-party storage◆ Reference information◆ Detailed background information including layout in aggregates and checksums

Guide name	Information includes...
<i>Implementation Guides</i>	<ul style="list-style-type: none"> ◆ Vendor-specific details about how to set up a storage array to work with V-Series systems. ◆ More detailed configuration examples than are provided in the <i>Installation Requirements and Reference Guide</i>.
<i>Implementation Guide for Native Disk Shelves</i>	Information about setting up the storage on the native disk shelves connected to the V-Series system.
<i>V-Series Setup, Installation, and Management Guide</i> or the <i>Data ONTAP</i> software setup guides	Detailed steps for setting up the V-Series system, including information about installing Data ONTAP software for installations using only third-party storage. These guides are most helpful to installers new to Data ONTAP setup and installation.
Data ONTAP guides	Detailed information about all Data ONTAP features used by all systems running Data ONTAP, for example, storage features and data protection features.

See the *V-Series Support Matrix* for details about Data ONTAP releases that support V-Series, supported switches, supported firmware, capacity, and maximum array LUN count.

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.

About this chapter This chapter provides an overview of how to integrate V-Series systems with EMC® CX series storage arrays.

Topics in this chapter This chapter discusses the following topics:

- ◆ “[CX series terminology](#)” on page 3
- ◆ “[Supported CLARiiON storage arrays and firmware](#)” on page 4
- ◆ “[Planning for using CX series Storage Groups](#)” on page 6
- ◆ “[CX series configuration requirements](#)” on page 8
- ◆ “[RAID type restrictions](#)” on page 9
- ◆ “[Guidelines for array LUN sizing](#)” on page 10

Additional Information to read This guide is intended to be used in conjunction with other information in the V-Series and Data ONTAP libraries. 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 array LUN count	V-Series <i>Support Matrix</i> at http://now.netapp.com Note _____ The <i>Support Matrix</i> 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 arrays)	V-Series <i>Installation Requirements and Reference Guide</i>

For information about...	See...
How to configure the V-Series system	<p>V-Series <i>Installation Requirements and Reference Guide</i> (quickstart procedure)</p> <p>V-Series <i>Setup, Installation, and Management Guide</i> or Data Ontap software setup guides (detailed procedures)</p>
How the V-Series system operates and what you need to plan for a successful deployment with the V-Series	V-Series <i>Installation Requirements and Reference Guide</i>

CX series terminology

metaLUN	A LUN that was expanded from its original size by adding another LUN or an entire physical disk. If you need a LUN that exceeds the maximum number of disks for a RAID type or if you need to expand the user capacity of an existing LUN, you can use the metaLUN feature. You can view all metaLUN components from Navisphere (that is, the original LUN and any added LUNs). However, you cannot divide a metaLUN into its original LUNs.
Navisphere software	Navisphere Manager is a Web-based user interface for managing and configuring CX series storage arrays.
shared storage system	A CX series storage array with the EMC Access Logix option. The Access Logix option provides data access control (Storage Groups) and configuration access control. A shared storage system is always a RAID Group storage system.
SP	Storage Processor.
Storage Group	A collection of one or more array LUNs and metaLUNs that you connect to one or more hosts. A host can access only the LUNs in the Storage Groups to which it is connected.
storage system	<p>The term used by EMC to refer to the CX series systems. V-Series manuals use the term <i>storage array</i> to refer to the CX series storage systems.</p> <p>In Data ONTAP documentation, storage system is a general term that describes all systems that run Data ONTAP software, including V-Series systems.</p>
unshared storage system	A storage system without the EMC Access Logix option. In Data ONTAP documentation, storage system is a general term that describe all systems that run Data ONTAP software.

Supported CLARiiON 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 CLARiiON CX series storage arrays in the following families:

- ◆ Family 1
 - ❖ CX300, CX500, CX700
- ◆ Family 2
 - ❖ CX3-20, CX3-40, CX3-80
- ◆ Family 3
 - ❖ CX4-120, CX4-240, CX4-480, CX4-960

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. (Setting up a Data ONTAP aggregate, and assigning array LUNs from different storage array families or different vendors to the same aggregate is not supported.)

V-Series systems that support CX series storage arrays

For information about the V-Series models that support CX series storage arrays, see the V-Series *Support Matrix*.

Where to find information about supported CX series firmware

For information about the supported CX series firmware, 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.

Planning for using CX series Storage Groups

Storage Groups defined

CX series shared storage arrays use Storage Groups to control access to data. A Storage Group is one or more LUNs within the storage array that can be accessed only by the host or hosts that you associate with the array LUNs. Each host can see only the array LUNs in the Storage Group with which it is associated. Therefore, a host cannot access or modify data in array LUNs that are not part of its Storage Group. The Access Logix software, which runs on each CX series storage array, enforces the host-to-Storage Group permissions.

Note

Shared means that more than one host is allowed to access the storage on the storage array. Access control is used to prevent one host from overwriting the storage of another host.

