FC configurations

ONTAP 9

NetApp
April 06, 2024

Table of Contents

FC configurations

Ways to configure FC & FC-NVMe SAN hosts

It is recommended that you configure your FC and FC-NVMe SAN hosts using HA pairs and a minimum of two switches. This provides redundancy at the fabric and storage system layers to support fault tolerance and nondisruptive operations. You cannot directly attach FC or FC-NVMe SAN hosts to HA pairs without using a switch.

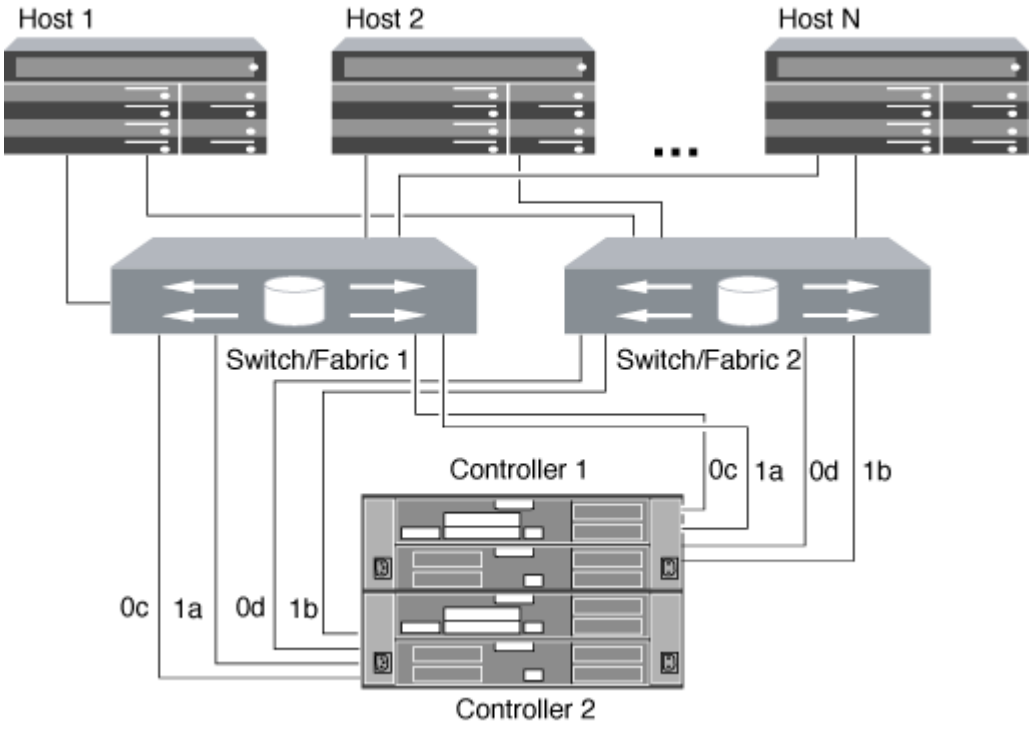
Cascade, partial mesh, full mesh, core-edge, and director fabrics are all industry-standard methods of connecting FC switches to a fabric, and all are supported. The use of heterogeneous FC switch fabrics is not supported, except in the case of embedded blade switches. Specific exceptions are listed on the Interoperability Matrix Tool. A fabric can consist of one or multiple switches, and the storage controllers can be connected to multiple switches.

Multiple hosts, using different operating systems, such as Windows, Linux, or UNIX, can access the storage controllers at the same time. Hosts require that a supported multipathing solution be installed and configured. Supported operating systems and multipathing solutions can be verified on the Interoperability Matrix Tool.

Multifabric FC and FC-NVMe configurations

In multifabric HA pair configurations, there are two or more switches connecting HA pairs to one or more hosts. For simplicity, the following multifabric HA pair figure shows only two fabrics, but you can have two or more fabrics in any multifabric configuration.

The FC target port numbers (0c, 0d, 1a, 1b) in the illustrations are examples. The actual port numbers vary depending on the model of your storage node and whether you are using expansion adapters.

