

gFiler™ Gateway Series

Getting Started with the gFiler for HP®

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Preface

About this guide	This guide introduces you to the NetApp gFiler gateway for Data ONTAP™ 6.5.3. It provides an overview of the tasks required to set up a gFiler, and provides configuration guidelines and sample configurations.
Audience	This guide is for users who are familiar with operating systems, such as UNIX®, Windows® 95, Windows NT®, Windows 2000, and Windows XP and who will be installing gFiler gateways. 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 NetApp® gFiler.
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. _____ Caution_____ A caution contains instructions that you must follow to avoid damage to the equipment, a system crash, or loss of data. _____

Safety Information (Sicherheitshinweise)

Safety rules

All products are Class 1 laser devices, except the NVRAM5 cluster media converter, which is Class 1M. You must follow these safety rules when working with this equipment:

WARNING

Failure to follow these directions could result in bodily harm or death.

- ◆ When using an NVRAM5 cluster media converter, the storage system must be installed in a restricted access location.
- ◆ **Switzerland only—for FAS900, GF900, R200, and C6200 systems:**
This equipment relies on fuses/circuit breakers in the building installation for overcurrent protection. Each power supply must receive power from a separately dedicated outlet with a 10A fuse/circuit breaker.
- ◆ When installing disk shelves and a storage system into a movable cabinet or rack, install from the bottom up for best stability.
- ◆ DC-based systems must be installed in a restricted access location and the two input power terminals for the DC power supply must be connected to separate isolated branch circuits.
- ◆ To reduce the risk of personal injury or equipment damage, allow internal components time to cool before touching them and ensure that the equipment is properly supported or braced when installing options.
- ◆ This equipment is designed for connection to a grounded outlet. The grounding type plug is an important safety feature. To avoid the risk of electrical shock or damage to the equipment, do not disable this feature.
- ◆ This equipment has one or more replaceable batteries. There is danger of explosion if the battery is incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

For units with multiple power cords



If your storage system or disk shelf has multiple power cords and you need to turn the unit off, heed the following warning:

WARNING

This unit has more than one power supply cord. To reduce the risk of electrical shock, disconnect all power supply cords before servicing.

Sicherheitsvorgaben

Alle Produkte sind Lasergeräte der Klasse 1, mit Ausnahme des NVRAM5 Cluster-Medienkonverters, der in Klasse 1M fällt. Beim Einsatz dieser Geräte sind die Sicherheitsvorschriften zu beachten:

Vorsicht

Nichtbeachtung dieser Vorschriften kann zu Verletzungen oder Tod führen.

- ◆ Bei der Verwendung eines NVRAM5 Cluster-Medienkonverters muss das Speichersystem an einem Standort mit beschränktem Zugriff installiert werden.
- ◆ **Nur für die Schweiz - Systeme FAS900, GF900, R200 und C6200:** Diese Geräte erfordern den Festeinbau von Sicherungen zum Überstromschutz. Jeder Netzanschluss muss mit Strom aus getrennten, speziell für diesen Zweck vorgesehenen Steckdosen versorgt werden, die jeweils mit einer 10A-Sicherung geschützt sind.
- ◆ Werden die Plattenregale und das Speichersystem in einen beweglichen Schrank oder Turm eingebaut, ist wegen der höheren Stabilität der Einbau von unten nach oben vorzunehmen.
- ◆ Gleichstrom-Systeme müssen an Betriebsstätte mit beschränktem Zutritt installiert sein und die beiden Eingangsstromklemmen für das Gleichstrom-Netzteil müssen an separate und isolierte Abzweigleitungen angeschlossen sein.
- ◆ Zum Schutz vor Körperverletzung oder Sachschäden am Gerät lassen Sie die inneren Bauteile stets vor dem Berühren abkühlen. Sorgen Sie dafür, dass das Gerät richtig abgestützt ist oder fest aufrecht steht, bevor Sie neues Zubehör einbauen.
- ◆ Dieses Gerät ist für die Einspeisung aus einer geerdeten Netzverbindung ausgelegt. Der Netzstecker mit Erdungsvorrichtung ist ein wichtiger Sicherheitsschutz. Zum Schutz vor elektrischem Schlag oder Sachschäden am Gerät die Erdung nicht abschalten.
- ◆ Das Gerät ist mit einer oder mehreren auswechselbaren Batterien ausgestattet. Bei unsachgemäßem Auswechseln der Batterie besteht Explosionsgefahr. Batterien nur mit dem vom Hersteller empfohlenen Typ oder entsprechenden Typen ersetzen. Gebrauchte Batterien sind gemäß den Anweisungen des Herstellers zu entsorgen.

Für Geräte mit mehrfachen Netzanschlussleitungen



Wenn Ihr Speichersystem oder Plattenregal über mehrere Stromkabel verfügt und Sie die Einheit ausschalten müssen, folgenden Warnhinweis beachten:

ACHTUNG

Gerät besitzt zwei Netzanschlussleitungen. Vor Wartung alle Anschlüsse vom Netz trennen.

About this chapter

This chapter introduces you to the gFiler™ gateway and provides an overview of the tasks that you need to do to set up your storage subsystem, gFiler hardware, and Data ONTAP™ software on a gFiler. Use this guide in conjunction with the *gFiler Hardware Installation Guide* and the *gFiler Software, Setup, and Management Guide*.

Note

For the most recent information about supported microcode versions and switch support, go to the *gFiler Series Support Matrix for HP* at <http://now.netapp.com>.

Topics in this chapter

This chapter discusses the following topics:

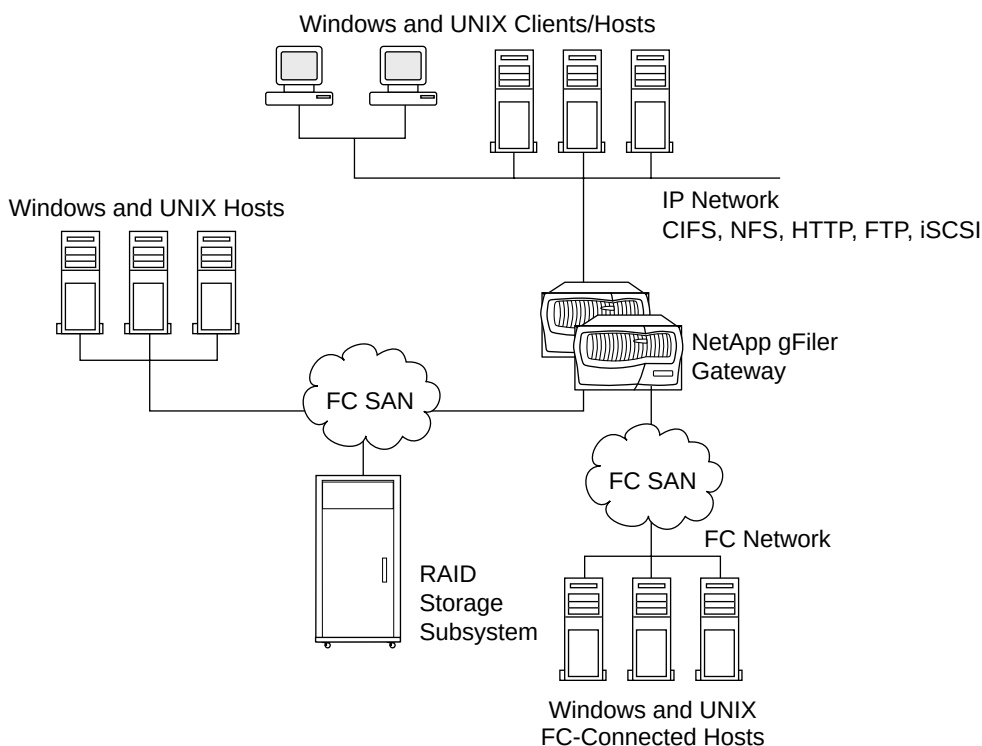
- ◆ “[What a gFiler is](#)” on page 2
- ◆ “[Features](#)” on page 3
- ◆ “[Setup task overview](#)” on page 5

What a gFiler is

Overview of a gFiler in the network

The NetApp industry-standard gFiler gateway is a virtualization and storage consolidation solution that provides unified NAS and SAN access to data stored in heterogeneous Fibre Channel (FC) SAN storage subsystems. The gFiler provides file-level and block-level access to data stored in Fibre Channel storage subsystems through client systems and application hosts on an IP network, a Fibre Channel network, or both.

Like all NetApp storage appliances, the gFiler is based on the Data ONTAP operating system, which supports multiprotocol file services and advanced data management capabilities for consolidating, protecting, and recovering data for applications and users.



Features

Supported gFiler platforms

The following gFiler platforms are supported:

- ◆ GF270c
- ◆ GF825, GF825c
- ◆ GF920, GF920c
- ◆ GF940, GF940c
- ◆ GF960, GF960c
- ◆ GF980, GF980c

The “c” in the model name denotes clustered systems. The GF800 and GF900 platforms use the cluster interconnect adapter to connect the gFiler gateways to one another. Unlike the rest of the gFiler models, the GF270c contains two CPU modules (heads) and integrated cluster interconnect adapters inside the same case. Each CPU module must be configured separately.

