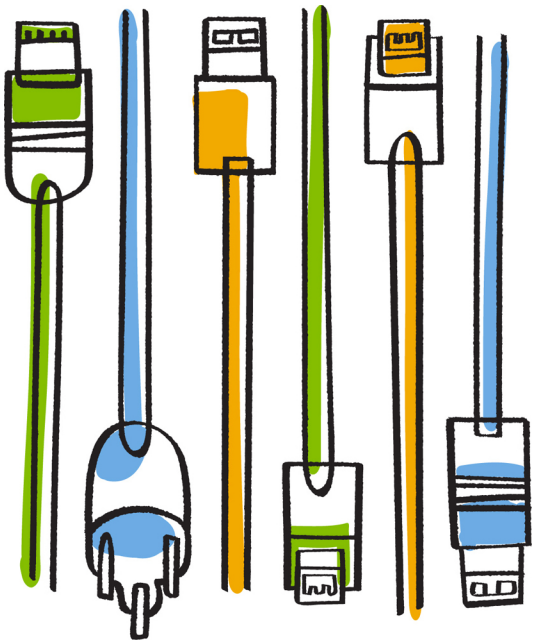
Updated for 8.2.1

FlexArray Virtualization

Implementation Guide for NetApp E-Series Storage



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Contents

Understanding E-Series storage implementation with Data ONTAP 4
Data ONTAP systems that can use array LUNs on storage arrays 6
Requirements for configuring E-Series storage arrays 7
Required host type for E-Series storage arrays 7
Supported fabric-attached configurations for E-Series storage arrays 8
Stand-alone basic configuration 8
Stand-alone with two 2-port array LUN groups 9
Single 4-port array LUN group 9
Two 4-port array LUN groups 10
Eight-port array LUN group configuration 11
Data ONTAP FC initiator port attaching to multiple targets ports 13
Supported direct-attached configurations for E-Series storage arrays 15
Two-port direct-attached stand-alone configurations 15
Four-port direct-attached HA pair configuration 15
Copyright information 17
Trademark information 18
How to send your comments 19
Index 20

Understanding E-Series storage implementation with Data ONTAP

Data ONTAP systems can be deployed with E-Series storage arrays. The E-Series storage array has back-end configuration requirements and limits on the supported configurations.

Information about Data ONTAP support for E-Series storage arrays

Not all Data ONTAP releases support the same features, configurations, storage array models, and Data ONTAP systems. During your deployment planning, you need to check Data ONTAP support information to ensure that the deployment conforms to Data ONTAP hardware and software requirements for all systems in the deployment.

Support information for deployments with E-Series storage arrays is included in the following documents:

Documents	Topics covered
Interoperability Matrix at *support.netapp.com*	Data ONTAP working with back-end devices, including the following: • Supported storage arrays and storage array firmware • Supported switches and switch firmware • Whether your storage array supports nondisruptive (live) upgrade of the storage array firmware
Hardware Universe at *hwu.netapp.com* **Note:** Limits for Data ONTAP systems were previously provided in the *V-Series Limits Reference for Third-Party Storage* and V-Series Support Matrix.	Data ONTAP limits for releases and platforms, including the following: • Minimum and maximum array LUN sizes including the minimum array LUN size for the root volume and spare array LUNs • Minimum aggregate size for aggregates with array LUNs • Minimum and maximum capacity • Neighborhood limits

Documents	Topics covered
FlexArray Virtualization Installation Requirements and Reference Guide	Planning tasks for Data ONTAP implementation with E-Series, including: • Planning the implementation • Connecting the Data ONTAP system and the array • Verifying the installation
E-Series documentation	Information you may need when setting up the E-Series storage array could include the following: • Site preparation requirements • Cabling instructions • SANtricity software installation and configuration instructions

Related documentation

The following documentation can be found at *support.netapp.com*.

