# IBM System Storage N series
# **Gateway Implementation Guide for IBM Storage**

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# Table of Contents

# Preface

## About this guide

This guide provides information about how to set up your storage array to work with an IBM® N series gateway running Data ONTAP® software, including configuration guidelines and sample configurations. The information in this guide pertains to all supported gateway platforms.

**Note**

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

**Attention**

In this document, the term *gateway* describes IBM N series storage systems that have been ordered with gateway functionality. Gateways support various types of storage, and they are used with third-party disk storage systems—for example, disk storage systems from IBM, HP®, Hitachi Data Systems®, and EMC®. In this case, disk storage for customer data and the RAID controller functionality is provided by the back-end disk storage system. A gateway might also be used with disk storage expansion units specifically designed for the IBM N series models.

The term *filer* describes IBM N series storage systems that either contain internal disk storage or attach to disk storage expansion units specifically designed for the IBM N series storage systems. Filer storage systems do not support using third-party disk storage systems.

## Audience

This guide is for system administrators who are familiar with operating systems such as UNIX® and Windows® that run on the storage system's clients. 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 gateway.

## Relationship of this guide to other guides

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

| Guide name | Information includes... |
|---|---|
| *Installation Requirements and Reference Guide* | ◆ General guidelines for creating and making array LUNs available to gateways<br>◆ Quick start installation instructions for connecting devices together and for installing Data ONTAP on a gateway that uses only third-party storage<br>◆ Reference information<br>◆ Detailed background information including layout in aggregates and checksums |
| *Implementation Guides* | ◆ Vendor-specific details about how to set up a storage array to work with gateways.<br>◆ More detailed configuration examples than are provided in the *Installation Requirements and Reference Guide*. |
| *Implementation Guide for Native Disk Shelves* | Information about setting up the storage on the native disk shelves connected to the gateway. |
| *Data ONTAP* software setup guides | Detailed steps for setting up the gateway, including information about installing Data ONTAP software for installations using only third-party storage. These guides are most helpful to users who are 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 gateway *Interoperability Matrix* for details about Data ONTAP releases that support the gateway, supported switches, supported firmware, capacity, and maximum array LUN count.

## Supported features

IBM® System Storage™ N series products are driven by NetApp® Data ONTAP software. Some features described in the product software documentation are neither offered nor supported by IBM. Please contact your local IBM representative or reseller for further details. Information about supported features can also be found at the following Web site:

www.ibm.com/storage/support/nas/

A listing of currently available N series products and features can be found at the following Web site:

www.ibm.com/storage/nas/

## Getting information, help, and service

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your IBM N series product, and whom to call for service, if it is necessary.

## Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected properly.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation and use the diagnostic tools that come with your system.

## Using the documentation

Information about the N series hardware products is available in printed documents and a documentation CD that comes with your system. The same documentation is available as PDF files on the IBM NAS support Web site:

www.ibm.com/storage/support/nas/

## Web sites

IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates.

- For NAS product information, go to the following Web site:
  www.ibm.com/storage/nas/
- For NAS support information, go to the following Web site:
  www.ibm.com/storage/support/nas/
- For AutoSupport information, go to the following Web site:
  www.ibm.com/storage/support/nas/
- For the latest version of publications, go to the following Web site:
  www.ibm.com/storage/support/nas/

### Accessing online technical support

For online Technical Support for your IBM N series product, visit the following Web site:

www.ibm.com/storage/support/nas/

### Hardware service and support

You can receive hardware service through IBM Integrated Technology Services. Visit the following Web site for support telephone numbers:

www.ibm.com/planetwide/

### Supported servers and operating systems

IBM N series products attach to many servers and many operating systems. To determine the latest supported attachments, visit the following Web site:

www.ibm.com/storage/support/nas/

### Firmware updates

As with all devices, it is recommended that you run the latest level of firmware. For information on firmware updates, visiting the following Web site:

www.ibm.com/storage/support/nas/

Verify that the latest level of firmware is installed on your machine before contacting IBM for technical support. See the *Gateway Upgrade Guide* for your version of Data ONTAP for more information on updating firmware.

### 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.

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- Form number (for example, GC26-1234-02)
- Page numbers to which you are referring

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# Implementation Overview 1

## About this chapter

This chapter provides information about the IBM® storage array models and firmware that IBM N series gateways support, and guidelines specific to sizing array LUNs for the gateway on IBM storage arrays. Configuration requirements for setting up an IBM storage array with a gateway are in later chapters.

## Topics in this chapter

This chapter contains the following topics:



## Generic storage allocation terms used in this document

**array LUN:** This guide uses the term *array LUN* (logical unit number) to describe an area on the storage array that is available for a gateway or a non gateway host to read data from or write data to. You might be accustomed to hearing a different term to describe this area; the term varies among vendors and sometimes among platforms for the same vendor. See the gateway *Implementation Guide* for your storage array type for the specific term used for your platforms.

**HA pair:** Two storage systems (nodes) whose controllers are connected to each other either directly or through switches. In some versions of Data ONTAP, this configuration is referred to as an *active/active configuration*.

## Additional information to read

This guide is intended to be used in conjunction with the following additional documents:

- Gateway *Installation Requirements and Reference Guide*

  This guide contains general guidelines for setting up the storage array to work with the gateways. When planning your deployment, first read this guide, then read the gateway *Implementation Guide* for your storage array type. The *Implementation Guides* provide additional details that are specific to your vendor.
- Gateway *Interoperability Matrix* at http://www.ibm.com/storage/nas/

This document provides information about Data ONTAP releases that support the gateway, supported switches, supported firmware, capacity, and maximum array LUN count.

**Note**

The *Interoperability Matrix* is the final authority on the storage array models, storage array firmware, switches, and so on that the gateway supports.

# IBM terminology

**array**

A collection of Fibre Channel or SATA hard drives that are logically grouped together. All the drives in the array are assigned the same RAID level. An array is sometimes referred to as a RAID set in DS4xxx/DS5xxx models.

**host group**

An entity in the storage partition topology that defines a logical collection of host computers that require shared access to one or more logical drives.

**volume**

IBM uses the term *volume* to describe the area on the storage array that is available for a gateway or non gateway host to read data from or write data to. The gateway documentation uses the term *array LUN* to describe this area.

IBM 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). The gateway treats an IBM volume as a disk.

**volume group**

A DS8xxx volume group is used to control the hosts that can access array LUNs (LUN masking) by associating host attachments or port groups with the array LUNs that they are allowed to access. You assign the desired FC initiator ports and the array LUNs to be accessed to the same volume group.

# Supported IBM storage arrays

### Finding out which Data ONTAP release supports which storage arrays

This guide provides information about all vendors and storage arrays that the gateway supports at the time of publication. Not all vendors and models described in this guide are supported in all Data ONTAP releases. See the gateway *Interoperability Matrix* to determine which vendors and storage array models are supported in a particular Data ONTAP release.

**Note**

The gateway *Interoperability Matrix* is the final authority about which storage arrays and configurations that gateways support.

# License Internal Code and controller firmware

### Where to find information about supported versions

See the gateway *Interoperability Matrix* at http://www.ibm.com/storage/nas/ for information about the IBM storage array license code or firmware controller versions. The *Interoperability Matrix* is the final authority on the License Internal Code and firmware controller versions that the gateway supports.

### Live upgrade of firmware

Live upgrade of the controller firmware is not supported on the DS4xxx\DS5xxx storage arrays.

**Attention**

See Appendix A, "DS4xxx firmware upgrade issue workaround," on page 61.

# Guidelines for array LUN sizing

### GatewayRelationship 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 x 1024 x 1024 bytes.

See the gateway *Interoperability Matrix* for the general rule about Data ONTAP minimum and maximum array LUN sizes. Each gateway *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 gateway *Interoperability 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 value usable with IBM

IBM calculates units of measure differently than Data ONTAP. The 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.

| For this storage array... | A GB is calculated as... |
|---|---|
| IBM ESS800 | 1000 x 1000 x 1000 bytes |
| IBM DS4xxx | 1024 x 1024 x 1024 bytes |
| IBM DS5xxx | 1024 x 1024 x 1024 bytes |
| IBM DS8xxx | 1024 x 1024 x 1024 bytes |

**Note**

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

Do not create array LUNs that are smaller than the minimum LUN size shown in the gateway *Interoperability Matrix*.

See the gateway *Installation Requirements and Reference Guide* for guidelines about the implications of different size array LUNs on Data ONTAP storage.

### Maximum array LUN value usable with DS4xxx, DS5xxx, and DS8xxx storage arrays

If you plan to use a large-sized array LUN that is close to the maximum array LUN size that Data ONTAP supports, ensure that you specify its size as shown in the "Maximum usable value" column in the tables in this section.

#### 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... | Maximum usable value |
|---|---|
| GB | 1,952 GB |
| MB | 1,950,000 MB |
| 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, 7.3.1 and 7.3.2 in the 7.3.x family:

| If you are specifying in... | Maximum usable value |
|---|---|
| GB | 976 GB |
| MB | 975,000 MB |
| 512-byte blocks | 2,047,500,000 512-user blocks |

#### Values for Data ONTAP 7.2.3:

| If you are specifying in... | Maximum usable value |
|---|---|
| GB | 732 GB |

| If you are specifying in... | Maximum usable value |
|---|---|
| MB | 749,000 MB |
| 512-byte blocks | 1,535,500,000 512-byte blocks |

**Values for Data ONTAP 7.2.2 and earlier:**

| If you are specifying in... | Maximum usable value |
|---|---|
| GB | 488.281 GB |
| MB | 500,000 MB |
| 512-byte blocks | 1,024,000,000 512-byte blocks |

### Maximum array LUN value usable with ESS800 storage arrays

If you plan to use a large-sized array LUN that is close to the maximum array LUN size that Data ONTAP supports, ensure that you specify its size as shown in the "Maximum usable value" column in the tables in this section.