Supported storage subsystems

The gFiler supports the following platforms in the HP XP family:

- ◆ HP StorageWorks XP Disk Array XP12000
- ◆ HP StorageWorks XP Disk Array XP1024
- ◆ HP StorageWorks XP Disk Array XP512
- ◆ HP StorageWorks XP Disk Array XP128
- ◆ HP StorageWorks XP Disk Array XP48

Note

The storage subsystems in the previous list are in the same series.

Multiple storage subsystems

Multiple storage subsystems can connect to one or more gFiler gateways if the storage subsystems are in the same series. Multiple gFiler gateways can connect to one or more storage subsystems.

Microcode versions The following table shows the microcode versions for the platforms in the HP XP family.

Platform	Microcode version
XP12000	02.14.00
XP1024, XP128	10.10.00
XP512, XP48	19.59.00

See the *gFiler Support Matrix for HP* for information about any updates to the microcode versions and for the required system parameter setting for your storage subsystem model.

Data ONTAP features not supported

The gFiler supports most Data ONTAP features that are described in the Data ONTAP documentation set. The following Data ONTAP features are not supported by the gFiler:

- ◆ RAID-4 and RAID-DP
The gFiler uses RAID-0 on top of RAID-1, RAID-5, or RAID-10 on RAID storage subsystems. See Appendix A, “[Terminology](#),” on page 59 for more information.
- ◆ Disk sanitization and disk scrubbing
- ◆ MetroCluster and SyncMirror on the GF270c
- ◆ SnapLock Compliance

You can read about any differences in the gFiler’s use of a feature in the gFiler *Software Setup, Installation, and Management Guide*.

Setup task overview

Setup task overview The following table provides a high-level summary of the tasks involved in setting up the storage subsystems and the gFiler to work together. For each task, you are directed to where you can find the information that you need to perform the task.

Step	Task	Description
1	Planning your gFiler configuration	You decide the gFiler configuration in which you connect your gFiler to your storage subsystem. 1. Determine the type of configuration between your gFiler and your storage subsystem, as discussed in Chapter 2, “Planning Your Configuration,” on page 9 of this guide. 2. Review the configuration rules for your gFiler before you allocate space on your storage subsystem for your gFiler, as discussed in Chapter 2, “Planning Your Configuration,” on page 9 of this guide. 3. Verify all site prerequisite information by reviewing Chapter 1, “Preparing Your Site for Your Gateway,” in the <i>gFiler Hardware Installation Guide</i>.

Step	Task	Description
2	Installing the gFiler and connecting it to the storage subsystem	You install the gFiler in a rack and connect the gFiler to the storage subsystem. 1. Install the gFiler into a rack, as described in Chapter 2, “Installing your gateway into a rack,” in the gFiler <i>Hardware Installation Guide</i>. 2. You connect your gFiler to your storage subsystem, as described in Chapter 3, “Connecting to your Storage Subsystem,” in the gFiler <i>Hardware Installation Guide</i>. 3. You connect your gFiler to an ASCII terminal and power it on in Maintenance mode to obtain WWNs for the ports on your HBAs, as described in Chapter 4, “Preparing Your Gateway for LUN Configuration” in the gFiler <i>Hardware Installation Guide</i>. Note— If you are planning a configuration with no LUN security, you do not need to obtain the WWNs on your gFiler.
3	Setting up the storage subsystem to work with the gFiler gateways	You must create LUNs on the storage subsystem and export (map) them to a storage subsystem port so that the LUNs are available for the gFiler gateways connected to the port. See your storage subsystem documentation per model for information about configuring LUNs on the storage subsystem.
4	Connecting your gFiler to a network and any third-party tape backup devices, and then powering on and booting in regular mode	You connect your gFiler to a network and to any third-party tape backup devices, as described in Chapter 5, “Connecting Your Gateway,” in the gFiler <i>Hardware Installation Guide</i>.

Step	Task	Description
5	Basic initial software setup and installation	Your initial setup and configuration of gFiler gateways involves ◆ Designating which gFiler can access a specific LUN on a storage subsystem. ◆ Providing system information, such as IP address and media type ◆ Installing the Data ONTAP software See the <i>gFiler Software Setup, Installation, and Management Guide</i> for details. Note If you are upgrading the Data ONTAP software on a gFiler, specific steps must be followed to ensure that a gFiler can access LUNs on the storage subsystem under the new scheme introduced in Data ONTAP 6.5. See the <i>gFiler Data ONTAP 6.5 Upgrade Guide</i> for more information.
6	Configuring Data ONTAP features that you want to use with your gFiler	You might want to use some Data ONTAP features to manage your gFiler gateways. Use the Data ONTAP documentation set in conjunction with the <i>gFiler Software Setup, Installation, and Management Guide</i> to learn about the Data ONTAP features that are available and how to set them up. Features that are specific to the gFiler (that is, not applicable to the filer) are described in the <i>gFiler Software Setup, Installation, and Management Guide</i>. Additionally, the <i>gFiler Software Setup, Installation, and Management Guide</i> discusses any special considerations in using standard Data ONTAP features with gFiler gateways.

About this section

This section discusses configuration types and rules for connecting your gFiler to your storage subsystem.

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“gFiler capacity metrics”](#) on page 10
- ◆ [“gFiler metrics for LUNs”](#) on page 12
- ◆ [“LUN sizing”](#) on page 13
- ◆ [“Types of configurations”](#) on page 15
- ◆ [“gFiler neighborhood described”](#) on page 16
- ◆ [“Storage subsystem port support, by model”](#) on page 17
- ◆ [“Guidelines for configuring ports on your storage subsystem”](#) on page 18

gFiler capacity metrics

Units of measurement for storage

NetApp defines units of measurement for storage as follows:

Kilobyte (KB) = 1,024 bytes

Megabyte (MB) = 1,024 x 1,024 bytes

Gigabyte (GB) = 1,000 bytes x MB

Terabyte (TB) = 1,000 bytes x GB

Note

All capacity metrics used in the gFiler document library use the NetApp-defined units of measurement.

gFiler capacity limits

gFiler models have the following maximum and minimum capacity limits.

Note

In the table, “Required” assumes 60 percent compression. A core dump is not guaranteed. “Recommended” assumes no compression and a guaranteed coredump.

Model	Maximum total capacity	Minimum total capacity
GF270c	6 TB	Each CPU module (head) must have ◆ A root volume of the following size: ❖ Recommended: 72 GB ❖ Required: 1 GB ◆ A spare LUN of at least 1.5 GB is also required in case a problem occurs that results in a system failure. The system can then dump core to the spare LUN, and NetApp can analyze the core dump to determine the cause of the problem.
GF825	3 TB unmirrored; 6 TB mirrored	Recommended: 141 GB Required: 85 GB

Model	Maximum total capacity	Minimum total capacity
GF825c	6 TB unmirrored; 12 TB mirrored	For each node, single node values apply.
GF920	6 TB	Recommended: 254 GB Required: 153 GB
GF920c	12 TB	For each node, single node values apply.
GF940	12 TB	Recommended: 364 GB Required: 220 GB
GF940c	24 TB	For each node, single node values apply.
GF960	24 TB	Recommended: 704 GB Required: 423 GB
GF960c	48 TB	For each node, single node values apply.
GF980	32 TB	Recommended: 958 GB Required: 575 GB
GF980c	64 TB	For each node, single node values apply.

gFiler metrics for LUNs

Maximum and minimum number of LUNs per gFiler

The following table shows the maximum number of LUNs on the storage subsystem that the gFiler can support and the minimum number of LUNs that the gFiler requires.

Model	Maximum number of LUNs	Minimum number of LUNs
GF270c	42 (21 on each CPU module)	The GF270c requires a total of four LUNs. Each CPU module (head) of the GF270c requires a minimum of two LUNs: ◆ One for the root volume ◆ One spare LUN for a core dump
GF825	84	◆ A gFiler other than a GF270c must own at least one LUN. ◆ A cluster configuration must own at least two LUNs, one per CPU module.
GF825c	168 (84 on each cluster node)	
GF920	168	
GF920c	336 (168 on each clustered node)	
GF940	336	
GF940c	672 (336 on each cluster node)	
GF960	336	
GF960c	672 (336 on each cluster node)	
GF980	336	
GF980c	672 (336 on each cluster node)	

LUN sizing

Maximum and minimum sizes supported

gFiler support for LUN sizes is as follows:

Maximum LUN size: 500 GB

Minimum LUN size: 1 GB

Note

The Data ONTAP definition of a GB is as follows: one GB is equal to 1000 x 1024 x 1024 bytes. Therefore, the maximum LUN size that NetApp supports means $500 * 1000 * 1024 * 1024 = 524288000000$ bytes.

This definition might not match the definition of a GB for your storage subsystem.

Usable space on a LUN

The usable space of a LUN size is reduced by the following elements:

- ◆ 12.5%—Block checksum
- ◆ 10%—WAFL® (Write-Anywhere File Layout) reserve
- ◆ 1%—Core dump
- ◆ 20%—Snapshot (default setting)

Note

Space for your Snapshot reserve is optional and changeable through Data ONTAP.