- *Hardware Universe* (formerly the *System Configuration Guide*)
- *FlexArray Virtualization Installation Requirements and Reference Guide*
- Interoperability Matrix at *support.netapp.com*
- *E-Series Storage Systems Site Preparation Guide*
- *E-Series Storage Systems Hardware Cabling Guide*
- *SANtricity ES Storage Manager documentation*

Data ONTAP systems that can use array LUNs on storage arrays

V-Series ("V") systems and new FAS platforms released in Data ONTAP 8.2.1 and later can use array LUNs if the proper license is installed. In discussions in the Data ONTAP and FlexArray Virtualization documentation, these systems are collectively referred to as Data ONTAP systems when it is necessary to make it clear which information applies to them and what information applies to storage arrays.

Note: Starting with Data ONTAP 8.2.1, the capability of using LUNs on a storage array, formerly identified as V-Series functionality, has a new name—*Data ONTAP FlexArray Virtualization Software*. The capability of using array LUNs continues to be available as a licensed feature in Data ONTAP.

Systems prior to Data ONTAP 8.2.1 that can use array LUNs

The only systems released prior to Data ONTAP 8.2.1 that can use array LUNs are V-Series systems —systems with a "V" or "GF" prefix. A V-Series system is an open storage controller that virtualizes storage from storage array vendors, native disks, or both into a single heterogeneous storage pool.

Note: Almost all Data ONTAP platforms released prior to Data ONTAP 8.2.1 were released with FAS and V-Series equivalent models (for example, a FAS6280 and a V6280). (For a few systems, there were no "V" equivalent models.) Although both types of models could access native disks, only the V-Series systems (a "V" or "GF" prefix) could attach to storage arrays.

Systems in Data ONTAP 8.2.1 and later that can use array LUNs

Starting with Data ONTAP 8.2.1, the model for how platforms are released and the storage they can use changes. Attaching to storage arrays is no longer limited to V-Series systems.

Starting with Data ONTAP 8.2.1, all new platforms are released as a single hardware model. This single hardware model has a FAS prefix; there are no longer separate "V" and FAS models for new platforms. If the V_StorageAttach license package is installed on a new FAS model, it can attach to storage arrays. (This is the same license required on a V-Series system.)

Important: FAS systems released prior to Data ONTAP 8.2.1 cannot use LUNs on storage arrays, even if they are upgraded to Data ONTAP 8.2.1 or later; only the "V" equivalent of a platform can use array LUNs.

Requirements for configuring E-Series storage arrays

There are system parameters that you must set and considerations to keep in mind when configuring a storage array to work with a Data ONTAP system.

Required host type for E-Series storage arrays

You must set the `host type` parameter for the storage array to communicate with the Data ONTAP system.

The required host type setting, based on the storage array firmware version that you have installed, is shown in the following table:

If your firmware version is...	**Then set the `host type` to...**
07.86.29.00 and below	AIX
07.86.34.00 and above	ONTAP

Supported fabric-attached configurations for E-Series storage arrays

Only certain fabric-attached configurations of E-Series storage arrays deployed with Data ONTAP system are supported.

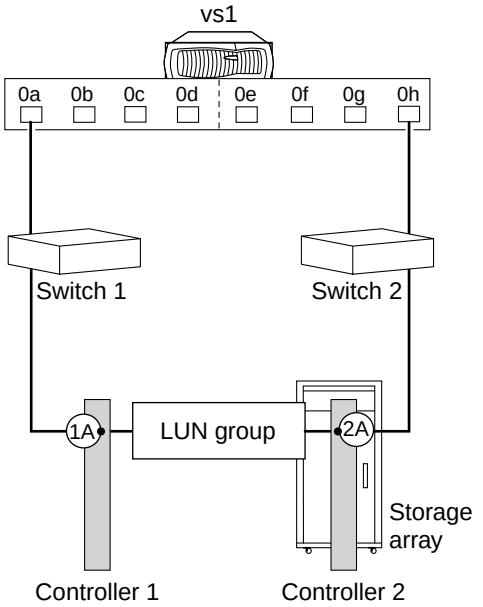
For additional information about specific array model configurations, see the Interoperability Matrix at *support.netapp.com*.