Switch zoning cannot selectively control data access to LUNs on the storage array because each SP appears as a single Fibre Channel device to the switch fabric.

Maximum number of LUNs per Storage Group

On CX series storage arrays, the maximum number of LUNs per Storage Group is 256.

Note

Although there is limit of 256 LUNs per CX series Storage Group, performance is better if you create fewer larger array LUNs than a lot of smaller array LUNs. See the V-Series *Installation Requirements and Reference Guide* for the best practice recommendations for the number of array LUNs to create.

Rules for use of Storage Groups with V-Series

If you are using Storage Groups on your CX series storage array, you must adhere to the following rules:

- ◆ For Data ONTAP releases 7.3 and later, the V-Series systems supports more than one Storage Group per CX storage array. See “[Multiple array LUN group requirements](#)” on page 35 for more information.
- ◆ For Data ONTAP releases earlier than 7.3 the V-Series supports only one Storage Group (per CX series storage array).

- ◆ All the V-Series systems in the same neighborhood must be in the same Storage Group (because all the V-Series systems in the neighborhood must be able to see the same array LUNs).
- ◆ The maximum number of LUNs per Storage Group is 256.

CX series configuration requirements

CX series configuration requirements to work with a V-Series system

When you manually register the V-Series FC initiator port names as hosts, you set the parameters as shown in the following table.

Setting	Required value
Initiator Type	CLARiiON Open
Array Com Path	Enabled
Failover mode	1
Unit serial number	LUN
Host Name	If this section is available in the dialog box, specify <code>New Host</code> . To simplify management, it is recommended that you enter a host name and port number under in the host name fields, for example, V-Series v6030-2b-0a .
IP address	Enter a unique fake IP address. Be sure that you have not entered this IP address anywhere else in the storage array configuration and that it is not an IP address that is present on the network.

Note

The Access Logix feature installed on a shared CX series storage array enables you to set up data access and create Storage Groups. If you are using Storage Groups, you need to manually register the V-Series system FC initiator ports as hosts in the storage array before you assign them to the V-Series Storage Group.

RAID type restrictions

RAID types that V-Series supports with CX series

See the V-Series *Support Matrix* for information about RAID type restrictions for V-Series storage on CX series storage arrays.

If array LUNs of a nonsupported RAID type are presented to V-Series

If V-Series does not support the RAID type of an array LUN presented to it, one of the following occurs:

- ◆ V-Series uses the LUN successfully initially, but failure occurs later, for example, when V-Series must fail over to the alternate path to a LUN.

Note

Examples of the types of circumstances that cause V-Series to fail over to the alternate path to a LUN are storage array controller reset, fabric reset, and partial fabric outage.

- ◆ V-Series marks the LUN as a failed device immediately.

Guidelines for array LUN sizing

Relationship of Data ONTAP and storage array units of measure

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 Data ONTAP supports. The Data ONTAP definition of a gigabyte (GB) might not match the definition of a GB for your storage array. When you determine the minimum and maximum array LUN sizes for your storage array, you need to consider whether the units of measure for your storage array are different from Data ONTAP units of measure.

The Data ONTAP definition of a GB is as follows:

One GB is equal to $1000 \times 1024 \times 1024$ bytes.

See the V-Series *Support Matrix* for the general rule about Data ONTAP minimum and maximum array LUN sizes. Each V-Series *Implementation Guide* contains specific information about the equivalent minimum and maximum limits according to the vendor's calculation of units of measure.

Minimum array LUN size for the root volume

The minimum array LUN size shown in this section 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 *Support Matrix*. 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.

Minimum and maximum array LUN sizes with EMC CX series 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	$1024 \times 1024 \times 1024$ bytes
MB	1024×1024 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 *Installation Requirements and Reference Guide* for guidelines about the implications of different size array LUNs on Data ONTAP storage.

Values for Data ONTAP 7.3.3 and later in the 7.3 family and 8.0 and later in the 8.0 family:

If you are specifying in...	Minimum usable value	Maximum usable value
GB	2 GB	1,952 GB
MB	1,049 MB	1,950,000 MB
512-byte blocks	2,048,001 512-byte blocks	4,095,000,000 512-byte blocks

Values for Data ONTAP 7.2.4 and later in the 7.2.x family; and 7.3 and 7.3.1 in the 7.3.x family:

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 in...	Minimum usable value	Maximum usable value
GB	2 GB	732 GB
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 in...	Minimum usable value	Maximum usable value
GB	2 GB	488.281 GB
MB	1,049 MB	500,000 MB
512-byte blocks	2,048,001 512-byte blocks	1,024,000,000 512-byte blocks

About this chapter

This chapter discusses the configurations supported with EMC CX series storage arrays that V-Series supports. Use the configurations in this chapter as guidelines when you connect your V-Series system to your storage array.

Note

The V-Series *Support Matrix* is the final authority about which configurations that V-Series systems support.