Determining LUN size

You can determine LUN size in the following respects:

- ◆ Usable capacity (the actual capacity available for storage)
- ◆ Desired capacity (the exact LUN size desired)

Calculating the usable capacity: To determine the usable capacity for storage in a LUN, after taking into account Snapshot reserve, use the following formula, where Y is the usable capacity for storage and N is the total capacity of the LUN.

$$Y = N \times \{0.875 \times 0.9 \times 0.99 \times \text{Snapshot reserve}\}$$

Example: Total capacity of LUN is 4 GB with Snapshot reserve set at default:

$$4 \times \{0.875 \times 0.9 \times 0.99 \times 0.8\} = 2.49 \text{ GB}$$

Calculating desired capacity: To determine the LUN capacity needed to obtain the desired capacity, while taking reserved space into account, use the following formula, where Y is the exact desired LUN size:

$$Y \text{ divided by } \{0.875 \times 0.9 \times 0.99 \times \text{Snapshot reserve}\} = \text{Actual capacity needed}$$

Example: Desired LUN capacity is 10 GB of usable capacity.

◆ Calculating actual LUN size without accounting for Snapshot reserve.

$$10 \text{ GB divided by } \{0.875 \times 0.9 \times 0.99\} = 13.3 \text{ GB}$$

◆ Snapshot reserve left on default setting.

$$10 \text{ GB divided by } \{0.875 \times 0.9 \times 0.99 \times 0.8\} = 16 \text{ GB}$$

Types of configurations

Types of configurations

You can connect your gFiler to your storage subsystem in the following configurations:

- ◆ Direct-attached stand-alone
- ◆ Direct-attached cluster
- ◆ Switch-attached stand-alone
- ◆ Switch-attached cluster
- ◆ MetroCluster

For recommended configurations for each configuration type and for each gFiler gFiler model, go to Chapter 3, “[Recommended Configurations](#),” on page 21.

Connection to multiple storage subsystems

Multiple storage subsystems can connect to a stand-alone or clustered gFiler if the storage subsystems are within the same series. Multiple gFilers can connect to the same storage subsystem.

Planning your configuration

You must devise a port-to-port connectivity scheme after selecting the configuration you plan to deploy. For recommended port-to-port connectivity schemes for each configuration type and for each gFiler model, go to Chapter 3, “[Recommended Configurations](#),” on page 21.

gFiler neighborhood described

gFiler neighborhood defined

A *gFiler neighborhood* is one or more stand-alone gFiler gateways or clustered gFiler gateways that share access to LUNs on the storage subsystem. By sharing access to LUNs, these gFiler gateways can view the same LUNs on the storage subsystem. Through the LUN ownership feature in the gFiler configuration, you use Data ONTAP to restrict access to a particular LUN to a specific gFiler, thereby preventing one gFiler from writing over LUNs assigned to another gFiler in the neighborhood.

Note

LUN access control mechanisms allow sharing of ports while preventing hosts from accessing each others' LUNs. These mechanisms can be used only for LUNs in different neighborhoods or for non-gFiler hosts.

Guidelines for designing your gFiler neighborhood

Use the following guidelines and rules when designing a gFiler neighborhood:

- ◆ There can be up to six nodes in a gFiler neighborhood, four of which can be in MetroClusters.
In a given gFiler neighborhood, you can configure a maximum of two MetroClusters. If needed, you can have two additional gFiler gateways outside of the MetroClusters.
- ◆ You can have multiple gFiler neighborhoods in a switch fabric, that is, multiple zones in the fabric.
- ◆ Migration of volumes through SnapMover is supported between the six nodes in a gFiler neighborhood. (See the *gFiler Software Setup, Installation, and Management Guide* for more information about SnapMover.)
- ◆ A gFiler neighborhood can support different gFiler models. However, GF270c gateways cannot be mixed with other gFiler models in a gFiler neighborhood.

You must adhere to the following rules:

- ◆ Zone switch ports that connect to your gFiler Host Bus Adapters (HBAs) so that each gFiler in the neighborhood can access each other's LUNs.
- ◆ Set the access control on your storage subsystem so that the gFiler gateways can access each other's LUNs.
- ◆ If there are multiple MetroClusters, each MetroCluster interconnect adapter must be in a separate zone.

Storage subsystem port support, by model

LUN support on storage system ports

The following table shows the type of LUN support provided for ports and host groups, by storage subsystem model. A host group is a property of a port.

Storage subsystem model	Port support information
XP512, XP48	◆ Supports only up to a maximum of 256 LUNs per port. ◆ No support for host groups.
XP1024, XP128	◆ Supports 256 LUNs per port. However, when LUN security is enabled on the port, a maximum of 512 LUNs is supported on the port. ◆ To achieve the 512 LUNs per port, create at least two host groups per port. All LUNs can be divided among the host groups for the port. ◆ A maximum of 256 LUNs per host group can be configured. ◆ A maximum of 128 host groups can be created for each port. ◆ Host groups are created within each port. The same gFiler HBA WWN cannot be registered within multiple host groups.
XP12000	◆ Supports 1,024 LUNs per port, with or without LUN security enabled. ◆ A maximum of 256 host groups can be created for each port. ◆ A maximum of 1,024 LUNs per host group can be configured. However, if more than one host group exists in a port, the 1024 LUN limit for that port can be divided among those host groups.

Guidelines for configuring ports on your storage subsystem

Redundant port configuration

Always configure ports in pairs. Each port in a redundant pair of ports must be configured the same way.

Sharing LUNs in a parity group

LUNs in a parity group can be shared between gFiler gateways and non-gFiler hosts.

gFiler sharing channel adapter ports with other hosts

If you are using the host group feature on your storage subsystem, you can share channel adapter ports among gFiler gateways and non-gFiler hosts.

gFiler ports in a host group

If you create a host group, include all ports of the gFiler or gFiler cluster in the host group. The gFiler is limited to one host group per port and the maximum number of LUNs per host group in that port. If this maximum number of LUNs is smaller than the maximum number of LUNs that the gFiler node or cluster needs, you must add more ports on the storage subsystem to obtain the maximum number of LUNs that the node can support. You cannot just add another host group on the existing port for the gFiler to increase the number of LUNs.

Preventing overwriting of data

To prevent overwriting of data, gFiler gateways and non-gFiler hosts must not share each other's LUNs. You can prevent overwriting of data by other hosts by using one of the following methods:

- ◆ Configuring switch zoning
gFiler gateways and non-gFiler hosts can share the same switch if you configure switch zoning. See your third-party switch documentation for details about zoning.
- ◆ Configuring the LUN access controls on the storage subsystem

Guidelines for configuring Fibre Channel ports

After selecting the Fibre Channel port you want to configure, use the following guidelines to set port options on the UI of your storage subsystem.

Port parameter		Guideline
Port address		Any port address
Fibre Channel topology	Whether a fabric switch is used—Fabric ON or OFF	Select whether a fabric switch is used to connect the gFiler to the storage subsystem. If you use a fabric switch, select Fabric ON. If not, select Fabric OFF.
	Connection type—Fibre Channel or Point-to-Point	Select whether the connection type is Fibre Channel or Point-to-Point. If you use a fabric switch, select point-to-point. If not, that is, if the gFiler is directly connected to the storage subsystem, select Fibre Channel.
Host speed—1 or 2 Gb/s, or Auto		Set channel speed to <i>auto</i> or 2 Gb/s.

About this chapter

This chapter describes the various types of configurations and provides examples of each configuration with each gFiler platform.

Topics in this chapter

This chapter discussed the following configuration types:

- ◆ “[Stand-alone configurations](#)” on page 23
- ◆ “[Cluster configurations](#)” on page 32

Note

Stand-alone gFilers are the equivalent of non-clustered gFilers.

How to use information in this chapter

Use the following configurations as guidelines for when you connect your gFiler to your storage subsystem. You can also refer to the configurations when you determine desired capacity usage, create LUNs initially, and add LUNs to your gFiler.

Each configuration provides information regarding the following aspects of configuration:

- ◆ Connectivity overview—Provides an illustration and calls out the number of ports used and the total cable connections needed.
- ◆ Port-to-port connectivity—Outlines which ports on the gFiler and storage subsystem should be used. The ports designated for use are recommendations based on maintaining redundancy across ports on the gFiler and the storage subsystem. The actual ports named might not be available on your storage subsystem.

Note

The illustrations show configurations in which the storage subsystem can have, at most, 256 LUNs per port or 256 LUNs per host group per port. If the storage subsystem model supports more than 256 LUNs per port or 256 LUNs per host group per port, you can reduce the number of storage subsystem connections.

The maximum number of LUNs supported for a configuration is limited by the maximum number of LUNs that a particular gFiler model supports.

Note

CLx in the port-to-port sections after the illustrations refer to the storage subsystem port name. See the HP XP manuals for information about how ports are named.

How redundant port pairs are shown in illustrations

Redundant paths to the same set of LUNs on the storage subsystem go through two different ports. A pair of redundant connections is represented in an illustration by using the same line type. For example, in the illustration in “[Direct-attached stand-alone configuration—257 to 336 LUNs](#)” on page 26, the redundant connections are as follows:

- ◆ 1A to 1A and 2B to 2A (solid black lines)
- ◆ 1B to 1B and 2A to 2B (gray lines)

For illustrations that show switches, although the line types between the gFiler gateways and the switches and the line types between switches and the storage subsystems might be the same line type, they do not represent the same connection.