Stand-alone basic configuration

The stand-alone basic configuration of a Data ONTAP system that uses array LUNs is a simple, fabric-attached configuration with a single FC initiator port pair accessing a single LUN group.

This configuration is supported for use with all storage arrays listed in the *Interoperability Matrix* as supported for the release and mode of Data ONTAP running on your system.

The following illustration shows this configuration:

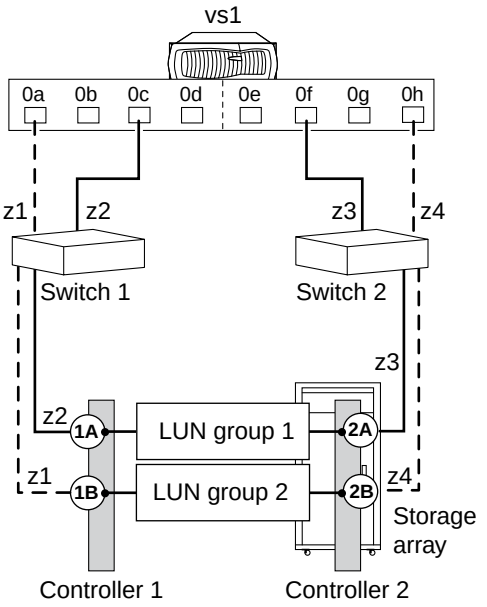


Stand-alone with two 2-port array LUN groups

This is a stand-alone Data ONTAP system in a fabric-attached simple configuration. In this configuration, each Data ONTAP system FC initiator port pair accesses a separate array LUN group.

This configuration is supported for use with all storage arrays listed in the *Interoperability Matrix* as supported for the release and mode of Data ONTAP running on your system.

The following illustration shows this configuration:

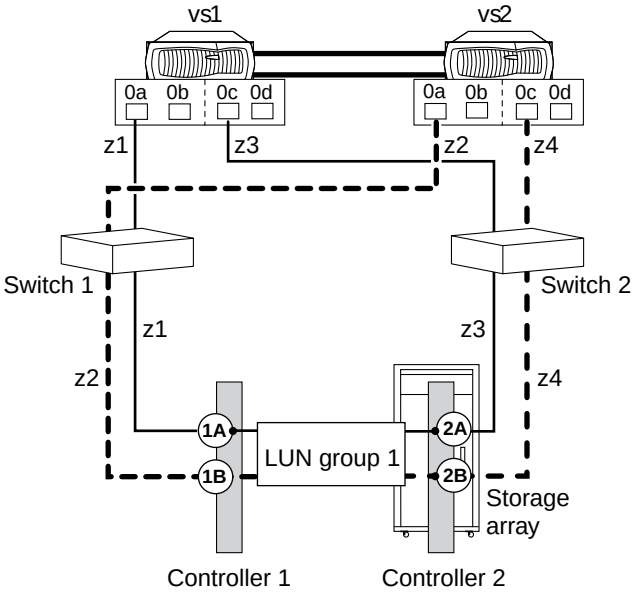


Single 4-port array LUN group

This configuration contains a single, 4-port LUN group with each target port accessed by a single Data ONTAP system FC initiator port from the HA pair. Zoning ensures that there are only two paths to a specific array LUN from each Data ONTAP system.

This configuration is supported for use with all storage arrays listed in the *Interoperability Matrix* as supported for the release and mode of Data ONTAP running on your system.