Topics in this chapter

This chapter discusses the following topics:

- ◆ “[Your guide to interpreting the illustrations](#)” on page 14
- ◆ “[Direct-attached configurations](#)” on page 18
- ◆ “[Fabric-attached configurations](#)” on page 20
- ◆ “[Fabric-attached configuration that optimizes performance](#)” on page 25

Your guide to interpreting the illustrations

Number of ports shown

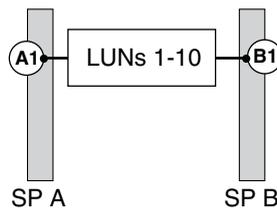
The minimum number of ports that you can use per configuration is shown in the illustrations. You might choose to use more ports than are shown.

How redundant paths and port pairs are shown

As you look through the illustrations, notice that on the V-Series system, connections from the V-Series FC initiator ports are set up for redundancy.

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 on the port, with the ports on alternate Storage Processors (SPs). In the illustrations in this chapter, the labels A1 and A2 represent ports on SP A and the labels B1 and B2 represent ports on SP B.



See the V-Series *Installation Requirements and Reference Guide* for rules for setting up redundant ports and examples of valid and invalid path setup.

Illustration of redundant paths and port pairs for the V-Series systems:

tems: 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.

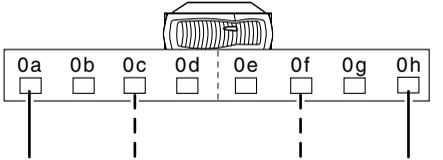
The following illustrations show a V6xxx system model, which has both onboard FC initiator ports and cards. In this example, two different redundant port pairs are used. Redundancy is achieved on the V-Series system because each port in a pair is on a different bus. (For more information about selecting redundant ports on the different V-Series models with onboard FC initiator ports, see the *V-Series Installation Requirements and Reference Guide*.)

Relationship between V-Series port pairs and array LUN groups:

The following table shows configurations for redundant paths and port pairs for the V-Series systems.

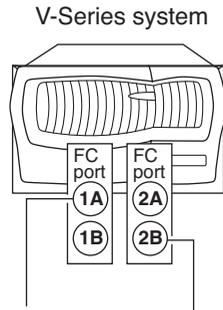
The illustrations in the following table show a V6xxx model, which has both onboard FC initiator ports and cards. These examples show the use of two different redundant port pairs. Redundancy is achieved on the V-Series system because each port in a pair is on a different bus.

See “[Fabric-attached configuration that optimizes performance](#)” on page 25 for examples of configurations with multiple port pairs and multiple array LUN groups.

Release	Supported configurations
7.3 and later	<p data-bbox="516 505 1231 661">For any storage array, you can use multiple port pairs on a V-Series system to access array LUNs on the same storage array, if each V-Series port pair is accessing a different group of array LUNs. To use multiple V-Series port pairs as the illustration shows, each port in a V-Series port pair must access a different fabric.</p> <div data-bbox="696 696 1139 1060" style="text-align: center;"> <p data-bbox="825 696 999 722">V-Series system</p>  <p data-bbox="650 944 1139 1060"> FC initiator port pair to a LUN set over two independent fabrics FC initiator port pair to a different LUN set over two independent fabrics </p> </div>

Release	Supported configurations
Prior to 7.3	<p data-bbox="517 239 1229 395">To use multiple V-Series port pairs with a CX storage array, each port in a V-Series port pair must access a different fabric, and each V-Series port pair on the same V-Series system must access LUNs on different storage array than any other port pair on that V-Series system.</p> <p data-bbox="517 421 1216 482">For an HA pair, one port pair from each V-Series system must be able to see the same LUNs.</p> <div data-bbox="682 517 1115 703" style="text-align: center;"> <p style="text-align: center;">V-Series system</p> </div> <div data-bbox="638 760 1162 881" style="margin-left: 100px;"> <p>—— FC initiator pair to one storage subsystem over two independent fabrics</p> <p>- - - FC initiator pair to a different storage subsystem over two independent fabrics</p> </div>

The following illustration shows a redundant port pair on a V-Series system 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.