**Values for Data ONTAP 7.3.2 and later in the 7.3 family and 8.0 and later in the 8.0 family:**

| If you are specifying in... | Maximum usable value |
|---|---|
| GB | 2,046 GB |
| MB | 2,044,000 MB |
| 512-byte blocks | 4,095,000,000 512-user blocks |

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

| If you are specifying in... | Maximum usable value |
|---|---|
| GB | 1,023 GB |
| MB | 1,022,000 MB |
| 512-byte blocks | 2,047,500,000 512-user blocks |

**Values for Data ONTAP 7.2.3:**

| If you are specifying in... | Maximum usable value |
|---|---|
| GB | 786 GB |
| MB | 785,000 MB |
| 512-byte blocks | 1,535,500,000 512-byte blocks |

**Values for Data ONTAP 7.2.2 and earlier:**

| If you are specifying in... | Maximum usable value |
|---|---|
| GB | 524 GB |

# Zoning for IBM storage arrays

## Zoning requirements

Zoning is required to prevent LUNs from being visible to a gateway on more than two target ports. You must configure zoning to restrict each initiator port to a single target port on each storage array. Data ONTAP requires that a LUN is only visible on one target port for each initiator port.

When you create LUNs on an IBM storage array, you assign each array LUN to a host group. A host group binds a group of LUNs to a set of gateway FC initiator ports. The host group does not restrict which target ports an initiator can access the array LUNS through, therefore you must configure switch zoning to restrict each initiator port to a single target port on each storage array.

If zoning is not used, and there are multiple target ports from an array in a given fabric the gateway initiator will see the same LUNs on all those target ports. Data ONTAP expects to see a LUN on one target port for each initiator.

## Recommendation for single-initiator zoning

It is recommended that you use single-initiator zoning, which limits each zone to a single gateway FC initiator port. See Chapter 2, "Configurations Supported with IBM Arrays," on page 11 for configuration examples with zoning information.

# Configurations Supported with IBM Arrays 2

## About this chapter

This chapter discusses the supported configurations for all supported IBM storage arrays. Use the configurations in this chapter as guidelines when you connect your gateway to your storage array. You can also refer to the configurations when you determine desired capacity usage, create array LUNs initially, and assign array LUNs to your gateway.

**Note**

The gateway *Interoperability Matrix* is the final authority about which configurations that gateways support.

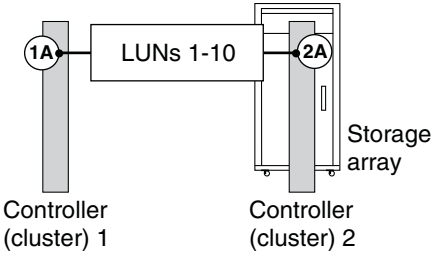
## Topics in this chapter

This chapter discusses the following topics:

# Your guide to interpreting the illustrations

## How redundant paths and port pairs are shown

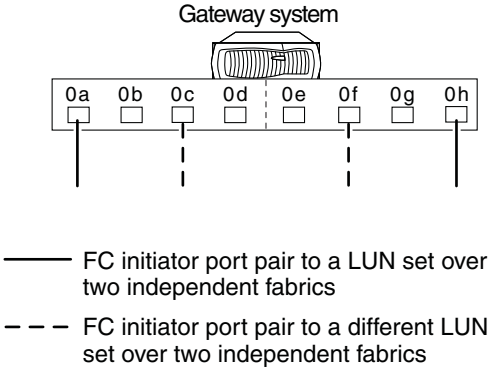
**Illustration of redundant paths and port pairs for storage arrays:** In each illustration in this chapter, the port pairs on the storage array are shown in relation to the LUNs on the port, with the ports on alternate controllers, clusters, or enclosures. (The hardware component on which host adapters and ports are located varies on different storage arrays.) Different storage array models, even those from the same vendor, might label the ports differently from those shown in the examples.

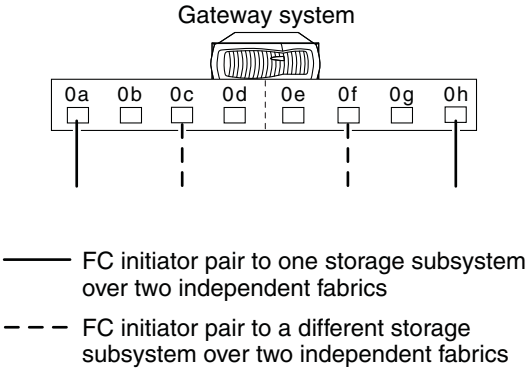



See the gateway *Installation Requirements and Reference Guide* for rules for setting up redundant ports on the gateway and examples of valid and invalid configurations.

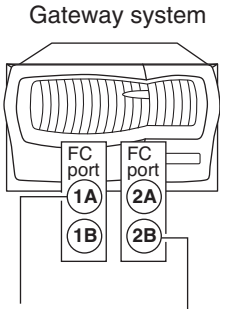
**Illustration of redundant paths and port pairs for gateways:** On some gateway systems, the FC initiator ports are on cards. On other models, the FC initiator ports are onboard ports and are labeled 0a, 0b, and so on. Some models include both cards and onboard ports. As you look through the illustrations, notice that on the gateway the connections from the gateway FC initiator ports are set up for redundancy.

**Relationship between port pairs and LUN groups:** The illustrations in the following table show an N7000 series, 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 gateway because each port in a pair is on a different bus.

| Release | Supported configurations |
|---|---|
| 7.3 and later | For DS8xxx and DS4xxx/DS5xxx storage arrays only, you can use multiple port pairs on a gateway to access LUNs on the same storage array, if each gateway port pair accesses a different group of LUNs and each gateway port in a pair accesses a different fabric.<br><br>See "Fabric-attached configurations that optimize performance" on page 32 for examples of configurations with multiple port pairs and multiple LUN groups.<br><br>  |

| Release | Supported configurations |
|---|---|
| Earlier than 7.3 | To use multiple gateway port pairs with an IBM storage array, you must follow these rules:<br>◆ Each port in a gateway port pair must access a different fabric.<br>◆ No more than one port pair on a specific gateway can access LUNs on that storage array.<br>◆ For a gateway HA pair, one port pair from each gateway must be able to see the same array LUNs.<br>  |

The following illustration shows a redundant port pair on a gateway 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 illustrations show two cards, one with FC ports 1A and 1B and the other with FC ports 2A and 2B. The number represents the slot.

For more information about selecting redundant ports on the different gateway models with onboard FC initiator ports, see the gateway *Installation Requirements and Reference Guide*.

# Direct-attached configurations

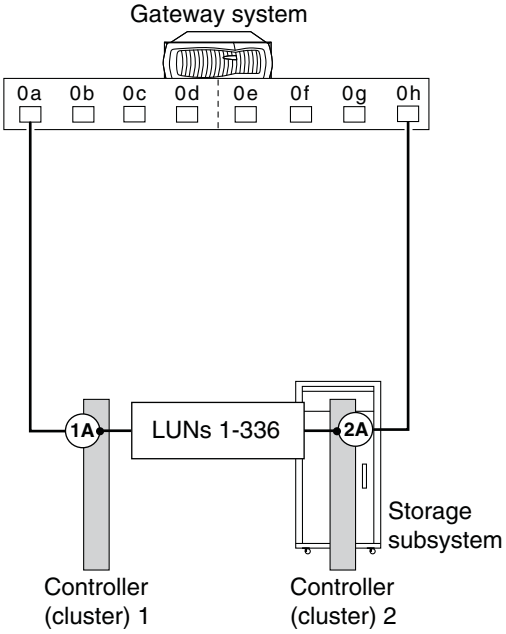
## Direct-attached stand-alone configuration

The following illustration shows an example of a direct-attached stand-alone configuration with 336 LUNs allocated for the gateway:

- For an ESS storage array, you can allocate up to 336 LUNs, as shown in the following illustration, if the gateway model supports 336 LUNs.
- For DS4xxx, DS5xxx, and DS8xxx storage arrays, you can allocate up to 256 LUNs for each LUN group gateway.

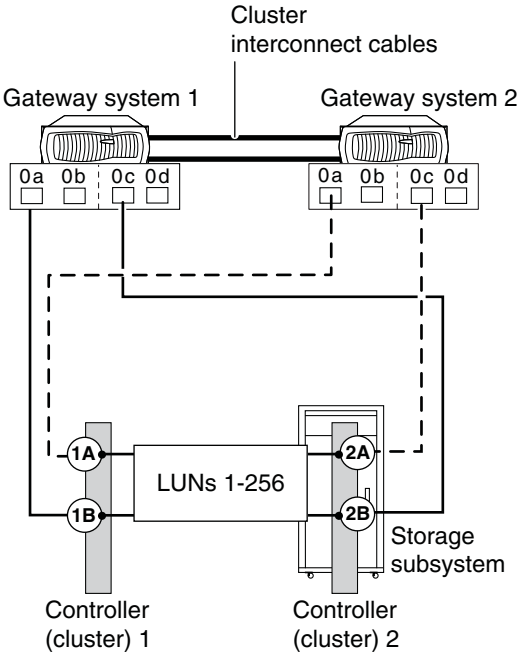
**Note**

The gateway *Interoperability Matrix* is the final authority about which configurations that gateways support.




## Direct-attached HA pair configuration

The following illustration shows a deployment with a gateway HA pair that is directly connected to the storage array. The storage array in this example has allocated 256 LUNs for the gateways.




In this illustration, the solid lines show the connections from gateway 1 and the dashed lines show the connections from gateway 2. For each gateway in a direct-attached configuration, you need one redundant port pair on the storage array to ensure that there are two paths to an array LUN. You use a total of four ports on the storage array for an HA pair, as shown in this example. Although four ports on the storage array are used to access the LUNs for gateway, each gateway can see a particular LUN through only two redundant ports.