The following illustration shows this configuration:

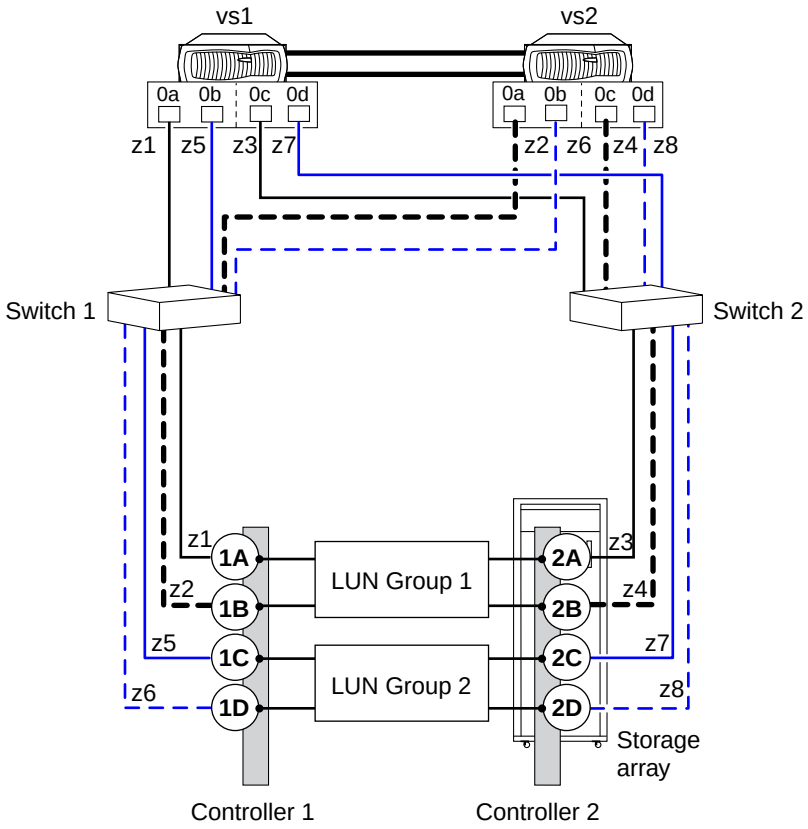


Two 4-port array LUN groups

In this configuration, each Data ONTAP FC initiator port pair accesses a separate array LUN group. The zoning is a single Data ONTAP system FC initiator to a single array target port.

This configuration is supported for use with all storage arrays listed in the *Interoperability Matrix* as supported for the release and mode of Data ONTAP running on your system.

The following illustration shows a block diagram of this configuration:



Eight-port array LUN group configuration

Starting in Data ONTAP 8.2, an eight-port LUN group configuration is supported on clustered V-Series systems and, starting in Data ONTAP 8.2.1, also on Data ONTAP systems that can use array LUNs.

This configuration is supported for use with all storage arrays listed in the *Interoperability Matrix* as supported for the release and mode of Data ONTAP running on your system.

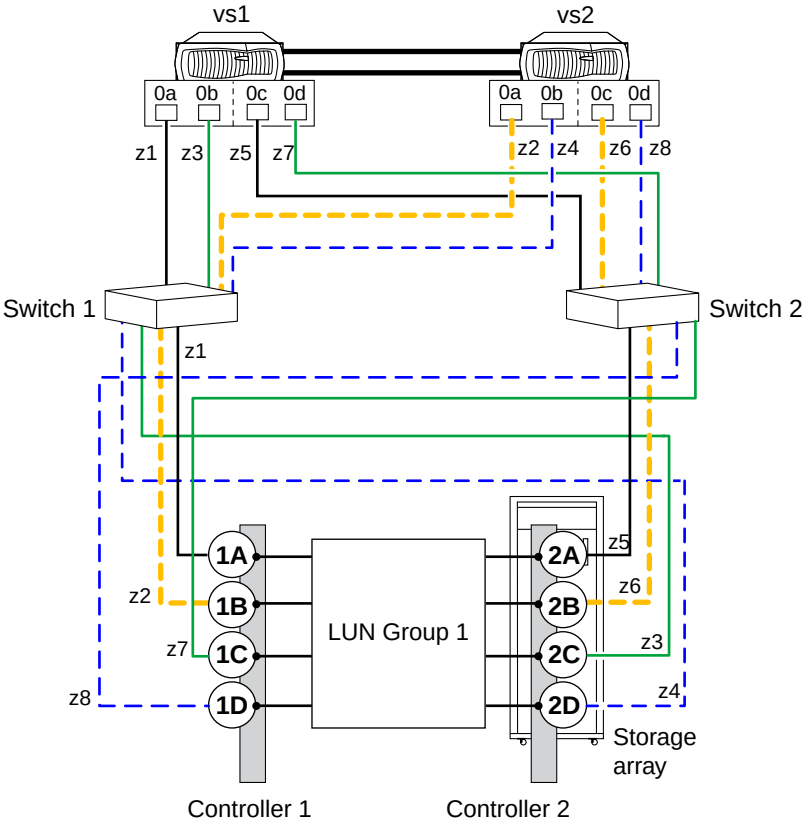
There are two ways of deploying this configuration: crossed and uncrossed back-end connections.