Stand-alone configurations

Types of stand-alone systems

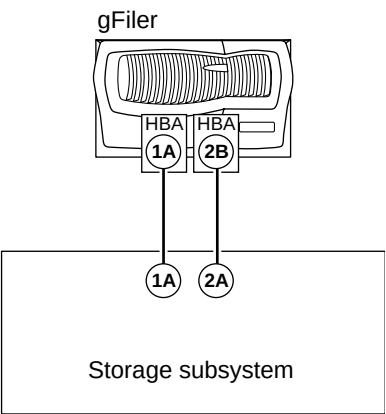
This section discusses the following types of stand-alone configurations:

- ◆ Direct stand-alone configurations
 - ❖ “[Direct-attached stand-alone configuration—1 to 256 LUNs](#)” on page 24
 - ❖ “[Direct-attached stand-alone configuration—257 to 336 LUNs](#)” on page 26
 - ❖ “[Switch-attached stand-alone configuration—1 to 256 LUNs](#)” on page 28
 - ❖ “[Switch-attached stand-alone configuration—257 to 336 LUNs](#)” on page 30
- ◆ Switch stand-alone configurations
 - ❖ “[Switch-attached stand-alone configuration—1 to 256 LUNs](#)” on page 28
 - ❖ “[Switch-attached stand-alone configuration—257 to 336 LUNs](#)” on page 30

Direct-attached stand-alone configuration—1 to 256 LUNs

Connectivity overview

The following information is for a direct-attached stand-alone configuration of 256 LUNs or fewer. The illustration and table show the number of ports and cable connections required.



Ports and connections	Number
gFiler HBA ports used	2
Storage subsystem ports used	2
Total cable connections	2

Notes to the illustration:

- ◆ All connected ports on a gFiler have access to all LUNs for that gFiler. The minimum number of ports are included in the illustration.
- ◆ For this configuration, only two ports are required on the storage subsystem, one for the primary connection and one for the secondary connection. The reason is that a single port on the storage subsystem can handle the number of LUNs in this configuration. (See “[Storage subsystem port support, by model](#)” on page 17.)

**Port-to-port
connectivity**

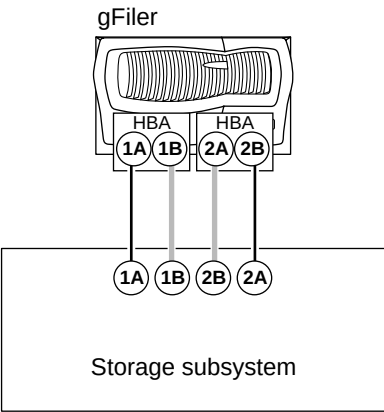
The following table summarizes the port-to-port connectivity scheme for the previous illustration.

Port-to-port connectivity scheme	
gFiler	Storage subsystem
1A	1A
2B	2A

Direct-attached stand-alone configuration—257 to 336 LUNs

Connectivity overview

The following information is for a direct-attached stand-alone configuration of 257 to 336 LUNs. The illustration and table show the number of ports and cable connections required for storage subsystem models that support 256 LUNs per port or 256 LUNs per host group per port.



Ports and connections	Number
gFiler HBA ports used	4
Storage subsystem ports used	4
Total cable connections	4

Notes to the illustration:

- ◆ All connected ports on a gFiler have access to all LUNs for that gFiler. The minimum number of ports for storage system models that support 256 LUNs per port are included in the illustration.
- ◆ The gFiler is limited to one host group per port and the maximum number of LUNs per host group in that port.
 - ❖ For storage subsystem models that cannot support more than 256 LUNs per host group per port, you must add another redundant port pair on the storage subsystem to obtain the 336 LUNs. You cannot just add another

host group on the existing port for the gFiler to increase the number of LUNs.

- ❖ For the XP12000, only one redundant port pair is required.
- ◆ NetApp recommends that LUNs be distributed equally over the redundant port pairs for load balancing.

Port-to-port connectivity

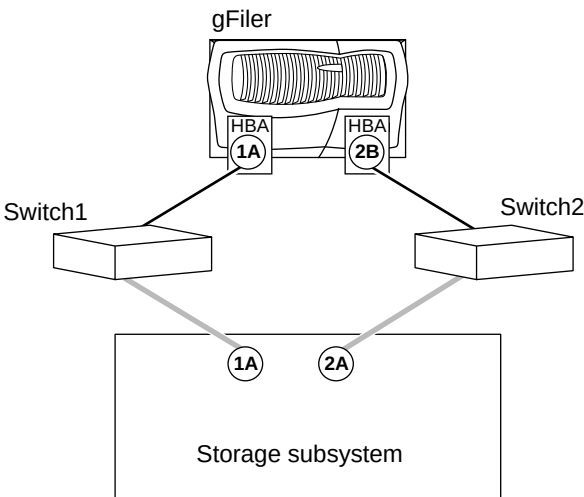
The following table summarizes the port-to-port connectivity scheme for the previous illustration of between 257 and 336 LUNs.

Port-to-port connectivity scheme	
gFiler	Storage subsystem
1A	CL1-A
1B	CL1-B
2A	CL2-B
2B	CL2-A

Switch-attached stand-alone configuration—1 to 256 LUNs

Connectivity overview

The following information is for a switch-attached stand-alone configuration of 256 LUNs or fewer. The illustration and table show the number of ports and cable connections required.



Ports and connections	Number
gFiler HBA ports used	2
Storage subsystem ports used	2
Total cable connections	4

Notes to the illustration:

- ◆ All connected ports on a gFiler have access to all LUNs for that gFiler. The minimum number of ports are included in the illustration.
- ◆ All LUNs can be mapped to one redundant port pair, one for the primary connection and one for the secondary connection.

Port-to-port connectivity

The following table summarizes the port-to-port connectivity scheme for the previous illustration of up to 256 LUNs.

Port-to-port connectivity scheme	
gFiler	Switch
1A	Any port on switch 1
2B	Any port on switch 2
Storage subsystem	Switch
CL1-A	Any port on switch 1
CL2-A	Any port on switch 2

The primary and secondary connection paths between the gFiler and storage subsystem, through the switches, provide redundancy.

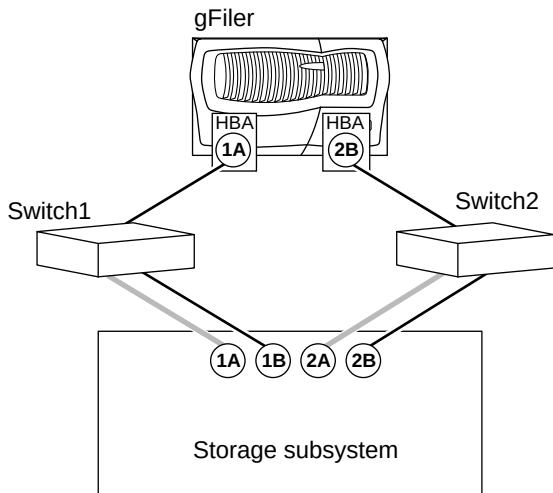
Switch-attached stand-alone configuration—257 to 336 LUNs

Connectivity overview

The following information is for a switch-attached stand-alone configuration of 257 to 336 LUNs. The illustration and table show the number of ports and cable connections required.

Note_____

The maximum number of HBAs on a gFiler is determined by model.



Ports and connections	Number
gFiler HBA ports used	2
Storage subsystem ports used	4
Total cable connections	6

Notes to the illustration:

- ◆ All connected ports on a gFiler have access to all LUNs for that gFiler. The minimum number of ports to support gFiler access to this configuration are included in the illustration.

- ◆ The number of links that you can connect between a gFiler and a switch is dependent on the gFiler model and the type of switch. However, NetApp recommends that you use just two links, one between each gFiler and each switch. The reason is that two links is sufficient for performance and redundancy requirements. More than two links might not provide significantly more benefit.
- ◆ The gFiler is limited to one host group per port and the maximum number of LUNs per host group in that port.
 - ❖ For storage subsystem models that cannot support more than 256 LUNs per host group per port, you must add another redundant port pair on the storage subsystem to obtain the 336 LUNs. You cannot just add another host group on the existing port for the gFiler to increase the number of LUNs.
 - ❖ For the XP12000, only one port pair is required per switch.

Port-to-port connectivity

The following table summarizes the port-to-port connectivity scheme for the previous illustration of between 257 and 336 LUNs.

Port-to-port connectivity scheme	
gFiler	Switch
1A	Any port on switch 1
2B	Any port on switch 2
Storage subsystem	Switch
CL1-A	Any port on switch 1
CL2-A	Any port on switch 2
CL1-B	Any port on switch 1
CL2-B	Any port on switch 2

Cluster configurations

Types of cluster configurations

This section discusses the following types of cluster configurations:

- ◆ “[Direct-attached cluster configuration—2 to 256 LUNs](#)” on page 34
- ◆ “[Direct-attached cluster configuration—257 to 512 LUNs](#)” on page 37
- ◆ “[Direct-attached cluster configuration—513 to 672 LUNs](#)” on page 39
- ◆ “[Switch-attached cluster configuration—2 to 256 LUNs](#)” on page 41
- ◆ “[Switch-attached cluster configuration—257 to 512 LUNs](#)” on page 45
- ◆ “[Switch-attached cluster configuration—513 to 672 LUNs](#)” on page 48
- ◆ “[MetroCluster configurations](#)” on page 51

Rules for clustered configurations

Review the following information before cabling your gFiler:

GF900 series: A standard gFiler cluster contains two gFiler gateways, a local node and a partner node. Both nodes must be identical (that is, you cannot cluster a GF920 with a GF980). The nodes are connected to each other through an IB cluster adapter or alternately, for a GF980, an NVRAM5 adapter. An IB cluster adapter or NVRAM5 adapter allows one node to serve data to its failed partner node. Each node continually monitors its partner, mirroring the data for each other’s NVRAM. The two nodes in a cluster can be separated from each other by as much as 500 meters.