Use a redundant port pair on each gateway node to ensure availability. (That is, on a gateway model with cards, use one connection from each adapter. For a model with onboard ports, use one port from each bus.) Then, if one path from a gateway node fails, the other path from the node is used; gateway controller takeover does not occur.

# Fabric-attached HA pair configurations

## Examples in this section

This section includes the following examples:



## Zoning recommendation

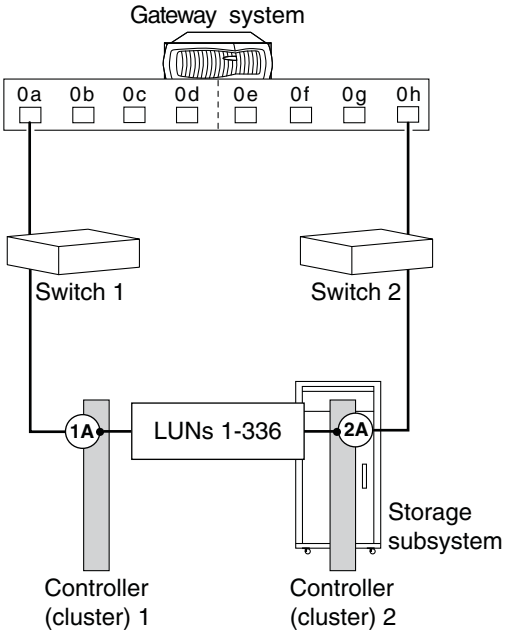
It is recommended that you use single-initiator zoning, which limits each zone to a single gateway FC initiator port and one storage array port. Single-initiator zoning improves discovery and boot time because the gateway FC initiators do not attempt to discover each other.

## Fabric-attached stand-alone configuration

The following illustration shows a fabric-attached configuration for a stand-alone gateway, with 336 LUNs allocated for the gateway.

**Note**

Not all configurations can support 336 LUNs. See the gateway *Interoperability Matrix* for information about the number of array LUNs your gateway model can support.

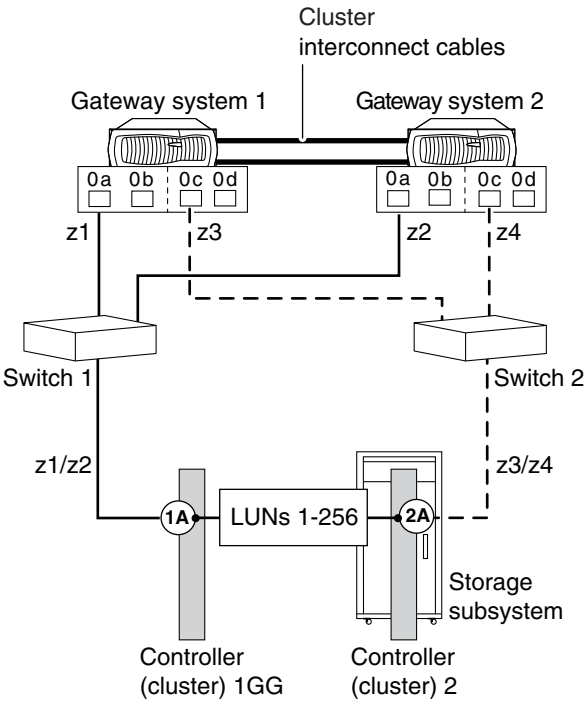



**Zoning:** The following table shows single-initiator zoning for this example. Single-initiator zoning is the recommended zoning strategy.

| Zone | Switch | Gateway port | Storage array port |
|---|---|---|---|
| z1 | 1 | 0a | 1A |
| z2 | 2 | 0h | 2A |

### Two ports accessed on a single storage array

This is an example of a fabric-attached HA pair in which the gateway nodes share the two (redundant) storage array ports. This configuration uses the fewest number of ports that are possible for the gateway. This configuration is useful if you are limited in the number of storage array ports or switch ports that you can use with the gateway.




In this example, 256 LUNs are allocated for the gateways.

To ensure availability, use a redundant port pair on each gateway (that is, one connection from each adapter on a gateway model with cards or a port from each bus for a model with onboard ports). Then, if one path from a gateway node fails, the other path from the node is used; gateway controller takeover does not occur.

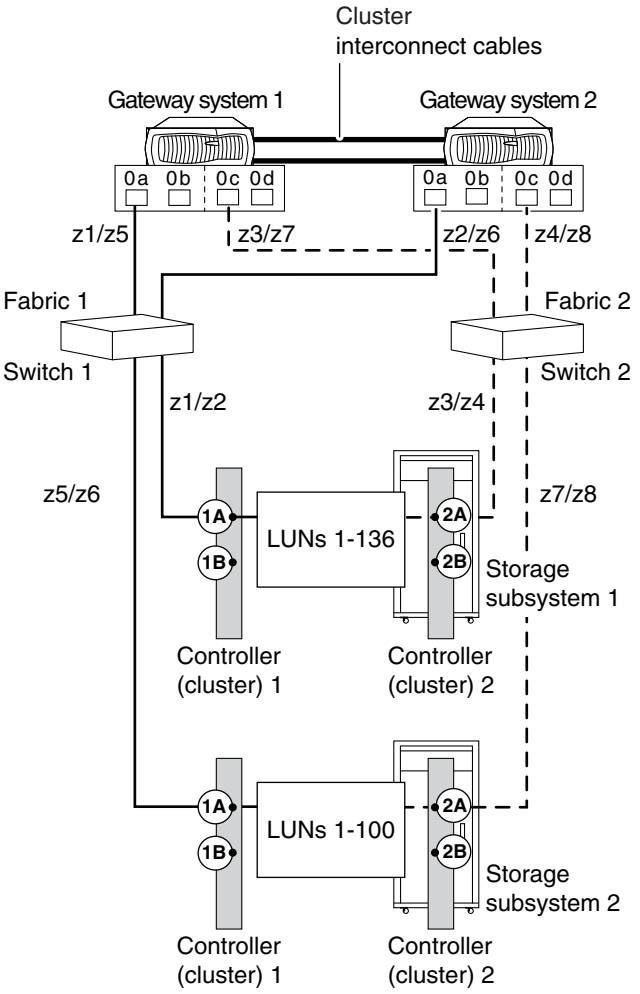
**Zoning:** The following table shows single-initiator zoning for this example with an N5000 series gateway HA pair. Single-initiator zoning is the recommended zoning strategy.

| Zone | Gateway | | Storage array | |
|---|---|---|---|---|
| **Switch 1** | | | | |
| z1 | Gateway 1 | Port 0a | Controller 1 | Port 1A |
| z2 | Gateway 2 | Port 0a | Controller 1 | Port 1A |
| **Switch 2** | | | | |
| z3 | Gateway 1 | Port 0c | Controller 2 | Port 2A |
| z4 | Gateway 2 | Port 0c | Controller 2 | Port 2A |

### Two ports accessed on each storage array—Layout 1

This is an example of a layout in which the gateway nodes connect to two different storage arrays. The two storage arrays can be from the same vendor or from different vendors. You might want to use this type of layout if you need to use some gateway FC initiator ports as targets (for example, to use the port pair 0b and 0d for FCP).

In this example, the solid connection lines represent Fabric 1 and the dashed connection lines represent Fabric 2. FC initiator ports 0a and 0c are a port pair; any array LUN seen on port 0a is also seen on port 0c.




**Zoning:** The following table shows single-initiator zoning for this example with an N5000 series gateway HA pair. Single-initiator zoning is the recommended zoning strategy.

| Zone | Gateway | | Storage array | | |
|---|---|---|---|---|---|
| **Switch 1** | | | | | |
| z1 | Gateway 1 | Port 0a | 1 | Controller 1 | Port 1A |
| z2 | Gateway 2 | Port 0a | 1 | Controller 1 | Port 1A |
| z5 | Gateway 1 | Port 0a | 2 | Controller 1 | Port 1A |
| z6 | Gateway 2 | Port 0a | 2 | Controller 1 | Port 1A |
| **Switch 2** | | | | | |
| z3 | Gateway 1 | Port 0c | 1 | Controller 2 | Port 2A |
| z4 | Gateway 2 | Port 0c | 1 | Controller 2 | Port 2A |
| z7 | Gateway 1 | Port 0c | 2 | Controller 2 | Port 2A |
| z8 | Gateway 2 | Port 0c | 2 | Controller 2 | Port 2A |

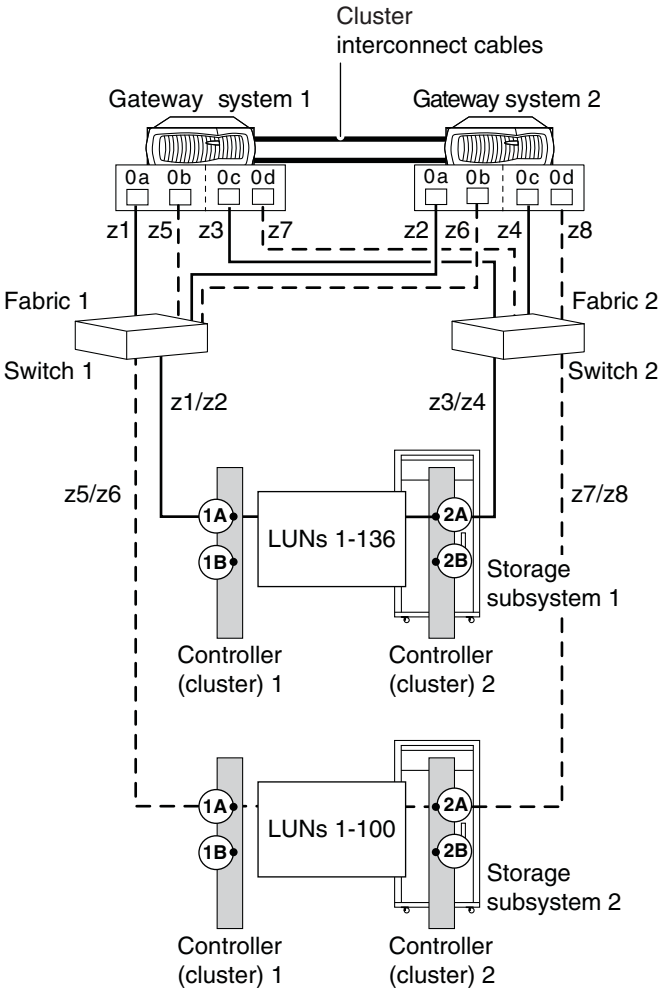
### Two ports accessed on each storage array—Layout 2

This example is similar to "Two ports accessed on each storage array—Layout 1" on page 21, but in this example two port pairs are used on each gateway node. To use multiple gateway port pairs with an IBM storage array, you must follow these rules:

- Each port in a gateway port pair must access a different fabric.
- No more than one port pair on a specific gateway can access LUNs on that storage array.
- For a gateway HA pair, one port pair from each gateway must be able to see the same array LUNs.