Crossed back-end connections

In this configuration with the back-end connections crossed, the FC connections from the same storage array controller go to both fabric switches (redundant).

In this illustration of crossed back-end connections, note how the nodes are attached to the switches and to the storage array. Vs1 uses switch 1 when attaching to the storage array Controller 1 port 1A and Controller 2 port 2C, and uses switch 2 when attaching to storage array Controller 2 ports 2A and

Controller 1 port 1C. This optimizes the use of switch ports and array ports, which reduces the impact of a switch or storage array controller failure.

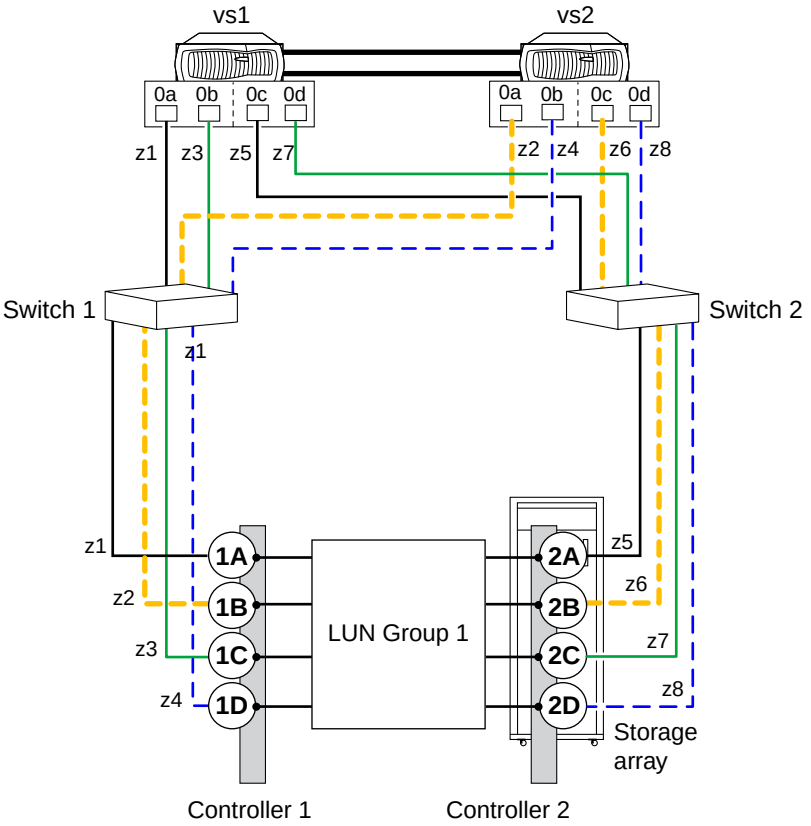


Note: The following problem can occur with Active-Passive storage arrays in crossed back-end connections: If one of the fabric switches is taken offline or goes down and a path failure from both Data ONTAP systems occurs, the Data ONTAP systems panic even though the alternate path from each system is still online. For example, if switch 2 is down and the “0b” paths on both vs1 and vs2 go down, vs1 and vs2 panic even though the “0a” paths are still online.

Back-end connections are not crossed

In this configuration in which the back-end connections are not crossed, the FC connections from the same storage array controller go to only one fabric switch.