Requirements are as follows if the distance is greater than 10 meters but less than 500 meters:

- ◆ For NVRAM4-based cluster interconnect (with IB Cluster Adapter), use 50 micron optical cable that meets this specification: LC-LC 50/125 Plenum cable with Laser-Link 300.
- ◆ For NVRAM5-based cluster interconnect: 4X IB MTP 50/125 Plenum Cable 500 Mhz/KM and Cu-to-optical converters

See NOW (<http://now.netapp.com>) for more information about requirements for clustered failover.

Note

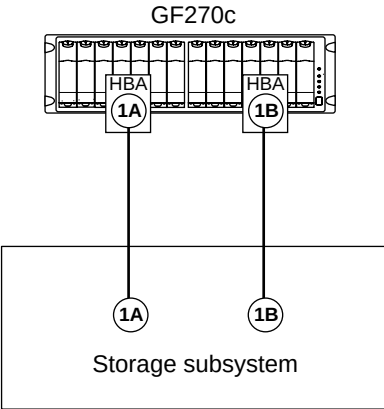
MetroClusters are treated as their own configuration type. See “[MetroCluster configurations](#)” on page 51 for more information.

GF270c: The GF270c is a self-contained clustered system. The two CPU modules (heads) in a GF270c are the two nodes of a standard cluster. The GF270c does not support the MetroCluster configuration.

Direct-attached cluster configuration—2 to 256 LUNs

About this section This section shows two different configuration schemes for 2 to 256 LUNs in a direct-attached cluster configuration scheme. The configuration for the GF270c differs from other gFiler models.

Connectivity overview—configuration 1 The following information is for a direct-attached cluster configuration of a GF270c, which supports 42 LUNs. The illustration and table show the number of ports and cable connections required for the GF270c.



Ports and connections	Number
gFiler HBA ports used	2
Storage subsystem ports used	2
Total cable connections	2

- Notes to the illustration:
- ◆ All connected ports on a gFiler cluster have access to all LUNs for that gFiler.
 - ◆ Only two ports are supported on the GF270c.

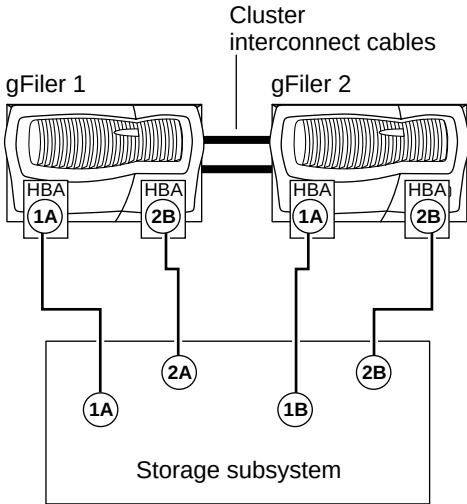
Port-to-port connectivity

The following table summarizes the port-to-port connectivity scheme for the previous illustration.

Port-to-port connectivity scheme	
CPU module 1	Storage subsystem
1A	CL1-A
CPU module 2	Storage subsystem
1B	CL1-B

Connectivity overview—configuration 2

The following information is for a direct-attached cluster configuration of 2 to 256 LUNs. The illustration and table show the number of ports and cable connections required for models other than the GF270c.



Ports and connections	Number
gFiler HBA ports used	4 (2 each node)
Storage subsystem ports used	4 (2 each CL)
Total cable connections	6, including cluster interconnect cables

Notes to the illustration:

- ◆ All connected ports on a gFiler cluster have access to all LUNs for that gFiler.
- ◆ The minimum number of ports are included in the illustration.
- ◆ One port pair per node is required.

Port-to-port connectivity

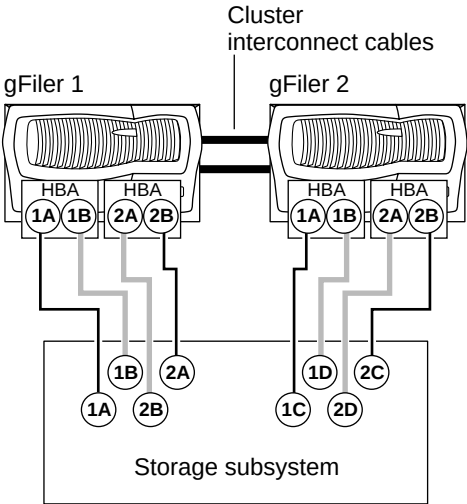
The following table summarizes the port-to-port connectivity scheme for this configuration example for between 2 to 256 LUNs.

Port-to-port connectivity scheme	
gFiler 1	Storage subsystem
1A	CL1-1A
2B	CL2-2A
gFiler 2	Storage subsystem
1A	CL1-1B
2B	CL2-2B

Direct-attached cluster configuration—257 to 512 LUNs

Connectivity overview

The following information is for a direct-attached cluster configuration of 257 to 512 LUNs. The illustration and table show the number of ports and cable connections required for storage subsystems that support 256 LUNs per port or 256 LUNs per host group per port (see “Storage subsystem port support, by model” on page 17).



Ports and connections	Number
gFiler HBA ports used	8 (4 each node)
Storage subsystem ports used	8 (4 each CL)
Total cable connections	10, including cluster interconnect cables

Notes to the illustration:

- ◆ All connected ports on a gFiler cluster have access to all LUNs for that gFiler.
- ◆ The minimum number of ports are included in the illustration.

- ◆ The gFiler is limited to one host group per port and the maximum number of LUNs per host group in that port.
 - ❖ For storage subsystem models that cannot support more than 256 LUNs per host group per port, you must add additional redundant port pairs on the storage subsystem to obtain the 512 LUNs. You cannot just add another host group on the existing port for the gFiler to increase the number of LUNs.
 - ❖ For the XP12000, one port pair per gFiler node is required. (Any direct-attached cluster configuration requires four redundant ports.)
- ◆ NetApp recommends that LUNs be distributed equally over the redundant port pairs for load balancing.

Port-to-port connectivity

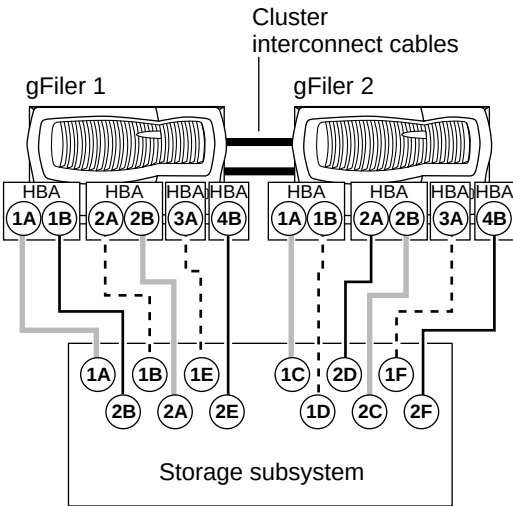
The following table summarizes the port-to-port connectivity scheme for this configuration example for between 257 and 512 LUNs.

Port-to-port connectivity scheme	
gFiler 1	Storage subsystem
1A	CL1-A
1B	CL1-B
2A	CL2-B
2B	CL2-A
gFiler 2	Storage subsystem
1A	CL1-C
1B	CL1-D
2A	CL2-D
2B	CL2-C

Direct-attached cluster configuration—513 to 672 LUNs

Connectivity overview

The following information is for a direct-attached cluster configuration of 513 to 672 LUNs. The illustration and table show the number of ports and cable connections required for storage subsystems that support 256 LUNs per port or 256 LUNs per host group per port (see “Storage subsystem port support, by model” on page 17).



Ports and connections	Number
gFiler HBA ports used	12 (6 each node)
Storage subsystem ports used	12 (6 each CL)
Total cable connections	14, including cluster interconnect cables

Notes to the illustration:

- ◆ All connected ports on a gFiler cluster have access to all LUNs for that gFiler.
- ◆ The minimum number of ports are included in the illustration.

- ◆ The gFiler is limited to one host group per port and the maximum number of LUNs per host group in that port.
 - ❖ For storage subsystem models that cannot support more than 256 LUNs per host group per port, you must add additional redundant port pairs on the storage subsystem to obtain the 672 LUNs. You cannot just add another host group on the existing port for the gFiler to increase the number of LUNs.
 - ❖ For the XP12000, one port pair per gFiler node is required. (Any direct-attached cluster configuration requires four redundant ports.)
- ◆ NetApp recommends that LUNs be distributed equally over the redundant port pairs for load balancing.

Port-to-port connectivity

The following table summarizes the port-to-port connectivity scheme for this configuration example for between 513 and 672 LUNs.