The two storage arrays can be from the same vendor or from different vendors.

In this example, the gateway port pair 0a and 0c (the solid lines) connects to one storage array. Any array LUN seen on 0a is also seen on 0c on the other fabric. The gateway port pair 0b and 0d (the dashed lines) connects to the other storage array. Any array LUN seen on 0b is also seen on 0d on the other fabric.




**Zoning:** The following table shows single-initiator zoning for this example with an N5000 series gateway HA pair. Single-initiator zoning is the recommended zoning strategy.

| Zone | Gateway | | Storage array | | |
|---|---|---|---|---|---|
| **Switch 1** | | | | | |
| z1 | Gateway 1 | Port 0a | 1 | Controller 1 | Port 1A |
| z2 | Gateway 2 | Port 0a | 1 | Controller 1 | Port 1A |
| z5 | Gateway 1 | Port 0b | 2 | Controller 1 | Port 1A |
| z6 | Gateway 2 | Port 0b | 2 | Controller 1 | Port 1A |
| **Switch 2** | | | | | |
| z3 | Gateway 1 | Port 0c | 1 | Controller 2 | Port 2A |
| z4 | Gateway 2 | Port 0c | 1 | Controller 2 | Port 2A |
| z7 | Gateway 1 | Port 0d | 2 | Controller 2 | Port 2A |
| z8 | Gateway 2 | Port 0d | 2 | Controller 2 | Port 2A |

### Four ports accessed on a single storage array— Layout 1

The following illustration shows an example of a fabric-attached HA pair in which the gateway nodes access array LUNs through four (redundant) ports on the storage array.

**Connections between the switch and the storage array:** In this layout, there is a straight connection from the storage array to the switch. (Compare this layout with the connections in “Four ports accessed on a single storage array—Layout 2” on page 28.)

**Utilization of devices:** In this layout, the following occurs with device failure:

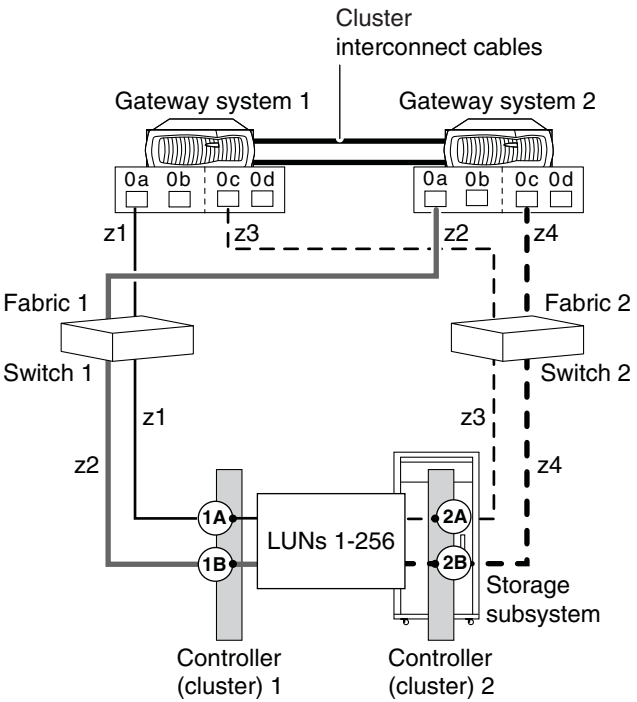
- If a switch fails, all traffic goes to the same controller.

  For example, if Switch 1 fails, the path from FC initiator port 0a on both gateways is unavailable. Therefore, all traffic goes from FC initiator port 0c to Controller 2. No traffic can go to Controller 1.

- If a controller fails, all traffic goes through the same switch.

  For example, if Controller 2 fails, traffic goes from Gateway 1 port 0a and Gateway 2 port 0a through Switch 1. No traffic can go through Switch 2.

See "Four ports accessed on a single storage array—Layout 2" on page 28 for an example that provides better utilization of the devices than in this layout if a switch or a controller (cluster) on the storage array becomes unavailable.



**Zoning:** The following table shows single-initiator zoning for this example with an N5000 series gateway HA pair. Single-initiator zoning is the recommended zoning strategy.

| **Zone** | **Gateway** | | **Storage array** | |
|---|---|---|---|---|
| Switch 1 | | | | |
| z1 | Gateway 1 | Port 0a | Controller 1 | Port 1A |
| z2 | Gateway 2 | Port 0a | Controller 1 | Port 1B |
| **Switch 2** | | | | |
| z3 | Gateway 1 | Port 0c | Controller 2 | Port 2A |
| z4 | Gateway 2 | Port 0c | Controller 2 | Port 2B |

### Four ports accessed on a single storage array—Layout 2

The following illustration shows another example of a fabric-attached HA pair in which the gateway nodes access array LUNs through four (redundant) ports on the storage array.

**Connections between the switch and the storage array:** In this layout, there is a cross connection from the storage array to the switch. (Compare this layout with the connections in "Four ports accessed on a single storage array—Layout 1" on page 25.)

**Utilization of devices:** During maintenance or an outage that causes one path to become unavailable, this layout provides better load balancing and utilization than the layout in "Four ports accessed on a single storage array— Layout 1" on page 25, as follows. During other circumstances, the two layouts are equal.

- When the switch is down, there is better storage array utilization.

  In this layout, if a switch fails, the traffic is still distributed over two controllers. For example, if Switch 1 fails

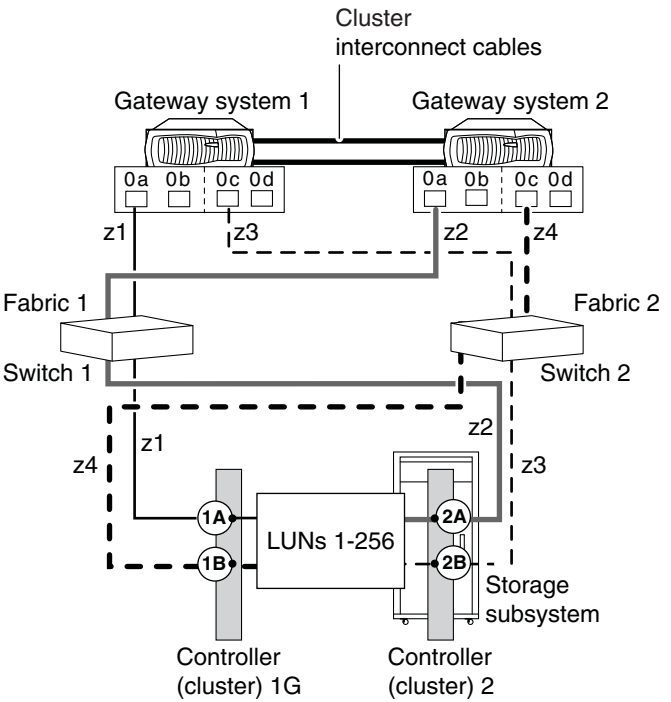
  - The path from Gateway 1 port 0a to Switch 1 to 1A on Controller 1 is unavailable.
  - The path from Gateway 2 port 0a to 2A on Controller 2 is unavailable.
  - There is still a path to each storage array controller through Switch 2.
- When the storage array controller (cluster) is down, there is better switch utilization.

  In this layout, even if a controller fails, the traffic is still sent through both switches. For example, if Controller 1 fails

  - The path from Gateway 1port 0c to Controller 2 is available through Switch 2.
  - The path from Gateway 2 port 0a to Controller 2 is available through Switch 1.

**Attention**

Do not use this layout if your configuration includes a DS4xxx/DS5xxx storage array or any other storage array that implements standby paths to storage. The reason is that if a switch fails, the gateways can only access the array LUNs through opposite storage array controllers. Performance can degrade to the point where the data is unavailable because every access to an array LUN requires Data ONTAP to first change the LUN's affinity.