The following illustration shows this configuration when the back-end connections are not crossed.



Data ONTAP FC initiator port attaching to multiple targets ports

Starting in Data ONTAP 8.2, a Data ONTAP FC initiator port can be attached to multiple target ports on separate storage arrays within the same family. The *FlexArray Virtualization Installation Requirements and Reference Guide* contains the rules for setting up this configuration. This configuration is not supported with MetroCluster configurations.

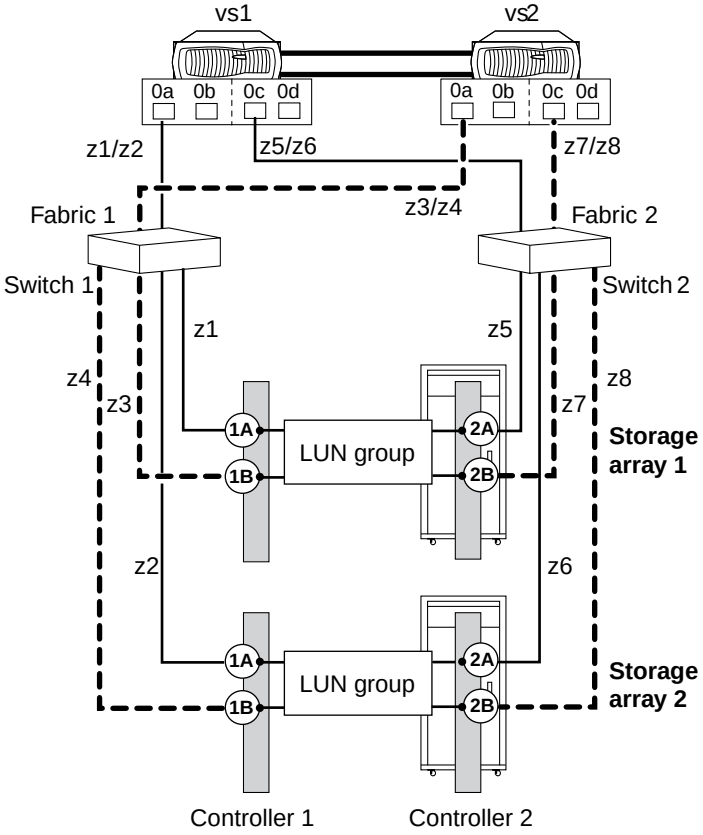
This configuration is supported for use with all storage arrays listed in the *Interoperability Matrix* as supported for the release and mode of Data ONTAP running on your system.

The following illustration shows a shared Data ONTAP FC initiator port configuration with an HA pair. However, sharing an FC initiator port with multiple target ports is supported with both stand-alone systems and HA pairs.

For details about sharing an FC initiator port with multiple target ports and zoning, see the information in the *FlexArray Virtualization Installation Requirements and Reference Guide*.

One Data ONTAP FC initiator port connecting to target ports on *separate* storage arrays

The following example shows an HA pair in which a single Data ONTAP FC initiator port connects to multiple target ports on different storage arrays:



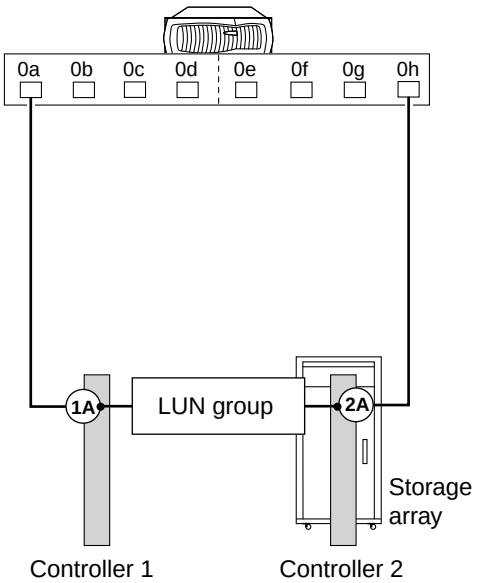
Supported direct-attached configurations for E-Series storage arrays

Only certain direct-attached configurations of E-Series storage arrays deployed with Data ONTAP system are supported.