Port-to-port connectivity scheme	
gFiler 1	Storage subsystem
1A	CL1-A
1B	CL2-B
2A	CL1-B
2B	CL2-A
3A	CL1-E
4B	CL2-E
gFiler 2	Storage subsystem
1A	CL1-C
1B	CL1-D
2A	CL2-D
2B	CL2-C
3A	CL1-F
4B	CL2-F

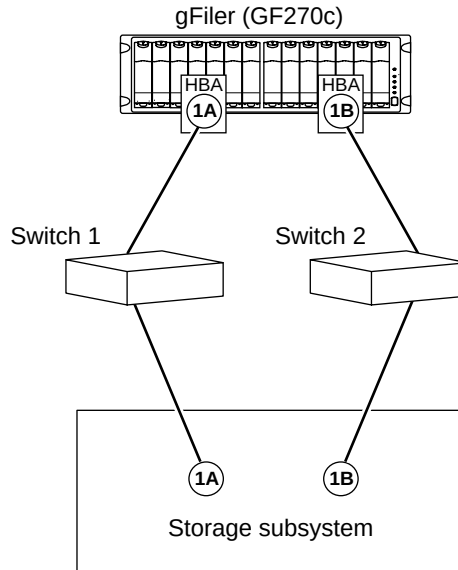
Switch-attached cluster configuration—2 to 256 LUNs

About this section

This section shows two different configuration schemes for 2 to 256 LUNs in a switch-attached cluster configuration. The configuration for the GF270c differs from other gFiler models.

Connectivity overview—configuration 1

The following information is for a switch-attached cluster configuration for a GF270c, which supports 42 LUNs. The illustration and table show the number of ports and cable connections required for the GF270c.



Notes to the illustration:

- ◆ All connected ports on a gFiler cluster have access to all LUNs for that gFiler.

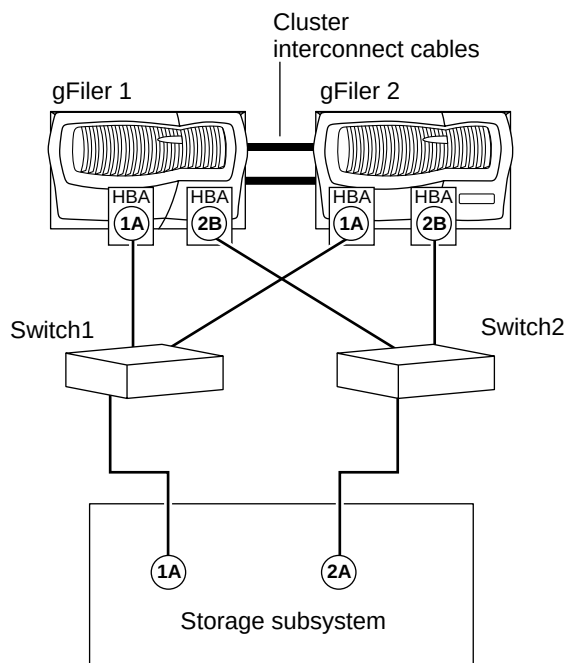
**Port-to-port
connectivity—
configuration 1**

The following table summarizes the port-to-port connectivity scheme for this configuration example for between 2 and 256 LUNs.

Port-to-port connectivity scheme	
CPU module 1	Switch
1A	Any port on switch 1
CPU module 2	Switch
1A	Any port on switch 1
Storage subsystem	Switch
CL1-A	Any port on switch 1
CL2-A	Any port on switch 2

**Connectivity
overview—
configuration 2**

The following information is for a switch-attached cluster configuration of 2 to 256 LUNs. The illustration and table show the number of ports and cable connections required for models other than the GF270c.



Ports and connections	Number
gFiler HBA ports used	4 (2 each node)
Storage subsystem ports used	2 (1 each CL)
Switch ports used	6
Total cable connections	8, including cluster interconnect cables

Notes to the illustration:

- ◆ All connected ports on a gFiler cluster have access to all LUNs for that gFiler.
- ◆ The minimum number of ports are included in the illustration.

**Port-to-port
connectivity—
configuration 2**

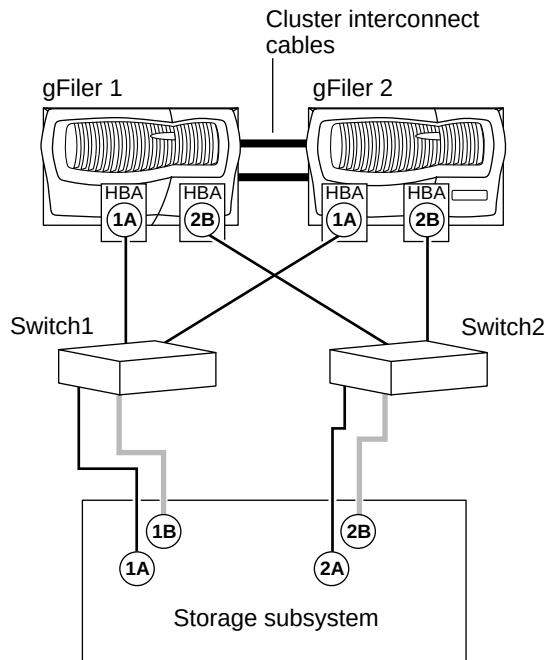
The following table summarizes the port-to-port connectivity scheme for this configuration example for between 2 and 256 LUNs.

Port-to-port connectivity scheme	
gFiler 1	Switch
1A	Any port on switch 1
2B	Any port on switch 2
gFiler 2	Switch
1A	Any port on switch 1
2B	Any port on switch 2
Storage subsystem	Switch
CL1-A	Any port on switch 1
CL2-A	Any port on switch 2

Switch-attached cluster configuration—257 to 512 LUNs

Connectivity overview

The following information is for a switch-attached cluster configuration of 257 to 512 LUNs. The illustration and table show the number of ports and cable connections required for storage subsystems that support 256 LUNs per port or 256 LUNs per host group per port (see [“Storage subsystem port support, by model”](#) on page 17).



Ports and connections	Number
gFiler HBA ports used	4 (2 each node)
Storage subsystem ports used	8 (4 each CL)
Switch ports used	6
Total cable connections	10, including cluster interconnect cables

Notes to the illustration:

- ◆ All connected ports on a gFiler cluster have access to all LUNs for that gFiler.
- ◆ The minimum number of ports are included in the illustration.
- ◆ The gFiler is limited to one host group per port and the maximum number of LUNs per host group in that port.
 - ❖ For storage subsystem models that cannot support more than 256 LUNs per host group per port, you must add additional redundant port pairs on the storage subsystem to obtain the 512 LUNs. You cannot just add another host group on the existing port for the gFiler to increase the number of LUNs.
 - ❖ For the XP12000, only one port pair is required.
- ◆ NetApp recommends that LUNs be distributed equally over the redundant port pairs for load balancing.

Port-to-port connectivity

The following table summarizes the port-to-port connectivity scheme for this configuration example for between 257 and 512 LUNs.

Port-to-port connectivity scheme	
gFiler 1	Switch
1A	Any port on switch 1
2B	Any port on switch 2
gFiler 2	Switch
1A	Any port on switch 1

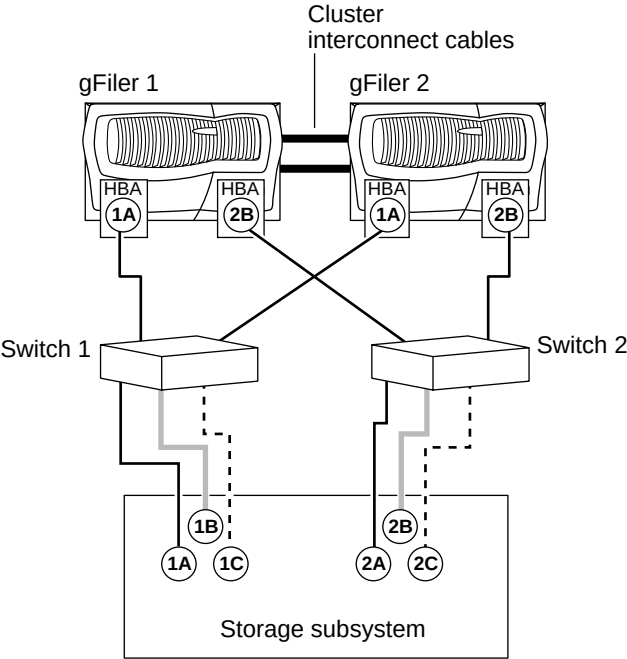
Port-to-port connectivity scheme	
2B	Any port on switch 2
Storage subsystem	Switch
CL1-B	Any port on switch 1
CL2-B	Any port on switch 2
CL1-A	Any port on switch 1
CL2-A	Any port on switch 2

Cluster configurations

Switch-attached cluster configuration—513 to 672 LUNs

Connectivity overview

The following information is for a switch-attached cluster configuration of 513 to 672 LUNs. The illustration and table show the number of ports and cable connections required for storage subsystems that support a maximum of 256 LUNs per port or 256 LUNs per host group per port (see “[Storage subsystem port support, by model](#)” on page 17).



Ports and connections	Number
gFiler HBA ports used	4 (2 each node)
Storage subsystem ports used	6 (3 each CL)
Switch ports used	10

Ports and connections	Number
Total cable connections	12, including cluster interconnect cables

Notes to the illustration:

- ◆ All connected ports on a gFiler cluster have access to all LUNs for that gFiler.
- ◆ The minimum number of ports are included in the illustration.
- ◆ The gFiler is limited to one host group per port and the maximum number of LUNs per host group in that port.
 - ❖ For storage subsystem models that cannot support more than 256 LUNs per host group per port, you must add additional redundant port pairs on the storage subsystem to obtain the 672 LUNs. You cannot just add another host group on the existing port for the gFiler to increase the number of LUNs.
 - ❖ For the XP12000, only one port pair is required.
- ◆ NetApp recommends that LUNs be distributed equally over the redundant port pairs for load balancing.