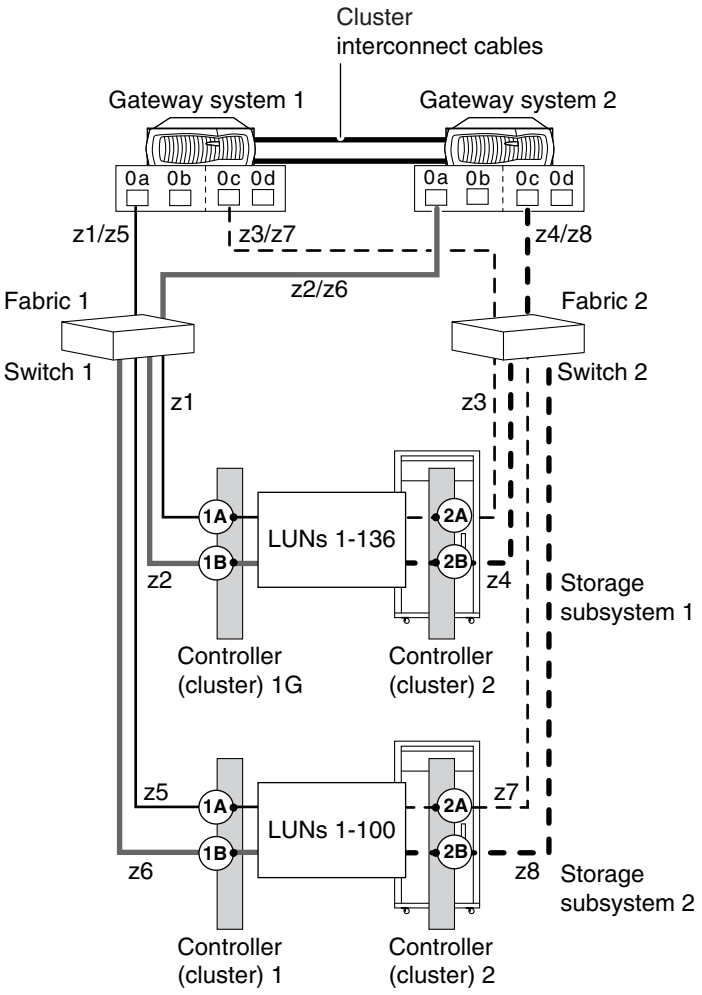



**Zoning:** The following table shows single-initiator zoning for this example with an N5000 series gateway HA pair. Single-initiator zoning is the recommended zoning strategy.

| Zone | Gateway | | Storage array | |
|---|---|---|---|---|
| **Switch 1** | | | | |
| z1 | Gateway 1 | Port 0a | Controller 1 | Port 1A |
| z2 | Gateway 2 | Port 0a | Controller 2 | Port 2A |
| **Switch 2** | | | | |
| z3 | Gateway 1 | Port 0c | Controller 2 | Port 2B |
| z4 | Gateway 2 | Port 0c | Controller 1 | Port 1B |

### Four ports accessed on each storage array

This example is similar to "Four ports accessed on a single storage array—Layout 1" on page 25. But in this example, the gateway nodes access array LUNs on two different storage arrays through only two ports on each gateway node. The two storage arrays can be from the same vendor or from different vendors.



**Zoning:** The following table shows single-initiator zoning for this example with an N5000 series gateway HA pair. Single-initiator zoning is the recommended zoning strategy.

| Zone | Gateway | | Storage array | | |
|---|---|---|---|---|---|
| **Switch 1** | | | | | |
| z1 | Gateway 1 | Port 0a | 1 | Controller 1 | Port 1A |
| z2 | Gateway 2 | Port 0a | 1 | Controller 1 | Port 1B |
| z5 | Gateway 1 | Port 0a | 2 | Controller 1 | Port 1A |
| z6 | Gateway 2 | Port 0a | 2 | Controller 1 | Port 1B |
| **Switch 2** | | | | | |
| z3 | Gateway 1 | Port 0c | 1 | Controller 2 | Port 2A |
| z4 | Gateway 2 | Port 0c | 1 | Controller 2 | Port 2B |
| z7 | Gateway 1 | Port 0c | 2 | Controller 2 | Port 2A |
| z8 | Gateway 2 | Port 0c | 2 | Controller 2 | Port 2B |

| Zone | Switch | Gateway port | Storage array port |
|---|---|---|---|
| **One gateway port pair** | | | |
| z1 | 1 | CPU 1, port 0c | 1A |
| z2 | 2 | CPU 2, port 0c | 1B |

# Fabric-attached configurations that optimize performance

## Optimizing performance by using multiple LUN groups

This example shows a configuration that enables you to optimize performance by spreading the I/O across the parity group (array). You set up your configuration so that different port pairs on a gateway access different groups of LUNs on the storage array. The gateway sees each LUN over only two paths.

**Note**

The gateway *Interoperability Matrix* is the final authority about which storage arrays and configurations that gateways support.

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**

Starting with 7.3, Data ONTAP adds functionality to support this configuration for DS8xxx and DS4xxx/DS5xxx storage arrays only. Prior to Data ONTAP 7.3, using multiple gateway port pairs to access different LUN groups on the same storage array results in more than two paths to an array LUN which causes the system to not function properly.

## Rules for implementing multiple LUN groups

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

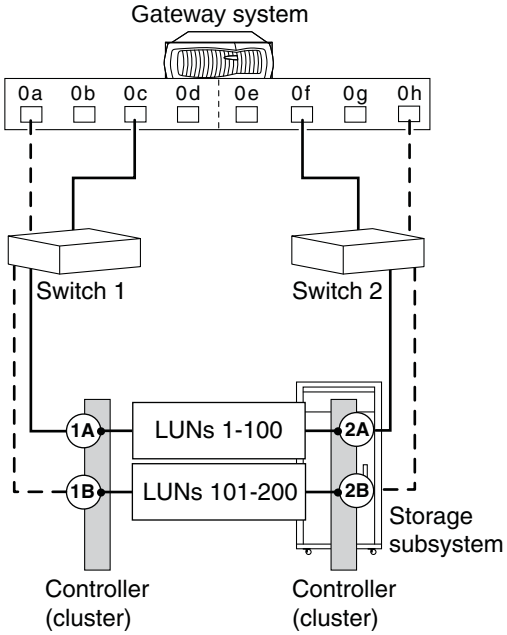
- On the storage array, use as many ports as possible to provide access to the LUNs you allocated for the gateway.
- On the gateway, use multiple port pairs. Each port pair accesses a different group of LUNs on the storage array, using redundant paths.
- In the Data ONTAP configuration, create one large aggregate, assigning LUNs from multiple parity groups to the aggregate. By doing so, the I/O is spread across more disks.

The combination of spreading I/O across the parity group (array) and creating one large aggregate results in a significant performance boost.

You can configure multiple LUN groups on DS4xxx, DS5xxx, and DS8xxx storage arrays. See "DS8xxx configuration with multiple LUN groups" on page 42 for information specific to DS8xxx storage arrays. See "DS4xxx/DS5xxx configuration with multiple LUN groups" on page 51 for information specific to DS4xxx/ DS5xxx storage arrays.

### Stand-alone system

The following illustration shows a configuration with a stand-alone N7600 or N7800 gateway. One gateway port pair accesses LUNs in one LUN group on the storage array and a different gateway port pair accesses LUNs in a different 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 | Gateway FC initiator port | Storage array port |
|---|---|---|
| **Switch 1** | | |
| z1 | Port 0a | Port 1B |
| z3 | Port 0c | Port 1A |

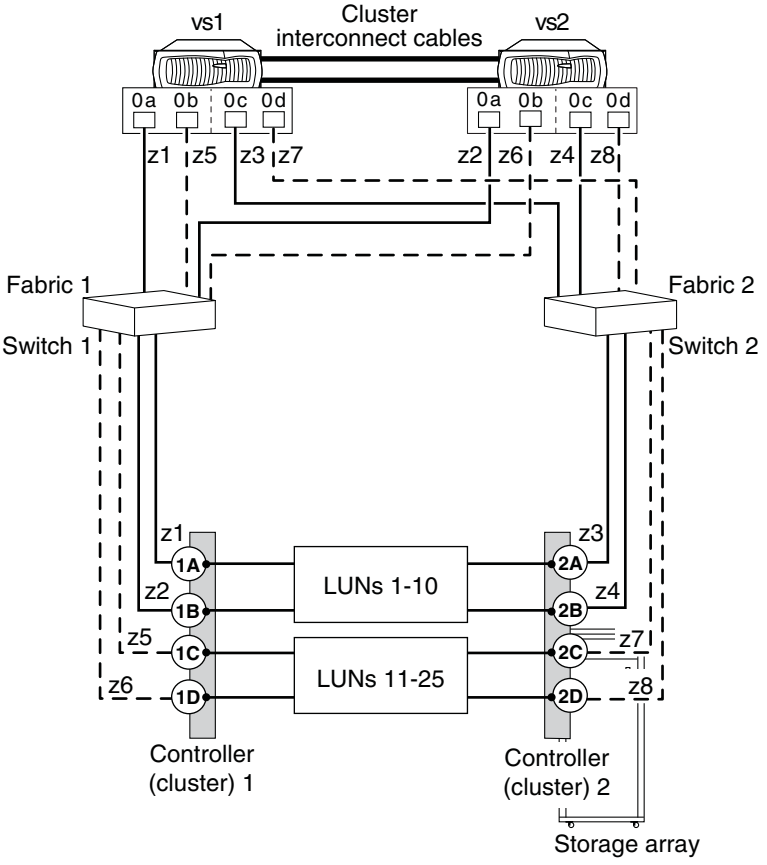
| Zone | Gateway FC initiator port | Storage array port |
|---|---|---|
| **Switch 2** | | |
| z2 | Port 0h | Port 2B |
| z4 | Port 0f | Port 2A |

### HA pair configuration with two 4-port LUN groups

The following illustration shows an gateway HA pair with N5300, N5500, or N5600 gateways. On each gateway, two gateway port pairs are used to optimize performance. The gateway port pairs are as follows:

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

Each gateway port pair accesses a separate device group on the storage array.



The following table summarizes the zoning for this configuration.

| Zone | Gateway and port | Storage array | Storage port | LUN group |
|---|---|---|---|---|
| **Switch 1** | | | | |
| z1 | vs1-0a | Controller 1 | 1A | LUNs 1 - 10 |
| z2 | vs2-0a | Controller 1 | 1B | LUNs 1 - 10 |
| z5 | vs1-0b | Controller 1 | 1C | LUNs 11 - 25 |
| z6 | vs2-0b | Controller 1 | 1D | LUNs 11 - 25 |
| **Switch 2** | | | | |
| z3 | vs1-0c | Controller 2 | 2A | LUNs 1 - 10 |
| z4 | vs2-0c | Controller 2 | 2B | LUNs 1 - 10 |
| z7 | vs1-0d | Controller 2 | 2C | LUNs 11 - 25 |
| z8 | vs2-0d | Controller 2 | 2D | LUNs 11 - 25 |

# Configuring DS8xxx arrays 3

**About this chapter**

This chapter provides information about the requirements for setting up a DS8xxx storage array to work with the gateway and an overview of the tasks you need to perform to configure LUNs on a DS8xxx storage array

**Topics in this chapter**

This chapter contains the following topics:



**About Storage Manager**

With the DS8000, the Storage Manager is a browser-based GUI that is part of the microcode. In contrast, with the DS4xxx/DS5xxx storage arrays, the GUI is provided through client software.