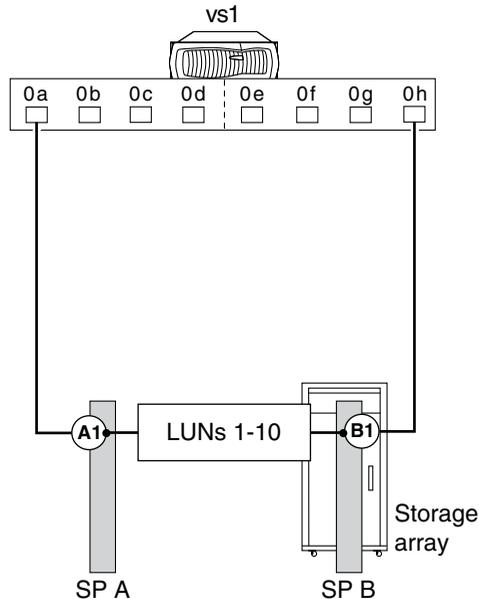
Note

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

Direct-attached configurations

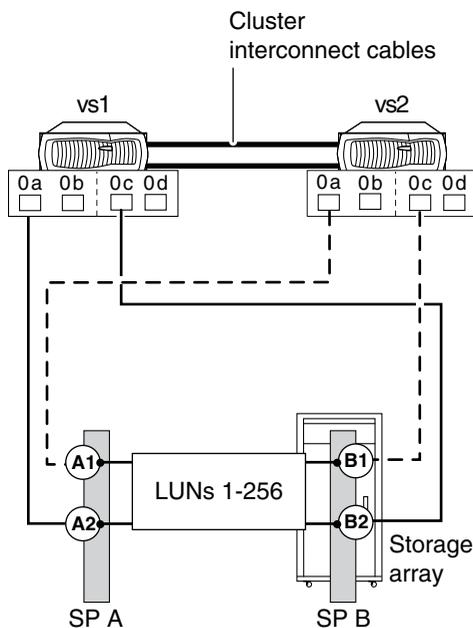
Direct-attached stand-alone configuration

The following illustration shows a direct-attached stand-alone configuration between a V6xxx system and an EMC CX series storage array with 10 array LUNs in the V-Series Storage Group.



Direct-attached HA pair configuration

The following illustration shows a deployment with a V3xxx series HA pair that is directly connected to the storage array. The storage array in this example has allocated 256 array LUNs for the V-Series systems, the maximum number allowed in a Storage Group.



In a direct-attached V-Series HA pair, one port pair *per node* is required. You can 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 V-Series *Installation Requirements and Reference Guide* for more information.)

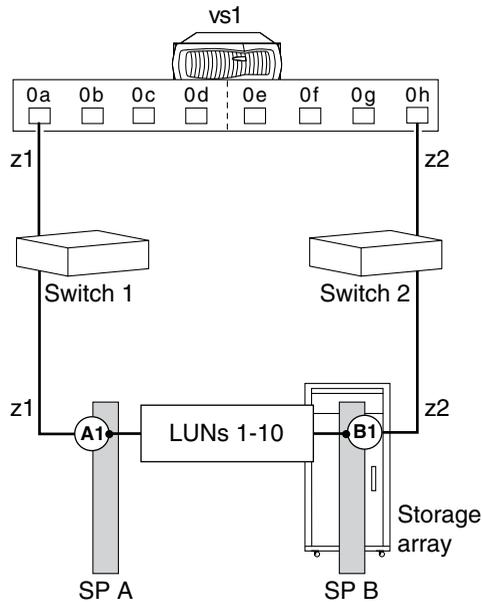
Fabric-attached configurations

Zoning recommendation

It is recommended that you use single-initiator zoning, which limits each zone to a single V-Series system FC initiator port and one SP. Single-initiator zoning improves discovery and boot time because the V-Series FC initiators do not attempt to discover each other.

Fabric-attached stand-alone configuration

The following illustration shows a fabric-attached configuration for a stand-alone configuration between a V6xxx system and a CX series storage array. In this example, 10 array LUNs are allocated for the V-Series system.

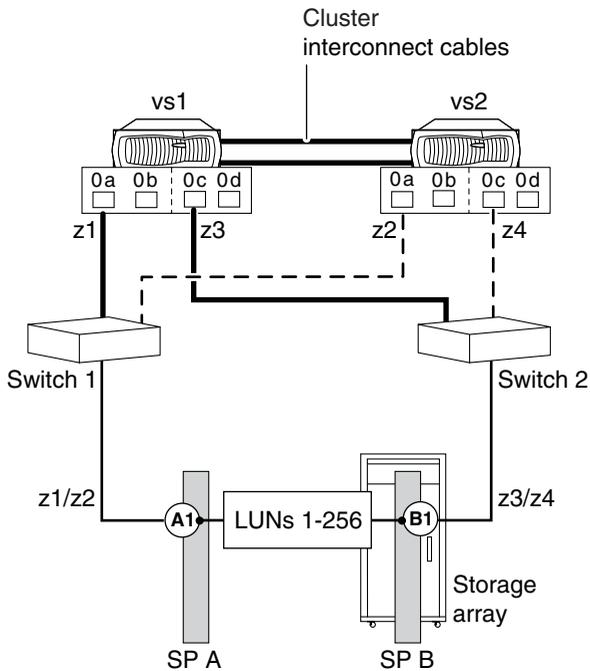


Zoning: The following table shows single-initiator zoning for this example with a V6xxx system. Single-initiator zoning is the recommended zoning strategy.

Zone	Switch	V-Series system port	Storage array port
z1	1	0a	A1
z2	2	0h	B1

Fabric-attached HA pair configuration

The following illustration shows a deployment with a V3xxx series switched HA pair. The storage array in this example has allocated 256 array LUNs for the V-Series systems, the maximum number allowed in a Storage Group.



You improve availability by having one connection from each adapter on each V-Series system in the HA pair. Then, if one path from a V-Series node fails, the other path from the node is used; failover in the V-Series HA pair does not occur.