Port-to-port connectivity

The following table summarizes the port-to-port connectivity scheme for this configuration example for between 513 and 672 LUNs.

Port-to-port connectivity scheme	
gFiler 1	Switch
1A	Any port on switch 1
2B	Any port on switch 2
gFiler 2	Switch
1A	Any port on switch 1
2B	Any port on switch 2
Storage subsystem	Switch
CL1-A	Any port on switch 1

Port-to-port connectivity scheme	
CL1-B	Any port on switch 1
CL1-C	Any port on switch 1
CL2-A	Any port on switch 2
CL2-B	Any port on switch 2
CL2-C	Any port on switch 2

MetroCluster configurations

About MetroCluster configurations

This section discusses how to configure gFiler gateways in a MetroCluster configuration. The MetroCluster configuration expands on the switch-attached cluster configuration.

Note

The GF270c does not support the MetroCluster configuration.

Also included in this section are rules for zoning switch ports, which is required for MetroCluster configurations.

Required adapters and hardware for connectivity

You need the following adapters for a MetroCluster:

- ◆ Fibre Channel HBAs
- ◆ Virtual Interface MetroCluster adapter (VI-MC) if the cluster interconnect adapter is wired through a Fibre Channel switch
- ◆ IB card if the cluster is directly connected to the storage subsystem
- ◆ Inter Switch Link (ISL)

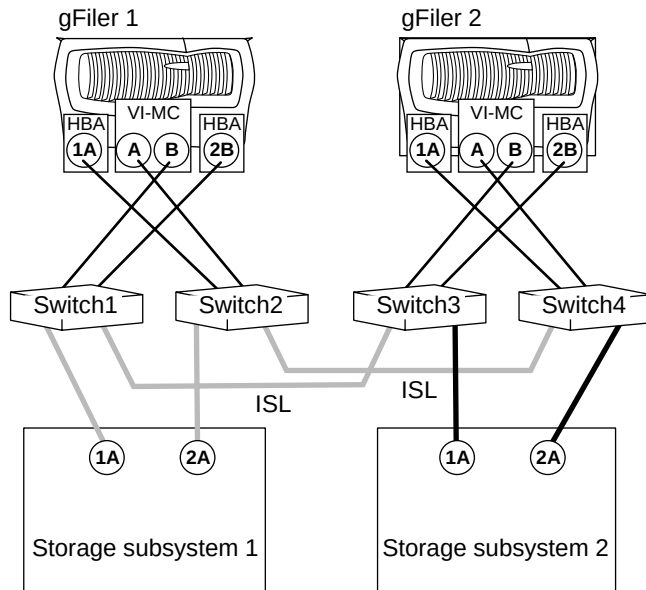
Connectivity overview

The following table describes the number of ports and cable connections needed for a MetroCluster configuration.

Number of gFiler gateways	Number of storage subsystems	Number of switches	Number of ISL connections (maximum supported)	Number of cables from gFiler to switch
2	2	4	2	8
4	2	4	2	16

Maximum LUN configuration for lower-end gFiler gateways

Connectivity overview: The following illustration provides an example of a MetroCluster configuration composed of two gFiler gateways. The maximum number of LUNs depends on the gFiler model and the LUN limitation of LUNs per port or per host group imposed by the storage subsystem.



Notes to the illustration:

- ◆ The XP12000 supports 1,024 LUNs per port. Therefore, this configuration supports the maximum number of LUNs supported by all gFiler models.
- ◆ For storage subsystem models that support 256 LUNs per port or 256 LUNs per port per host group, this configuration supports 256 LUNs on each storage subsystem, for a total of 512 LUNs.

See the *gFiler Software Setup, Installation, and Management Guide* for information about how to plan and configure a MetroCluster configuration.

Port-to-port connectivity: The following port-to-port connectivity scheme allows for the number of maximum LUNS on the lower-end gFiler models.

Port-to-port connectivity scheme			
gFiler 1		Switch	Zone
FC HBA	1A	Any port on switch 2	Optional
	2B	Any port on switch 1	
VI-MC	A	Any port on switch 2	1
	B	Any port on switch 1	2
Storage subsystem 1		Switch	Zone
1A		Any port on switch 1	Optional
2A		Any port on switch 2	
gFiler 2		Switch	Zone
FC HBA	1A	Any port on switch 4	Optional
	2B	Any port on switch 3	
VI-MC	A	Any port on switch 4	1*
	B	Any port on switch 3	2*
Storage subsystem 2		Switch	Zone
1A		Any port on switch 3	Optional
2A		Any port on switch 4	
ISL connection			Zone
Any port on switch 1		Any port on switch 3	None
Any port on switch 2		Any port on switch 4	None

* These zones are separate from those indicated for gFiler 1 but are identical to those zones.

Maximum LUN configuration for higher-end gFiler gateways

Connectivity overview: The following illustration provides an example of a MetroCluster configuration, for a total of four gFiler gateways. This configuration is needed to support the maximum number of LUNs on the higher-end gFiler models.

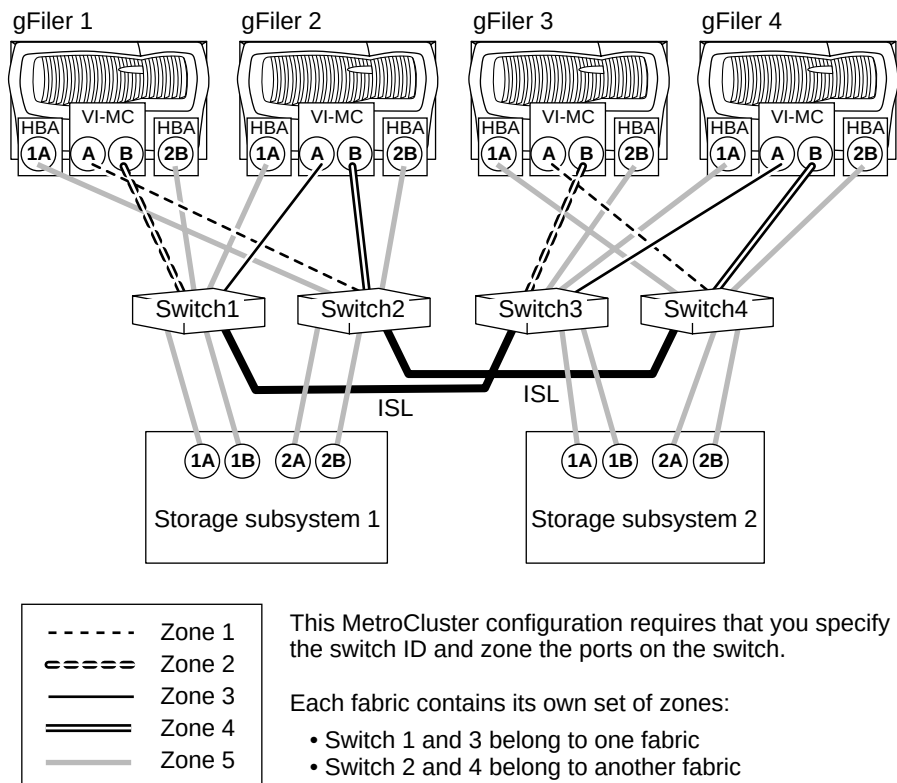
Note

HBA connections must never share the same zone as VI-MC connections. However, zoning individual HBA connections is not required.

The following illustration shows a MetroCluster configuration with two cluster nodes. gFiler gateways 1 and 3 are partner nodes and gFiler gateways 2 and 4 are partner nodes.

Note

The following illustration shows one gFiler neighborhood.



Notes to the illustration:

- ◆ This configuration illustrates storage subsystem models that cannot support more than 256 LUNs per port or 256 LUNs per host group per port.
- ◆ For the XP12000, one port pair per gFiler node is sufficient to achieve maximum configuration for any gFiler model.
- ◆ Unlike previous illustrations, the lines between the switches and the storage subsystems represent switch zoning only; they do not represent how LUN redundancy is achieved. LUN redundancy is achieved as follows:
 - ❖ On Storage subsystem 1: 1A and 2A are redundant, and 1B and 2B are redundant
 - ❖ On Storage subsystem 2: 1A and 2A are redundant, and 1B and 2B are redundant

Port-to-port connectivity: The following port-to-port scheme supports a maximum number of LUNs.

Port-to-port scheme			
First MetroCluster pair		Fabric 1	
gFiler 1		Switch	Zone
FC HBA	1A	Any port on switch 2	Optional
	2B	Any port on switch 1	
VI-MC	A	Any port on switch 2	1
	B	Any port on switch 1	2
gFiler 2		Switch	Zone
FC HBA	1A	Any port on switch 1	Optional
	2B	Any port on switch 2	
VI-MC	A	Any port on switch 1	3
	B	Any port on switch 2	4
Storage subsystem 1		Switch	Zone
1A		Any port on switch 1	Optional
1B		Any port on switch 1	
2A		Any port on switch 2	
2B		Any port on switch 2	

Port-to-port scheme			
Second MetroCluster pair		Fabric 2	
gFiler 3		Switch	Zone
FC HBA	1A	Any port on switch 4	Optional
	2B	Any port on switch 3	
VI-MC	A	Any port on switch 4	1*
	B	Any port on switch 3	2*
gFiler 4		Switch	Zone
FC HBA	1A	Any port on switch 3	Optional
	2B	Any port on switch 4	
VI-MC	A	Any port on switch 3	3*
	B	Any port on switch 4	4*
Storage subsystem 2		Switch	Zone
1A		Any port on switch 3	Optional
1B		Any port on switch 3	
2A		Any port on switch 4	
2B		Any port on switch 4	
ISL connection			Zone
Any port on switch 1		Any port on switch 3	None
Any port on switch 2		Any port on switch 4	None

* These zones are separate from those indicated for gFiler gateways 1 and 2, but are identical to those zones.