**Volume group defined**

A DS8xxx volume group is used to control the hosts that can access array LUNs (LUN masking) by associating host attachments or port groups with the array LUNs that they are allowed to access. You assign the desired FC initiator ports and the array LUNs to be accessed to the same volume group.

# DS8xxx configuration requirements

## Rules for the DS8xxx series

Use the following information to plan for configuring a DS8xxx storage array to work with a gateway.

| For... | Value... |
|---|---|
| Number of array LUNs on the DS8xxx storage array that can be allocated to gateways | 256 array LUNs per host group, regardless of the number of array LUNs that the gateway or DS8xxx supports. This is a gateway limitation with DS8xxx storage arrays. |
| Maximum array LUN size | The size of the LUNs that you can create on the storage array is limited by the maximum array LUN size that Data ONTAP supports. See "Guidelines for array LUN sizing" on page 6. |
| Host type | Sun Solaris for array LUNs mapped to the gateway. |

**Note**

When a host type of Sun-Solaris is used, the DS8xxx logical volume IDs are in hexadecimal format. Data ONTAP LUN IDs are in decimal format. To correlate DS8xxx logical volumes to Data ONTAP LUNs, you must convert the hexadecimal numbers to decimal.

## Recommended number of volume groups

**For releases 7.3 and later:** Use a single volume group for each LUN group on a DS8xxx storage array to guarantee the DS8xxx array LUNs are consistently presented to all gateway initiators that access them. If array LUNs are not consistently presented there is a potential for data corruption.

**For releases prior to 7.3:** Use a single volume group on a DS8xxx storage array.

### Storage array LUN access with the DS8300 9A2 LPAR

When setting up the DS8300 9A2 LPAR (system logical partition) model to interact with gateways, ensure that you set up access to each array LUN so that the redundant paths are both accessing the same LPAR.

# DS8xxx configuration overview

### Tasks before your gateway arrives

The following table summarizes the steps you can perform before the gateway arrives.

| Stage | Process |
|---|---|
| 1 | In the Management Console, check the License Internal Code to ensure that it meets the minimum version level required by the gateways. See the gateway *Interoperability Matrix* for version requirements. |
| 2 | Create (provision) LUNs on the DS8xxx storage array that you plan to use for the gateways.<br>**Note**<br>On a DS8xxx storage array, you do not have to assign LUNs to a specific host at the time you create the LUNs. |

### Tasks after your gateway arrives

The following table summarizes the steps to perform after you connect your gateway to the storage array.

While the array LUNs are being formatted, do not assign the LUNs to a gateway Volume group. After array LUNs are formatted, you can create a group for the gateway.

| Stage | Process |
|---|---|
| 1 | Obtain the gateway WWNs. Obtaining WWNs automatically is recommended. For information about how to obtain WWNs manually, see the gateway *Installation Requirements and Reference Guide*. |
| 2 | Access your storage array through the Storage Manager GUI. |

| Stage | Process |
|---|---|
| **3** | Create a single volume group for all gateways in the gateway neighborhood so that all gateways in the neighborhood can access the gateway LUNs:<br>◆ Assign type `SCSI map 256` to the gateway volume group.<br>◆ Assign the LUNs that the gateways share to the volume group (that is, the array LUNs that all gateways in the gateway neighborhood can see).<br>The name that you assign to the gateway volume group should help you easily identify that the volume group is for gateways.<br>**Note**<br>On the DS8xxx, logical volume IDs (LUNs) are available on all ports by default. You do not have to map array LUNs to ports. A set of array LUNs is grouped into a single volume group of type `SCSI map 256`. Write down this volume group name and specify it when you create a host for each gateway FC initiator port. |
| **4** | **For a direct-attached configuration:** When you create the Host Attachment files for the ports, change the default setting, which is FcSf (fibre-channel-switch-fabric). Set the Host Attachment Port type and Storage Image I/O port settings on the HBAs to FcAl (Fibre Channel Arbitrated Loop).<br>**Note**<br>If you do not change the setting from FcSf to FcAL, direct attachment of the gateway does not work correctly. |
| **5** | Identify the WWN of each gateway FC initiator port, and assign the host type of Sun-Solaris to each. |
| **6** | (Optional) Specify port masking to restrict gateways to certain ports. |

# DS8xxx configuration with multiple LUN groups

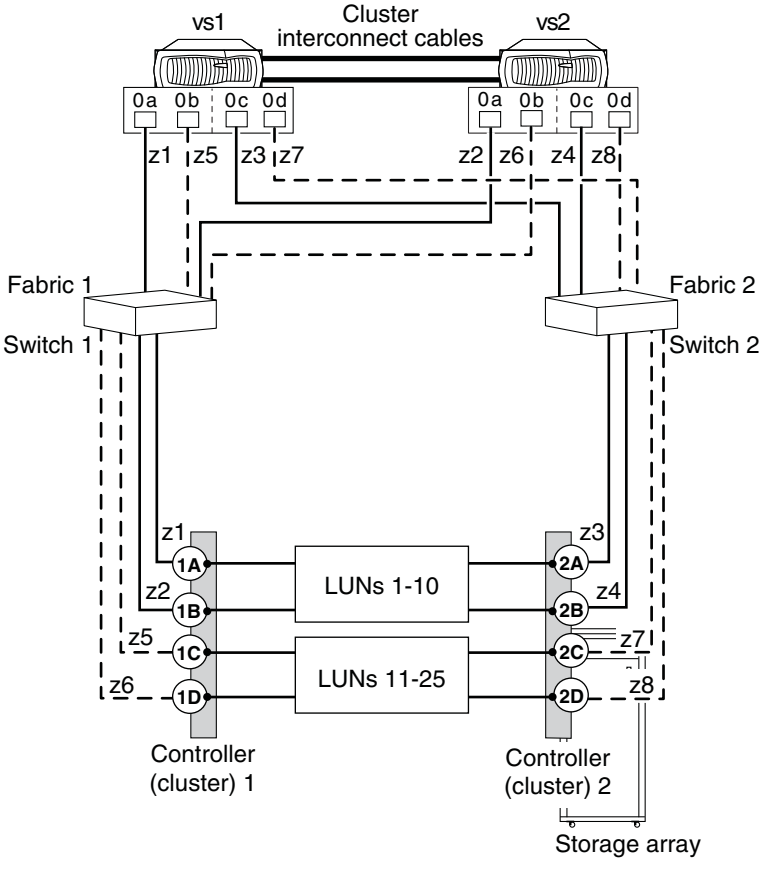
### Multiple LUN group requirements

The following are requirements to configure multiple LUN groups on DS8xxx storage arrays:

- Switch zoning must define which target ports the gateway FC initiator ports use to access each LUN group.
- Volume groups must define which LUN groups are presented to each gateway initiator port.
- One initiator port pair for each gateway is required for each LUN group.

### Multiple LUN group configuration example

The following illustration shows a gateway HA pair with two 4-port LUN groups on a on DS8xxx storage array.



The following table summarizes the zoning for this configuration.

| Zone | Gateway and port | Storage array | Storage port | LUN group |
|---|---|---|---|---|
| **Switch 1** | | | | |
| z1 | vs1-0a | Controller 1 | 1A | LUNs 1 - 10 |
| z2 | vs2-0a | Controller 1 | 1B | LUNs 1 - 10 |
| z5 | vs1-0b | Controller 1 | 1C | LUNs 11 - 25 |
| z6 | vs2-0b | Controller 1 | 1D | LUNs 11 - 25 |
| **Switch 2** | | | | |
| z3 | vs1-0c | Controller 2 | 2A | LUNs 1 - 10 |
| z4 | vs2-0c | Controller 2 | 2B | LUNs 1 - 10 |
| z7 | vs1-0d | Controller 2 | 2C | LUNs 11 - 25 |
| z8 | vs2-0d | Controller 2 | 2D | LUNs 11 - 25 |

## Tasks to create multiple LUN groups

The following table summarizes the steps to create multiple LUN groups on DS8xxx storage arrays. If the storage array is not already configured, see "DS8xxx configuration overview" on page 40.

The LUN groups (two 4-port LUN groups in an HA pair) and port names used in these tasks correspond to the "Multiple LUN group configuration example" on page 43.

| Stage | Process |
|---|---|
| **1** | Access your storage array through the Storage Manager user interface. |
| **2** | On the storage array, create two extent pools, one for each LUN group.<br>In the example you would create extent pool 1 for LUNs 1 through 10 and extent pool 2 for LUNs 11 through 25. |

| Stage | Process |
|---|---|
| **3** | Create one set of volumes for extent pool 1 and a second set of volumes for extent pool 2. |
| **4** | Create one volume group with gateway FC initiator ports 0a and 0c from both gateways and all the volumes from extent pool 2. |
| **5** | Create a second volume group with gateway FC initiator ports 0b and 0d from both gateways and all the volumes from extent pool 1. |
| **6** | Configure the zoning of the switches so that each gateways initiator port accesses only a single target port (as shown in the following illustration). |

# Configuring DS4xxx/DS5xxx arrays 4

**About this chapter**

This chapter provides information about the requirements for setting up DS4xxx/DS5xxx storage arrays to work with gateway and an overview of the tasks you need to perform to configure LUNs on DS4xxx/DS5xxx storage arrays

**Topics in this chapter**

This chapter discusses the following topics:

# DS4xxx/DS5xxx configuration requirements

## Rules for the DS4xxx/DS5xxx series

Use the following information to plan for configuring all DS4xxx/DS5xxx series storage array models to work with a gateway.

| For... | Value... |
|---|---|
| Number of LUNs on the DS4xxx/DS5xxx that can be allocated to gateways | 256 LUNs per host group, regardless of the number of LUNs that the gateway supports. This is a gateway limitation with DS4xxx/DS5xxx storage arrays. |
| Maximum array LUN size | The size of the array LUNs that you can create on the storage array is limited by the maximum array LUN size that Data ONTAP supports. See "Guidelines for array LUN sizing" on page 6. |
| Host type | AIX |

# DS4xxx/DS5xxx configuration overview

## Prerequisites to configuration

Before continuing with this chapter, you should have already accomplished the following tasks:

- You allocated arrays for the gateways before gateway installation and connection to the storage array.