Zoning: The following table shows single-initiator zoning for this example with a V3xxx system. Single-initiator zoning is the recommended zoning strategy.

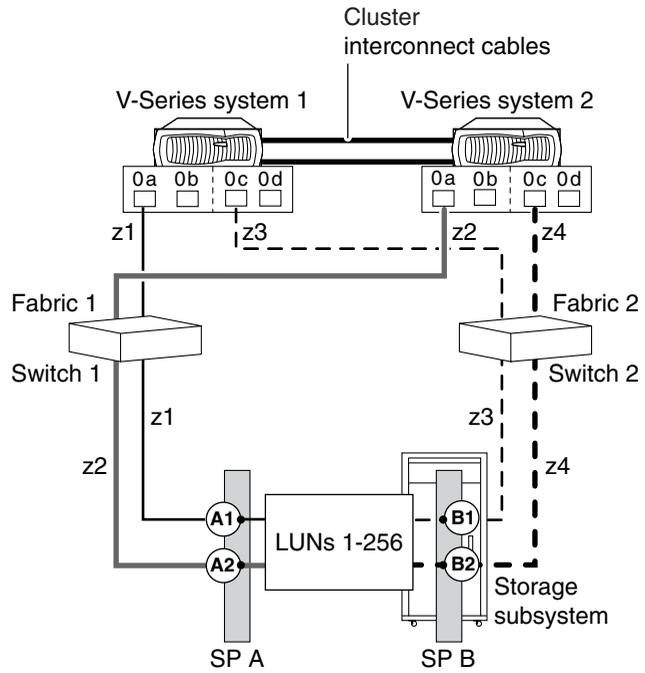
Zone	V-Series system port	Storage array port
Switch 1		
z1	V-Series system 1, port 0a	A1
z2	V-Series system 2, port 0a	A1
Switch 2		
z3	V-Series system 1, port 0c	B1
z4	V-Series system 2, port 0c	B1

Four ports accessed on a single storage array

The following illustration shows a fabric-attached HA pair in which the V-Series nodes access array LUNs through four (redundant) ports on the storage array. In this configuration, there is a straight connection from the storage array to the switch.

Utilization of devices: In the following configuration, the following occurs with device failure:

- ◆ If a switch fails, all traffic goes to the same SP.
For example, if Switch 1 fails, the path from FC initiator port 0a on both V-Series systems is unavailable. Therefore, all traffic goes from FC initiator port 0c to SP B. No traffic can go to SP A.
- ◆ If a controller fails, all traffic goes through the same switch.
For example, if SP B fails, traffic goes from V-Series system 1 port 0a and V-Series system 2 port 0a through Switch 1. No traffic can go through Switch 2.



Zoning: The following table shows single-initiator zoning for the previous illustration with a V3xxx HA pair. Single-initiator zoning is the recommended zoning strategy.

Zone	V-Series system		Storage array	
Switch 1				
z1	V-Series system 1	Port 0a	SP A	Port A1
z2	V-Series system 2	Port 0a	SP A	Port A2
Switch 2				
z3	V-Series system 1	Port 0c	SP B	Port B1
z4	V-Series system 2	Port 0c	SP B	Port B2

Fabric-attached configuration that optimizes performance

How performance is optimized

The illustration in this section shows a configuration that enables you to optimize performance by spreading I/O across the 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 array LUNs on the storage array. The V-Series system sees any given array LUN over only two paths.

On the storage array, different array 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 array LUNs (external numbers) can be duplicated on different ports.

Attention

Starting with 7.3, Data ONTAP adds functionality to support this configuration on EMC CX storage arrays. Prior to Data ONTAP 7.3, using multiple V-Series port pairs to access different array LUN groups on the same storage array results in more than two paths to an array LUN, which prevents the system from functioning properly.

Rules for implementing this type of configuration

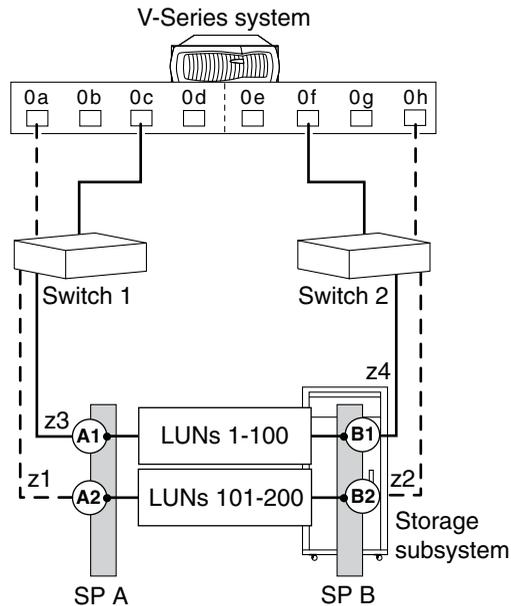
To implement this type of configuration, you need to do the following:

- ◆ On the storage array, use as many ports as possible to provide access to the array LUNs you allocated for V-Series.
- ◆ On the V-Series system, use multiple port pairs. Each port pair accesses a different group of array LUNs on the storage array through redundant paths.
- ◆ Create one big aggregate (in the Data ONTAP configuration), assigning array LUNs from multiple RAID groups to the aggregate. By doing so, I/O is spread across more disks.
- ◆ Use Access Logix software to restrict host access to array LUNs through the use of Storage Groups.