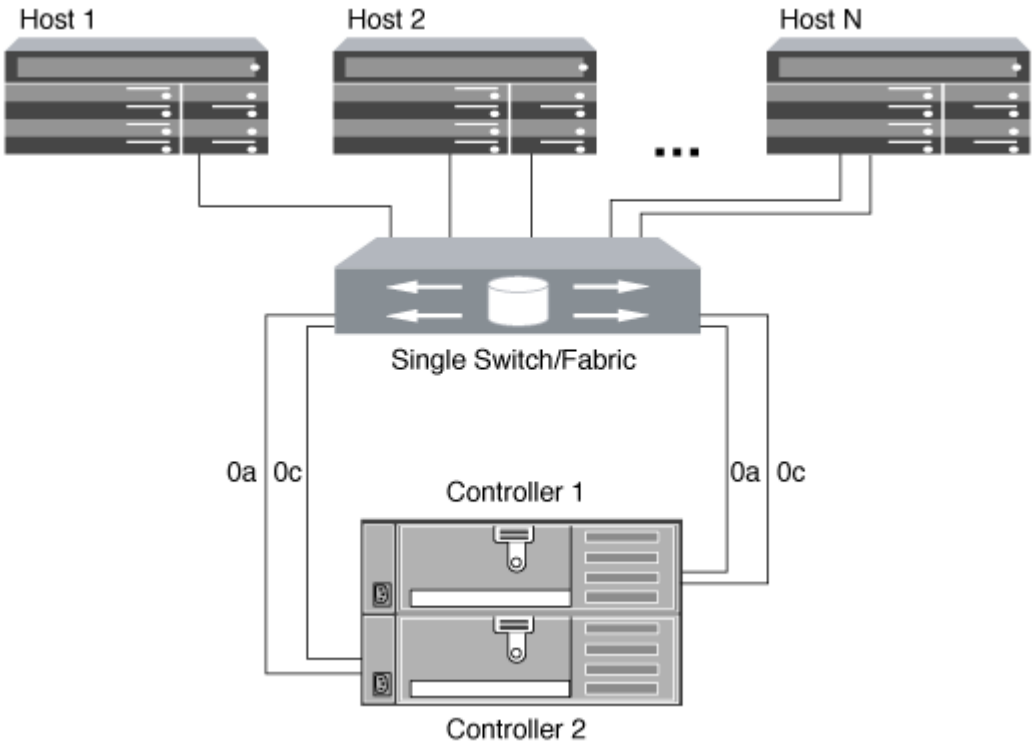


Single-fabric FC and FC-NVMe configurations

In single-fabric HA pair configurations, there is one fabric connecting both controllers in the HA pair to one or more hosts. Because the hosts and controllers are connected through a single switch, single-fabric HA pair configurations are not fully redundant.

The FC target port numbers (0a, 0c) in the illustrations are examples. The actual port numbers vary depending on the model of your storage node and whether you are using expansion adapters.

All platforms that support FC configurations support single-fabric HA pair configurations.



Single-node configurations are not recommended because they do not provide the redundancy needed to support fault tolerance and nondisruptive operations.

Related information

- Learn how Selective LUN mapping (SLM) limits the paths that are utilized to access the LUNs owned by an HA pair.
- Learn about SAN LIFs.

FC switch configuration best practices

For best performance, you should consider certain best practices when configuring your FC switch.

A fixed link speed setting is the best practice for FC switch configurations, especially for large fabrics because it provides the best performance for fabric rebuilds and can significantly save time. Although autonegotiation provides the greatest flexibility, FC switch configuration does not always perform as expected, and it adds time to the overall fabric-build sequence.

All of the switches that are connected to the fabric must support N_Port ID virtualization (NPIV) and must have

NPIV enabled. ONTAP uses NPIV to present FC targets to a fabric.

For details about which environments are supported, see the NetApp Interoperability Matrix Tool.

For FC and iSCSI best practices, see NetApp Technical Report 4080: Best Practices for Modern SAN.

Supported number of FC hop counts

The maximum supported FC hop count between a host and storage system depends on the switch supplier and storage system support for FC configurations.

The hop count is defined as the number of switches in the path between the initiator (host) and target (storage system). Cisco also refers to this value as the *diameter of the SAN fabric*.

Switch supplier	Supported hop count
Brocade	7 for FC, 5 for FCoE
Cisco	7 for FC, Up to 3 of the switches can be FCoE switches.

Related information

NetApp Downloads: Brocade Scalability Matrix Documents

NetApp Downloads: Cisco Scalability Matrix Documents

FC target port supported speeds

FC target ports can be configured to run at different speeds. You should set the target port speed to match the speed of the device to which it connects. All target ports used by a given host should be set to the same speed.

FC target ports can be used for FC-NVMe configurations in the exact same way they are used for FC configurations.

You should set the target port speed to match the speed of the device to which it connects instead of using autonegotiation. A port that is set to autonegotiation can take longer to reconnect after a takeover/giveback or other interruption.

You can configure onboard ports and expansion adapters to run at the following speeds. Each controller and expansion adapter port can be configured individually for different speeds as needed.

4 Gb ports	8 Gb ports	16 Gb ports	32 Gb ports
• 4 Gb • 2 Gb • 1 Gb	• 8 Gb • 4 Gb • 2 Gb	• 16 Gb • 8 Gb • 4 Gb	• 32 Gb • 16 Gb • 8 Gb

UTA2 ports can use an 8 Gb SFP+ adapter to support 8, 4, and 2 Gb speeds, if required.

FC Target port configuration recommendations

For best performance and highest availability, you should use the recommended FC target port configuration.

The following table shows the preferred port usage order for onboard FC and FC-NVMe target ports. For expansion adapters, the FC ports should be spread so that they do not use the same ASIC for connectivity. The preferred slot order is listed in NetApp Hardware Universe for the version of ONTAP software used by your controller.

FC-NVMe is supported on the following models:

- AFF A300

  The AFF A300 onboard ports do not support FC-NVMe.

- AFF A700
- AFF A700s
- AFF A800

The FAS2520 systems do not have onboard FC ports and do not support add-on adapters.

Controller	Port pairs with shared ASIC	Number of target ports: Preferred ports
FAS9000, AFF A700, AFF A700s and AFF A800	None	All data ports are on expansion adapters. See NetApp Hardware Universe for more information.
8080, 8060 and 8040	0e+0f 0g+0h	1: 0e 2: 0e, 0g 3: 0e, 0g, 0h 4: 0e, 0g, 0f, 0h
FAS8200 and AFF A300	0g+0h	1: 0g 2: 0g, 0h
8020	0c+0d	1: 0c 2: 0c, 0d

Controller	Port pairs with shared ASIC	Number of target ports: Preferred ports
62xx	0a+0b 0c+0d	1: 0a 2: 0a, 0c 3: 0a, 0c, 0b 4: 0a, 0c, 0b, 0d
32xx	0c+0d	1: 0c 2: 0c, 0d
FAS2554, FAS2552, FAS2600 series,FAS2720,FAS2750, AFF A200 and AFF A220	0c+0d 0e+0f	1: 0c 2: 0c, 0e 3: 0c, 0e, 0d 4: 0c, 0e, 0d, 0f

Copyright information

Trademark information