  Before you can create LUNs for gateways, you must define an array on your storage array.

  **Note**
  In the context of this chapter,"arrays" “arrays” means RAID sets or parity groups. Array creation enables you to allocate space on the storage array.

- You created LUNs for the gateways.

  **Note**
  If you did not create arrays or LUNs for gateways, see you must create them.

## Task overview

The following table summarizes the tasks to set up the storage array to work with the gateway.

**Note**
The following processes take place on the storage array UI after you connect your gateway to your storage array. You must have the Storage Partitioning License to perform this process.

| Stage | Process |
|---|---|
| **1** | Obtain the gateway WWNs. It is recommended that you obtain the WWNs automatically. For information about how to obtain the WWNs manually, see the gateway *Installation Requirements and Reference Guide*. |
| **2** | Gain access to your storage array through the user interface. |
| **3** | Check the controller firmware version to ensure that it meets the minimum version level required by the gateway. |

<table>
<tr><th>Stage</th><th colspan="2">Process</th></tr>
<tr><td>4</td><td>If...</td><td>Then...</td></tr>
<tr><td></td><td>Array LUNs were created for the gateways</td><td>Go to Step 5.</td></tr>
<tr><td></td><td>Array LUNs were not created for the gateways but free capacity is available in any array</td><td>Create LUNs on the storage array by using available free space, then go to Step 5 in this overview.</td></tr>
<tr><td></td><td>Array LUNs were not created for gateways and the capacity is unconfigured</td><td>Create LUNs on the storage array by using unconfigured free space. Then go to Step 5 in this overview.</td></tr>
<tr><td>5</td><td colspan="2">Create a host group on the storage array. You add the FC initiator ports of the gateways to the host group on the storage array to establish a logical connection for mapping LUNs. You must add to the host group the WWNs of all FC initiator ports of the gateways that need to see the same LUNs (that is, all participants in the gateway neighborhood).<br><br>Host type requirement: In the Storage Manager, when you add your gateway to a host group, you must select AIX as the host type of your gateway.<br><br>Before creating a host group:<br>◆ Ensure that the gateway system FC initiator port WWPNs are available (see the gateway Installation Requirements and Reference Guide).<br>◆ If LUNs have not yet been created on your storage array for the gateway, you must create the LUNs.<br>❖ If you have available free capacity, you must create new logical drives from available free capacity.<br>❖ If space is unconfigured, you must create arrays from unconfigured capacity.</td></tr>
<tr><td>6</td><td colspan="2">Map the array LUNs to the gateway.</td></tr>
<tr><td>7</td><td colspan="2">Add more arrays later, if needed.</td></tr>
</table>

# DS4xxx/DS5xxx configuration with multiple LUN groups

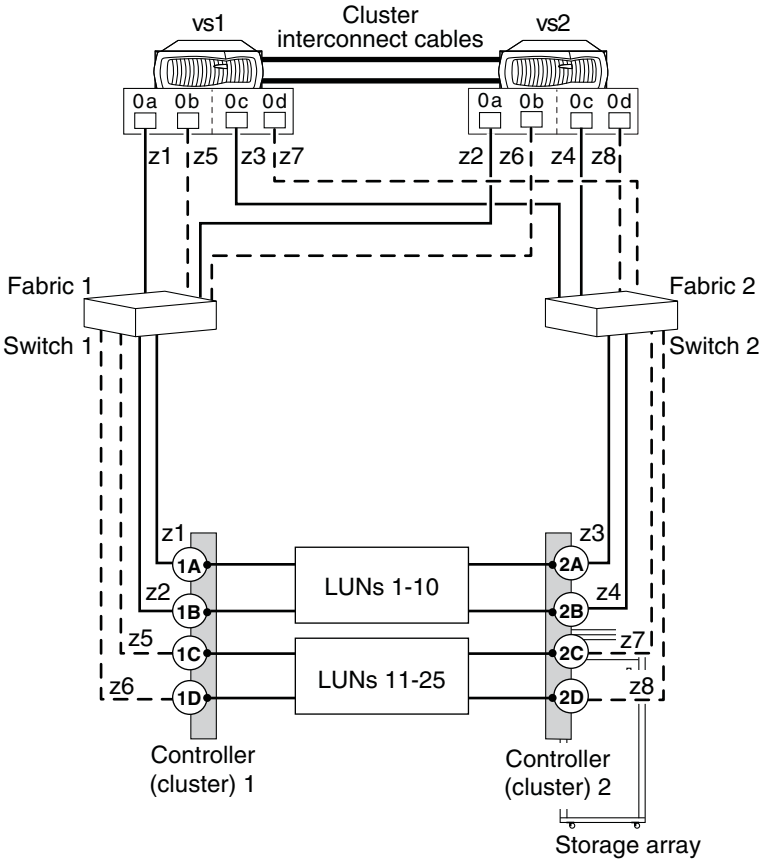
### Multiple LUN group requirements

The following are requirements to configure multiple LUN groups on DS4xxx/DS5xxx storage arrays:

- Switch zoning must define which target ports the gateway FC initiator ports use to access each LUN group.
- The host group must define which LUN groups are presented to each gateway initiator port.
- One initiator port pair is required for each LUN group.
- All target ports on a controller accessing an individual LUN group must be accessed through the same switch.

### Multiple LUN group configuration example

The following illustration shows a gateway HA pair with two 4-port LUN groups of N5300, N5500, or N5600 gateways.



The following table summarizes the zoning for this configuration.

| Zone | Gateway and port | Storage array | Storage port | LUN group |
|---|---|---|---|---|
| **Switch 1** | | | | |
| z1 | vs1-0a | Controller 1 | 1A | LUNs 1 - 10 |
| z2 | vs2-0a | Controller 1 | 1B | LUNs 1 - 10 |
| z5 | vs1-0b | Controller 1 | 1C | LUNs 11 - 25 |
| z6 | vs2-0b | Controller 1 | 1D | LUNs 11 - 25 |
| **Switch 2** | | | | |
| z3 | vs1-0c | Controller 2 | 2A | LUNs 1 - 10 |
| z4 | vs2-0c | Controller 2 | 2B | LUNs 1 - 10 |
| z7 | vs1-0d | Controller 2 | 2C | LUNs 11 - 25 |
| z8 | vs2-0d | Controller 2 | 2D | LUNs 11 - 25 |

### Tasks to create multiple LUN groups

The following table summarizes the steps to create multiple LUN groups for DS4xxx/DS5xxx storage arrays. If the array is not already configured see "DS4xxx/DS5xxx configuration overview" on page 49.

The LUN groups (two 4-port LUN groups in an HA pair) and port names used in these tasks correspond to the illustration in "DS4xxx/DS5xxx configuration with multiple LUN groups" on page 51.

| Stage | Process |
|---|---|
| **1** | Access your storage array through the Storage Manager GUI. |
| **2** | On the storage array, create two arrays (RAID groups), one for each LUN group.<br><br>In the following example you would create array 1 for LUNs 1 through 10 and array 2 for LUNs 11 through 25. |
| **3** | On the storage array, create a set of logical drives from array 1 and a second set of logical drives from array 2. |

| Stage | Process |
|---|---|
| **4** | Create one host group with 0a, 0c from both gateways and all the logical drives from array 1. |
| **5** | Create a second host group with 0b, 0d from both gateways and all the logical drives from array 2. |
| **6** | Configure zoning on the switches so that each gateways initiator port only accesses a single target port (as shown in the following illustration). |

# Configuring ESS arrays 5

## About this chapter

This chapter provides information about the requirements for setting up an ESS storage array to work with the gateway and an overview of the tasks you need to perform to configure LUNs on an ESS storage array.

**Note**

The gateway *Interoperability Matrix* is the final authority about which storage arrays and configurations that gateways support.

## Topics in this chapter

This chapter discusses the following topics:

# ESS configuration requirements

## Rules for the ESS series

Use the following information to plan for configuring an ESS storage array to work with a gateway.

| For... | Value... |
|---|---|
| Number of LUNs on the ESS storage array that can be allocated to gateways | The maximum number of array LUNs that you can allocate for gateways depends on the gateway models that you are deploying, not on what the ESS models can support.<br><br>See the gateway *Interoperability Matrix* at http://www.ibm.com/storage/nas/ for information about the maximum number of array LUNs that each gateway model supports. |
| Maximum array LUN size | The size of the array LUNs that you can create on the storage array is limited by the maximum array LUN size that Data ONTAP supports. See "Guidelines for array LUN sizing" on page 6. |
| Host type | The host type for each array LUN mapped to the gateway must be set to RS/6000. |

**Note**

ESS logical volume IDs are in hexadecimal format. Data ONTAP LUN IDs are in decimal format. To correlate ESS logical volumes to Data ONTAP LUNs, you must convert the hexadecimal numbers to decimal.