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

Example with a stand-alone V-Series system

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



Zoning for this configuration: The following table summarizes the zoning for this example. Single-initiator zoning is the recommended zoning strategy.

Zone	V-Series system FC initiator port	Storage array port
Switch 1		
z1	Port 0a	Port A2
z3	Port 0c	Port A1
Switch 2		
z2	Port 0h	Port B2
z4	Port 0f	Port B1

About this chapter

This chapter provides an overview of configuring storage on a CX series storage array for V-Series systems and setting up the V-Series systems, switches (if applicable), and storage array to work together. It also includes a configuration overview for multiple array LUN groups. For details about how to configure CX series storage arrays, see your vendor documentation.

Topics in this chapter

This chapter contains the following topics:

- ◆ [“Prerequisites and configuration overview”](#) on page 28
- ◆ [“Configuration overview for multiple array LUN groups on CX series storage arrays”](#) on page 35
- ◆ [“Multiple array LUN group configuration example”](#) on page 36
- ◆ [“Tasks to create multiple array LUN groups”](#) on page 38

Prerequisites and configuration overview

Prerequisites if you need to control access to array LUNs

The Access Logix feature enables you to control access to array LUNs on the CX series array by enabling the data access feature and creating Storage Groups. This configuration overview assumes that if you want to create Storage Groups you have already done the following on the a CX series storage array:

- ◆ Installed Access Logix software
Access Logix must be installed on a shared CX series storage array before you can enable the CX series data access control feature.
- ◆ Enabled the data access control feature on the CX series storage array
To be able to create Storage Groups on a shared CX series storage array, you must enable the data access control feature on the storage array.

Configuration overview

The following table provides the high-level steps for configuring a CX series storage array and setting up the storage array, switches, and V-Series systems to communicate with each other.

Step	Action
1	Determine the storage capacity that you need for the V-Series systems.
2	Plan the number and size of the array LUNs for the V-Series systems. See “ Guidelines for array LUN sizing ” on page 10 and the V-Series <i>Support Matrix</i> for recommendations about array LUN size.
3	Confirm that the firmware on the CX series storage array meets the version level required by the V-Series systems. Note _____ See the V-Series <i>Support Matrix</i> for firmware version requirements.

Step	Action
4	<p data-bbox="491 239 1193 298">In the Navisphere management software on the CX series storage array, create RAID groups if you have not already done so.</p> <p data-bbox="491 326 1228 482">You do not define the RAID type of the RAID group when you create it. The RAID group supports the RAID type of the first array LUN you bind on it. Any other array LUNs that you bind on it have the same RAID type. The number of disks that you select for a RAID group determines the RAID types it supports.</p> <p data-bbox="491 510 1228 604">Attention _____ Ensure that the array LUNs you create for V-Series storage conform to the RAID type restrictions described the <i>V-Series Support Matrix</i>.</p>
5	<p data-bbox="491 656 1206 715">Create the array LUNs for V-Series that you will bind to the RAID groups.</p> <p data-bbox="491 743 1206 871">When you bind a array LUN on a RAID Group, you specify how much of the RAID Group's user space (contiguous free space) you want the array LUN to use. The array LUN is distributed equally across all the disks in the RAID Group.</p> <p data-bbox="491 906 1228 965">Note _____ Binding array LUNs may take several hours.</p>

Step	Action
6	<p>Install each V-Series system as follows:</p> <ul style="list-style-type: none"> a. Rack mount the V-Series system. b. Make sure the power is connected to the V-Series system and that the console is set up. See the <i>V-Series Installation Requirements and Reference Guide</i> for detailed instructions. c. Power on the V-Series system. d. Interrupt the boot process by pressing Ctrl-C when you see the following message on the console: Starting Press CTRL-C for special boot menu e. Select option “Maintenance mode boot,” on the boot menu. Do not proceed any further with V-Series system installation and setup at this time.
7	<p>Install the Fibre Channel cables to connect the V-Series system to storage.</p> <ul style="list-style-type: none"> ◆ For a fabric-attached configuration, connect the cables between the storage array and switches and between the switches and the V-Series systems. ◆ For a direct-attached configuration, connect the cables between the storage array and the V-Series systems.