About this chapter

This appendix defines some basic terms that are used in Data ONTAP that you might not be familiar with, and provides a “mapping” between the terms that the storage system users and the gFiler users might be using.

Topics in this chapter

This chapter discusses the following topics:

- ◆ [“Terms”](#) on page 60
- ◆ [“Terminology differences in Data ONTAP documents”](#) on page 64

Terms

Array group	On the storage subsystem, the arrangement of disks in the back-end that together form the defined RAID level.
Channel adapter (CHA)	Includes the Client-Host Interface Processor (CHIP). The interface between the system and hosts or servers on an open system.
Cluster	Two gFiler gateways directly connected to each other. This type of deployment provides redundancy in case one gFiler in the cluster becomes unavailable. Each of the gFiler gateways in the cluster might be referred to as a node—a local node or a partner node.
coredump	Information written to disk to help with troubleshooting when a system failure occurs.
gFiler neighborhood	The number of nodes that can see each others' LUNs. When you configure LUNs on the storage subsystem, you identify the hosts in particular neighborhoods.
LDEV	Logical Device: Unit of capacity, defined at format time, that is used as capacity placeholder until it is mapped as a LUN.
LUN	Logical Unit Number (LUN). An area on the storage subsystem that is available for a gFiler or non-gFiler host to read data from or write data to.
Mapping of port definitions	The task of assigned LDEVs, by address, to Fibre Channel ports.
Node	In a gFiler cluster, either the local or partner gFiler.

Parity group

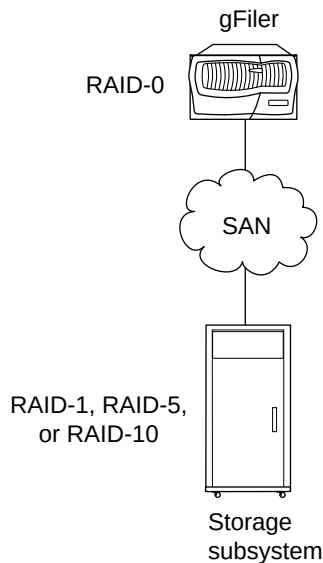
A mode of disk operation and configuration. It is synonymous with the term RAID group.

port

The number of supported ports on an XP storage subsystem is dependent upon the number of supported I/O slots and the number of ports available per I/O adapter. The XP family of storage subsystems supports SCSI, Fibre Channel (FC/AL), and ESCON I/O interfaces. I/O support might vary among XP storage subsystems. Ports are named based on their port group and port letter. Examples of port names include CL1-A through CL1-R and CL2-A through CL2-R (letters I and O are skipped). See the HP manuals for more information about port naming conventions.

RAID protocols supported

gFiler gateways support storage subsystems that use the RAID-1, RAID-5, and RAID-10 protocols, although the gFiler gateways do not themselves use RAID-1, RAID-5, or RAID-10. The following illustration provides a conceptual view of RAID-0 used on the gFiler and the RAID-1, RAID-5, and RAID-10 storage subsystems.



The gFiler stripes across LUNs in RAID-0, thereby maximizing performance because it is using more spindles. Another benefit of the gFiler using RAID-0 for striping across LUNs is that you can add LUNs to a NetApp volume.

There is no need for the gFiler to provide disk protection. The LUNs are already protected with the redundancy provided by RAID-1, RAID-5, and RAID-10 on the storage systems.

Note

NetApp filers use the RAID-4 protocol for disk protection. The RAID-4 protocol is not needed for gFiler gateways because the storage subsystems provide disk protection. Most of the disk information in the Data ONTAP documentation does not apply to the gFiler because it is about RAID-4 and RAID DP.

RAID group

A NetApp aggregate or traditional volume is composed of one or more NetApp RAID (Redundant Array of Independent Disks) groups. From the perspective of gFiler gateways, Data ONTAP uses RAID groups to determine where to allocate data to the LUNs. (From the perspective of NetApp filers, a RAID group is composed of one or more data disks, across which client data is striped and stored, plus one or two parity disks that ensure data recoverability even if as many as two disks within the RAID group fail.)

You cannot assign a RAID group to more than one traditional volume or aggregate.

redundant port pairs

The redundant paths to the same set of LUNs that go through two different ports.

Volume

For XP storage subsystems, volume is synonymous with LDEV.

In Data ONTAP, *volumes* are the primary means of organizing and managing data. You can think about a volume as a container for storing data. You identify the collection of LUNs that are to be in the volume (where collection could mean only one LUN); those LUNs provide the capability for data storage. You manage data storage by managing volumes through the Data ONTAP system administration interface.

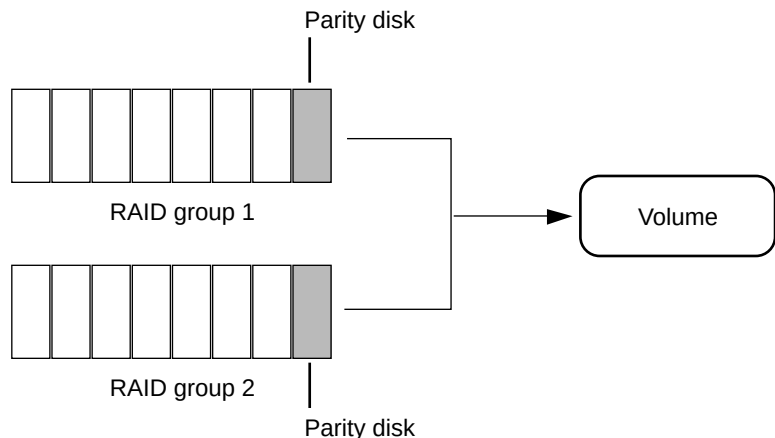
The capability of associating LUNs with volumes provides you a great deal of flexibility for data management. For example, you could create volumes to accommodate your users if they speak more than one language; you could create one volume for data in French and another for data in German. Alternatively, you can include all LUNs in one volume, the root volume that the gFiler setup process creates. The gFiler *Software Installation, Setup, and Management Guide* contains information about volume management.

Relationship of RAID groups to volumes: A NetApp volume is composed of one or more NetApp RAID groups.

The following illustration shows the components of a volume from the *filer* perspective—each volume is made up of one or more RAID groups, which are made up of one or more disks.

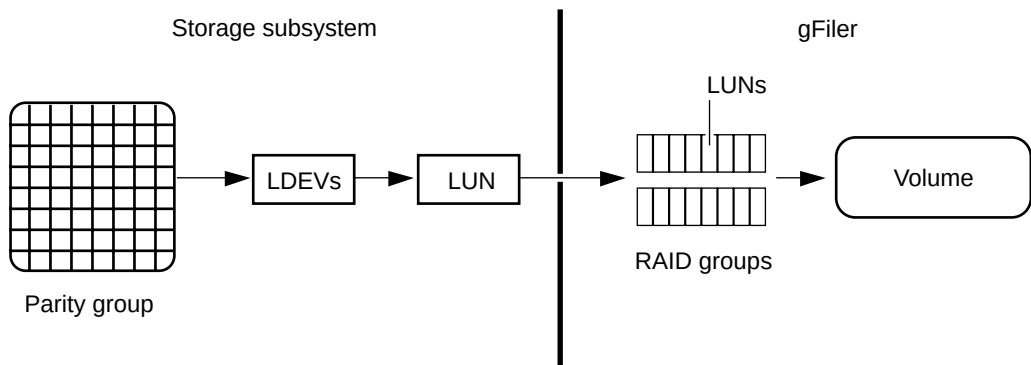
Note_____

The volume discussed is a RAID-4 volume, not RAID DP.



The following illustration shows the concept of the components of a volume from the perspective of a storage subsystem—each NetApp volume is made up of one or more LUNs in one or more RAID groups.

gFiler view of RAID groups



Terminology differences in Data ONTAP documents

Terminology differences

In some cases, different terminology is used between filer users and gFiler users. In most cases, the Data ONTAP documents use the terminology relevant to filer users. Therefore, you have to “translate” some of the words in the Data ONTAP documents to the context applicable to the gFiler. For example:

- ◆ Filers store data on disks in disk shelves. gFiler gateways access data stored in LUNS on the storage subsystems.
- ◆ Translate the term *filer* to *gFiler* or *gateway*.
- ◆ Translate the term *disk* to *LUN*.

If a command uses the term *disk*, replace it with the term *LUN*. For example, the `vol create` command syntax after replacing *disk* with *LUN* is

```
vol create volname LUN-list
```

- ◆ Generally, you can disregard discussions about disk shelves.

Any specific platform information stated for the filer is true for the gFiler series counterpart.

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