# ESS configuration overview

### Tasks before your gateway arrives

The following table summarizes the steps you can perform before the gateway arrives.

| Stage | Process |
|---|---|
| 1 | Access your storage array through the ESS UI. |
| 2 | Check the License Internal Code to ensure that it meets the minimum version level required by the gateway. |
| 3 | Create a dummy host.<br><br>**Requirement to create a dummy host first:** Formatting LUNs takes time to complete. Therefore, before configuring the gateway FC initiator ports as hosts, first create a dummy host. You then create and format LUNs for the dummy host. You can create a dummy host and assign LUNs to it before your gateway is installed.<br><br>**After your gateway arrives:** You configure the gateway FC initiator ports as hosts. You then modify the LUNs you created for the dummy host so that they can be used by the gateway FC initiator ports.<br><br>**Attention**<br>Do not remove the dummy host. If the dummy host is absent and you change which gateway owns the LUN (using the gateway LUN ownership feature in Data ONTAP), the LUN must be reformatted. This causes a delay in the gateway being able to access the LUN. |

| Stage | Process |
|---|---|
| 4 | Create LUNs for the dummy host.<br><br>**When to create LUNs for the dummy host:** You first create LUNs for the dummy host, then modify (remap) them to be used by the gateway FC initiator ports.<br><br>**Attention**<br>As new LUNs are created, ESS starts to format them. The gateway cannot recognize the LUNs while they are being formatted. Therefore, always assign (map) LUNs that you intend to use for the gateway to the dummy host first. After the LUN formatting finishes, remap the LUNs to the gateway's FC initiator ports. Adding LUNs to the gateway's FC initiator ports while the LUNs are being formatted can lead to data corruption. |

## Tasks after your gateway arrives

The following table summarizes the steps to perform after you connect your gateway to the storage array.

| Stage | Process |
|---|---|
| 1 | Obtain the gateway WWNs. It is recommended that you obtain WWNs automatically. For information about how to obtain WWNs manually, see the gateway *Installation Requirements and Reference Guide*. |
| 2 | Access your storage array through the ESS UI. |
| 3 | Configure each gateway FC initiator port as a host.<br><br>**Requirement for identifying gateway ports:** You must create a host in the ESS UI for each gateway FC initiator port that you plan to connect to the storage array.<br><br>**Prerequisite:** Be sure that you have the WWN for each gateway FC initiator port that you plan to connect to the storage array. If you do not have the gateway World Wide Names, see the gateway *Installation Requirements and Reference Guide*. |

| Stage | Process |
|---|---|
| **4** | Configure host adapter ports on the storage array to establish port access to the array LUNs. |
| **5** | Modify LUN assignments (mappings) so that gateway FC initiator ports can use the array LUNs.<br><br>You must reassign (remap) the array LUNs you assigned to the dummy host to the gateway's FC initiator ports.<br><br>**Attention**<br>The LUNs must be finished formatting before you modify the LUNs on the storage array, or data corruption can occur. |

# DS4xxx firmware upgrade issue workaround A

## About this appendix

This appendix describes how to workaround a DS4xxx firmware upgrade issue.

## Topics in this appendix

This appendix discusses the following topics:



## Description of the issue

A change was made in controller firmware version 6.12.03.10 to control how persistent reservations are handled in AIX host mode. The default settings on the DS4xxx storage arrays are no longer compatible with gateways. If you use controller firmware version prior to 6.12.40, you must change the default settings. Otherwise, a gateway reports errors with persistent reservations when you try to assign ownership of a storage array LUN to the gateway in the gateway configuration (see the following error example).

```
naneqa-f3050-5> disk assign brcdqa12:12.126L2 -c zoned
Assigning zoned checksum will prevent reverting to ONTAP 6.5 or
earlier.
Thu Dec 22 11:34:04 GMT [
diskown.changingOwner:info]: changing ownership for disk
brcdqa12:12.126L2 (S/N 600A0B800019E99900002ACE4378D97B) from
unowned (ID -1) to naneqa-f3050-5 (ID 101172146)
diskown: received reservation conflict while attempting to set
reservation on disk brcdqa12:12.126L2.
Thu Dec 22 11:34:04 GMT [ispfc_main:error]:
disk_reserve_done:Reservation failed on brcdqa12:12.126L2 (return
code 7).
disk assign: sanown returned status 27. Assign failed for one or
more disks in the disk list.
```

This section describes a workaround to reestablish compatibility between a DS4xxx storage array and the gateway.

### Requirement when performing the workaround on a production system

You can perform this workaround on a storage array that is in production.

### Effect of the workaround on communication with AIX

Performing this workaround affects all hosts connected to the storage array as type AIX if the host is running an application that uses SCSI-3 reservations (for example, VERITAS DMP). No effect has been observed with AIX running Tivoli® Storage Manager (TSM).

### Running a script to restore gateway compatibility

To reestablish compatibility between the DS4xxx storage array and the gateway, complete the following steps.

**Note**

The option changed by this workaround is 0x27, bit 3, which is the type of parameter data that is returned in response to a `prin` command with a read reservation service action. The bit 3 = 0 A header is returned with a reservation key set to zero. This behavior is not is in accordance with the current T10 standards for the `persistent reservations` command set. However, it preserves compatibility with the legacy implementation. The bit 3 = 1 A header is returned (but no reservation key). This behavior is in accordance with the current T10 standards for the `persistent reservations` command set.

| Step | Action |
|---|---|
| 1 | In the IBM Storage Manager management software, right-click the storage array name in the left window pane, then select `Execute Script` from the drop-down menu. |

| Step | Action |
|---|---|
| 2 | Enter the following in the top window of the script editor, which appears after you select Execute Script. Ensure that you enter AIX as the host type:<br>**show controller[a] HOSTNVSRAMByte["AIX", 0x27];**<br>**show controller[b] HOSTNVSRAMByte["AIX", 0x27];**<br>**set controller[a] hostnvsrambyte["AIX",0x27]=0x8,0xff;**<br>**set controller[b] hostnvsrambyte["AIX",0x27]=0x8,0xff;**<br>**show controller[a] HOSTNVSRAMByte["AIX", 0x27];**<br>**show controller[b] HOSTNVSRAMByte["AIX", 0x27];**<br>The script output at the bottom of the screen shows the old settings, sets bit 3 of byte 0x27 of host mode AIX, then displays the new settings:<br>`show controller[a] HOSTNVSRAMByte["AIX", 0x27];`<br>`show controller[b] HOSTNVSRAMByte["AIX", 0x27];`<br>`set controller[a] hostnvsrambyte["AIX",0x27]=0x8,0xff;`<br>`set controller[b] hostnvsrambyte["AIX",0x27]=0x8,0xff;`<br>`show controller[a] HOSTNVSRAMByte["AIX", 0x27];`<br>`show controller[b] HOSTNVSRAMByte["AIX", 0x27];`<br>`Performing syntax check...`<br>`Syntax check complete.`<br>`Executing script...`<br>`Controller "a" Host Type Index 6 NVSRAM offset 0x27 = 0x1.`<br>`Controller "b" Host Type Index 6 NVSRAM offset 0x27 = 0x1.`<br>`Controller "a" Host Type Index 6 NVSRAM offset 0x27 = 0x9.`<br>`Controller "b" Host Type Index 6 NVSRAM offset 0x27 = 0x9.`<br>`Script execution complete.` |
| 3 | Look at the script output to verify that the script output shows the new value of 0x9:<br>◆ If the script output shows 0x9, the system should be in a gateway compatible mode.<br>◆ If the script output does not show 0x9, reenter the text in the script, ensuring that the text that you enter in the script exactly matches Step 2. |
| 4 | View the NVSRAM Host Type Index to verify that AIX is mapped to one Index entry.<br>The Host Type Index is part of the storage array profile output. To access the storage array profile, from the Subsystem Management window, select Storage Subsystem > View Profile or Storage Subsystem > View > Profile (depending on your storage array type).<br>"Example of a Host Type Index" on page 63 shows an example of a Host Type Index that includes AIX as one entry. |

**Example of a Host Type Index:** The following example output shows the Host Type Index with "AIX" mapped to a Host Index of 6.

**Note**

The value of AIX in the Host Type Index on your system might be a value other than 6, which is shown in the following example. The mapping of host types to indexes varies for different storage array types.

| INDEX | ADT STATUS | TYPE |
|---|---|---|
| 0 | Disabled | Windows NT Non-Clustered (SP5 or higher) |
| 1 | Disabled | Windows NT Clustered (SP5 or higher) |
| 2 | Disabled | Windows 2000/Server 2003 Non-Clustered |
| 3 | Disabled | Windows 2000/Server 2003 Clustered |
| 4 | Enabled | NetWare-IBMSAN |
| 5 | Enabled | Linux |
| 6 (Default) | Disabled | AIX |
| 7 | Enabled | HP-UX |
| 8 | Disabled | Solaris |
| 9 | Enabled | Windows 2000/Server 2003 Non-Clustered (supports DMP) |
| 10 | Disabled | Irix |
| 11 | Enabled | Netware Failover |
| 12 | Enabled | IBM TS SAN VCE |
| 13 | Disabled | LNXCL |
| 14 | Enabled | Solaris (with Veritas DMP) |
| 15 | Enabled | Windows 2000/Server 2003 Clustered (supports DMP) |

### Reverting after the workaround is applied

If a problem occurs and you need to revert, complete the following steps to disable the option that was set by the workaround.

| Step | Action |
|---|---|
| 1 | In the Storage Manager, right click the storage array name in the left window pane, then select `Execute Script` from the drop-down menu. |

| Step | Action |
|---|---|
| 2 | Enter the following in the top window of the script editor, which appears after you select Execute Script.<br><br>**Note**<br>Ensure that you enter AIX as the host type.<br><br>`set controller[a] hostnvsrambyte["AIX",0x27]=0x8,0x00;`<br>`set controller[b] hostnvsrambyte["AIX",0x27]=0x8,0x00;` |

# Index

## R



## S



## T



## V



## Z

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