Step	Action
8	<p>If your deployment includes switches, zone the switches and verify that the communications between the storage array and the switch and the switch and the V-Series systems are working.</p> <p>If you are setting up zoning using worldwide port names, the V-Series systems and storage array must be powered on and running Data ONTAP (either in maintenance mode or in normal mode) for the worldwide port names (WWPNs) to be automatically discovered by the switch.</p> <p>Although you can obtain worldwide port names manually, automatic discovery of the WWPNs for the ports reduces the likelihood of errors. (See the <i>V-Series Installation Requirements and Reference Guide</i> for information about how to obtain WWPNs manually.)</p>
If you are NOT using Storage Groups	
9	<p>Manually register the V-Series FC initiator ports, as follows:</p> <ol style="list-style-type: none"> <li data-bbox="541 812 1197 873">a. Access the “Connectivity Status” right-click menu in the Navisphere management GUI. <li data-bbox="541 899 1227 960">b. Select one V-Series WWPN, apply the required parameters, create a new host name for V-Series, and then select OK. See “CX series configuration requirements” on page 8. <li data-bbox="541 1038 1217 1133">c. Select each additional V-Series WWPN, apply parameters, and add the WWPNs to the V-Series host name you just created, and then select OK.
10	<p>Add the array LUNs allocated for V-Series systems.</p> <p>Attention _____ If the storage array configuration automatically assigns LUN 0 as a Host ID, you must change array LUN 0 to another array LUN number. You can only map storage array LUNs to V-Series. See the <i>V-Series Installation Requirements and Reference Guide</i> for constraints for mapping array LUN 0 to V-Series.</p> <p>_____</p>

Step	Action
11	<p>On the V-Series system, verify that all the array LUNs that were allocated for the V-Series systems are visible to the V-Series system.</p> <ol style="list-style-type: none"> a. Enter the following command: <pre>disk show -v</pre> b. Verify that all the array LUNs that were allocated for the V-Series systems are displayed. <p>If you do not see all the array LUNs you expect, wait a short time, then enter the command again. There can be a short delay before the array LUNs are visible over the network.</p>
If you are using Storage Groups	
12	<p>If your CX series storage array is shared by V-Series systems and non V-Series systems, create Storage Groups to control access to the array LUNs, including a Storage Group for the V-Series systems.</p> <p>You can create only one Storage Group on the array for the V-Series systems in the neighborhood. See “Planning for using CX series Storage Groups” on page 6.</p> <p>Note</p> <hr/> <p>Access Logix software allows you to restrict host access to array LUNs through the use of Storage Groups. A host can access only the array LUNs in the Storage Group that you connect to the host. When you create a Storage Group, you select the array LUNs it contains. If both V-Series systems and non V-Series hosts are connected to a CX series storage system, you must connect them to different Storage Groups.</p> <hr/> <p>It is recommended that you assign a name for your Storage Group that makes it easy to identify that the Storage Group is for V-Series.</p>

Step	Action
13	<p>Manually register the V-Series FC initiator ports, as follows:</p> <ul style="list-style-type: none"> a. Access the “Connectivity Status” right-click menu in the Navisphere management GUI. b. Select one V-Series WWPN, apply the required parameters, create a new host name for V-Series, and then select OK. See “CX series configuration requirements” on page 8. c. Select each additional V-Series WWPN, apply parameters, and add the WWPNs to the V-Series host name you just created; then select OK. <p>Note You can register all V-Series FC initiator ports in the Storage Group at the same time.</p>
14	Add the V-Series host to the Storage Group.
15	<p>Add the array LUNs allocated for V-Series systems to the V-Series Storage Group.</p> <p>Attention If the storage array configuration automatically assigns array LUN 0 as a Host ID, you must change array LUN 0 to another array LUN number. You can only map storage array LUNs to V-Series. See the <i>V-Series Installation Requirements and Reference Guide</i> for constraints for mapping array LUN 0 to V-Series.</p>
16	Assign (connect) the V-Series hosts (FC initiator ports) to the Storage Group. (You might be able to assign the V-Series host in the Connect Hosts option on the Storage Group menu.)

Step	Action
17	<p data-bbox="491 239 1228 296">On the V-Series system, verify that all the array LUNs that were allocated for the V-Series systems are visible to the V-Series system.</p> <ul style="list-style-type: none"> <li data-bbox="542 328 915 354">a. Enter the following command: <ul style="list-style-type: none"> <li data-bbox="590 383 747 404"><code>disk show -v</code> <li data-bbox="542 434 1197 491">b. Verify that all the array LUNs that were allocated for the V-Series systems are displayed. <p data-bbox="590 519 1228 609">If you do not see all the array LUNs you expect, wait a short time, then enter the command again. There can be a short delay before the array LUNs are visible over the network.</p>

When you are ready to set up and configure Data ONTAP

You can begin Data ONTAP setup and configuration any time after assigning array LUNs to the V-Series systems and connecting the storage array and the V-Series system. The V-Series *Installation Requirements and Reference Guide* and the V-Series software setup guides describe how to set up and configure Data ONTAP.