For additional information about specific array model configurations, see the Interoperability Matrix at *support.netapp.com*.

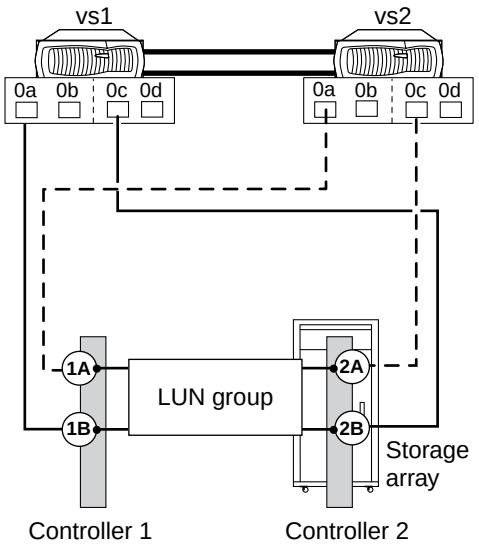
Two-port direct-attached stand-alone configurations

Two Data ONTAP FC initiator ports provide access to LUNs on the storage array.



Four-port direct-attached HA pair configuration

The illustration shows a direct-attached HA pair with four Data ONTAP FC initiator ports providing access to array LUNs on the storage array.


vs1
vs2
0a
0b
0c
0d
0a
0b
0c
0d
1A
1B
LUN group
2A
2B
Storage array
Controller 1
Controller 2

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Index

8-port array LUN group configuration
    support for *11*

A

array LUNs
    systems running Data ONTAP that can use *6*

C

configuration requirements
    E-Series storage arrays *7*
    where to get information about Data ONTAP systems and E-Series *4*
configurations
    where to get information about supported Data ONTAP systems and E-Series *4*
configurations supported with storage arrays
    8-port array LUN group *11*
    FC initiator port attaching to multiple targets ports *13*
    four-port direct-attached HA pair *15*
    single 4-port array LUN group *9*
    stand-alone basic configuration *8*
    stand-alone with two 2-port array LUN groups *9*
    two 4-port array LUN groups *10*
    two-port direct-attached stand-alone *15*

E

E-Series
    host type setting *7*
E-Series storage arrays
    configuration requirements *7*
    supported direct-attached configurations *15*
    supported fabric-attached configurations *8*

F

FC initiator ports
    sharing target ports
        supported configuration *13*
four-port direct-attached HA pair configuration
    support for *15*

I

initiator ports
    sharing with multiple target ports
        supported configuration *13*

L

LUNs (array)
    systems running Data ONTAP that can use *6*
LUNs, array
    See LUNs (array)

P

ports
    sharing initiator port with target ports
        supported configuration *13*

S

shared FC initiator target ports
    supported configuration *13*
single 4-port array LUN group configuration
    support for *9*
stand-alone basic configuration
    support for *8*
stand-alone with two 2-port array LUN groups configuration
    support for *9*
supported configurations
    where to get information about Data ONTAP systems and E-Series *4*
supported configurations with storage arrays
    8-port array LUN group *11*
    FC initiator port attaching to multiple targets ports *13*
    four-port direct-attached HA pair *15*
    single 4-port array LUN group *9*
    stand-alone basic configuration *8*
    stand-alone with two 2-port array LUN groups *9*
    two 4-port array LUN groups *10*
    two-port direct-attached stand-alone *15*
supported direct-attached configurations
    E-Series storage arrays *15*
supported fabric-attached configurations

E-Series storage arrays *8*

T

two 4-port array LUN groups configuration
support for *10*
two-port direct-attached stand-alone configuration
support for *15*

V

V-Series functionality
name change to FlexArray Virtualization *6*
V-Series systems
See LUNs (array)

Z

zoning
shared FC initiator port supported configuration *13*