Configuration overview for multiple array LUN groups on CX series storage arrays

Multiple array LUN group requirements

The following are requirements to configure multiple array LUN groups:

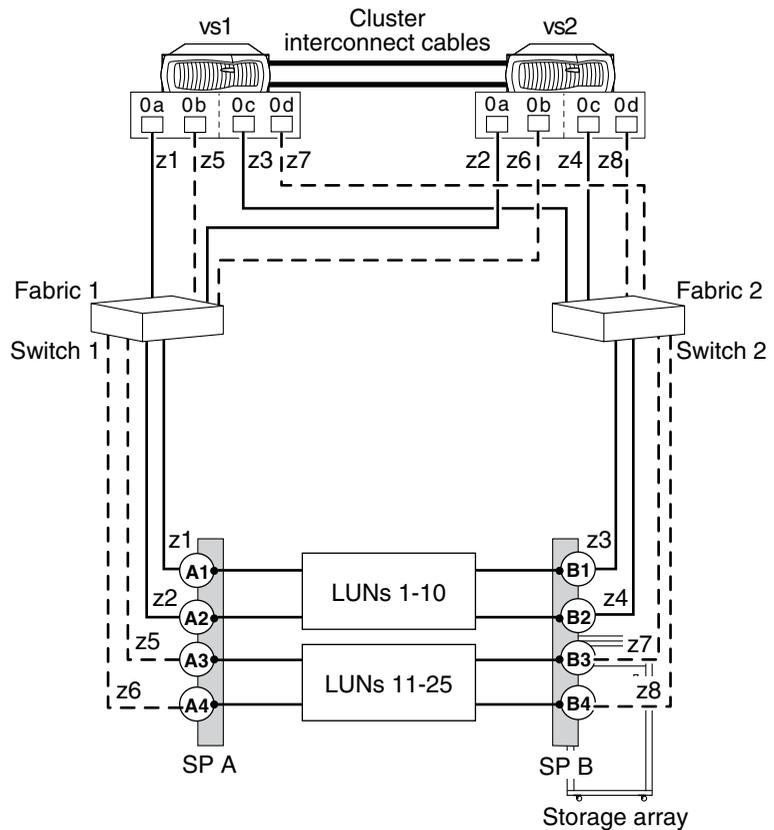
- ◆ Switch zoning must define which target ports the V-Series initiator ports use to access each array LUN group.
- ◆ Use Access Logix software to restrict host access to array LUNs through the use of Storage Groups.
- ◆ Storage groups must define which array LUN groups are presented to each V-Series initiator port.
- ◆ One initiator port pair on each V-Series system is required for each array LUN group.
- ◆ All target ports on a CX storage array accessing an individual array LUN group must be accessed through the same switch.

Multiple array LUN group configuration example

The following example shows a V-Series HA pair with two 4-port array LUN groups on a CX series storage array.

Note

Using multiple V-Series port pairs to access different array LUN groups on the same storage array is supported only in Data ONTAP 7.3 and later.



The following table summarizes the zoning for this configuration.

Zone	V-Series system and port	Storage array	Storage port	Array LUN group
Switch 1				
z1	vs1-0a	SP A	A1	LUNs 1 - 10
z2	vs2-0a	SP A	A2	LUNs 1 - 10
z5	vs1-0b	SP A	A3	LUNs 11 - 25
z6	vs2-0b	SP A	A4	LUNs 11 - 25
Switch 2				
z3	vs1-0c	SP B	B1	LUNs 1 - 10
z4	vs2-0c	SP B	B2	LUNs 1 - 10
z7	vs1-0d	SP B	B3	LUNs 11 - 25
z8	vs2-0d	SP B	B4	LUNs 11 - 25

Tasks to create multiple array LUN groups

The following table summarizes the steps to create multiple array LUN groups on CX series storage arrays. If the array is not already set up and configured, see “[Configuration overview](#)” on page 28.

The array LUN groups (two 4-port array LUN groups in an HA pair) and port names used in these tasks correspond to the “[Multiple array LUN group configuration example](#)” on page 36.

Stage	Process
1	<p>In the Navisphere Manager on the CX series storage array, create a RAID group for each array LUN group.</p> <p>In the example, there are two RAID groups and two array LUN groups.</p> <p>You do not define the RAID type of a RAID group when you create it. The RAID group supports the RAID type of the first array LUN you bind on it. Any other array LUNs that you bind on it have the same RAID type. The number of disks that you select for a RAID group determines the RAID types it supports.</p> <p>Attention _____ Ensure that the array LUNs you create for V-Series storage conform to the RAID type restrictions described the <i>V-Series Support Matrix</i>.</p>
2	<p>Create array LUNs from each RAID Group.</p> <p>In the example, LUNs 1 -10 are in the first RAID group and LUNs 11 - 25 are in the second RAID group.</p>
3	<p>Create one Storage Group with ports 0a and 0c from both V-Series systems and all the array LUNs from the first RAID Group.</p>
4	<p>Create a second Storage Group with ports 0b and 0d from both V-Series systems and all the array LUNs from the second RAID Group.</p>
5	<p>Configure switch zoning so that each V-Series initiator accesses only single target port.</p>

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