



Technical Report

SolidFire Fibre Channel Configuration Guide

NetApp SolidFire Team, NetApp
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1 Introduction

In this NetApp® SolidFire® Fibre Channel configuration guide, we discuss SolidFire Fibre Channel (FC) nodes and detail the required cabling, storage area network (SAN) zoning, and configuration maximums. This guide assumes that you have prior knowledge of both FC concepts and a basic understanding of the SolidFire platform.

2 Node Overview

The connections of a SolidFire FC node are shown in Figure 1. Each node has the same connection ports. We discuss how to best configure the connections in the next section.

Figure 1) SolidFire FC node: back-end view.

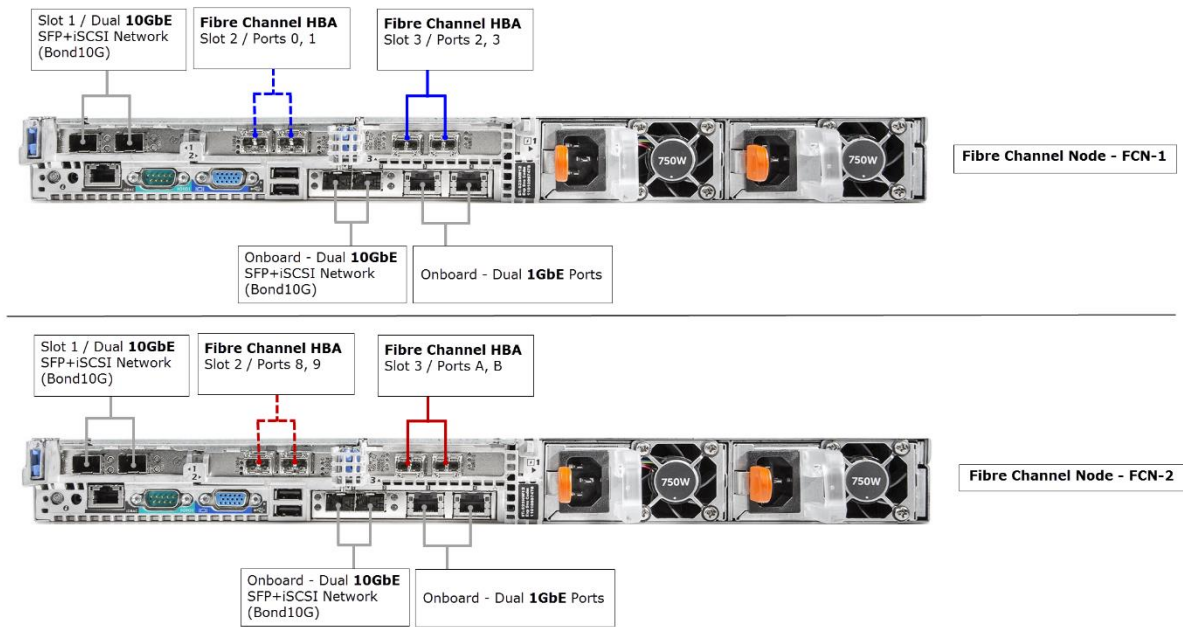


Table 1 shows the SolidFire FC node ports that must be cabled.—

Table 1) Cabling SolidFire FC node ports.

Location	Description
Slot 1	Dual-port 10Gb Ethernet card
Slot 2	Dual-port 16Gb FC card
Slot 3	Dual-port 16Gb FC card
Onboard	Dual-port 16Gb Ethernet + dual-port 16Gb Ethernet
Onboard	Dual power supplies

Table 2 shows the logical port numbers. Logical port numbers correspond to the last two digits of the cluster-assigned worldwide port name (WWPN) for each port.

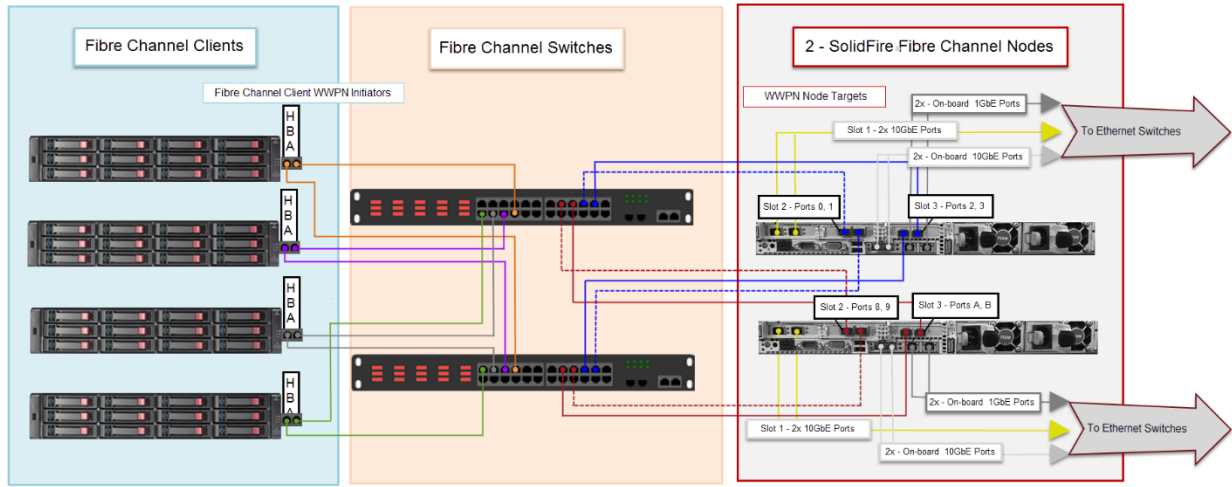
Table 2) Logical port numbers.

Node	Slot	Port	WWPN
1	2	1	00
1	2	2	01
1	3	1	02
1	3	2	03
2	2	1	08
2	2	2	09
2	3	1	0a
2	3	2	0b
3	2	1	10
3	2	2	11
3	3	1	12
3	3	2	13
4	2	1	18
4	2	2	19
4	3	1	1a
4	3	2	1b

3 Fibre Channel Cabling Diagram

NetApp SolidFire now supports four FC nodes in a cluster. If four FC nodes are included in a cluster, the third and fourth FC nodes use the same cabling scheme to the FC switches as the first and second nodes.

Figure 2) SolidFire FC node: cabling diagram.



4 Cabling Overview

Cabling the SolidFire FC nodes is very similar to cabling standard SolidFire nodes, with the addition of FC cables and additional 10Gb Ethernet cables. The key point to remember is that each card has one cable going to each separate switch (and fabric in the case of the FC ports).

Note: Like SolidFire storage nodes, cabling the 1Gb management ports on the FC nodes is optional and based on your overall cluster configuration.

4.1 Switch Cabling

Table 3 and Table 4 show logical block diagrams that correspond to the port layout on the rear of the SolidFire FC nodes. Ports with a white background are cabled to switch A, and ports with a gray background are cabled to switch B.

Note: Due to the mounting orientation of the FC cards in slot 2 and slot 3, the port numbering is reversed.

Table 3) Logical block diagram for SolidFire FC nodes: orientation 1.

Slot 1		Slot 2		Slot 3	
10Gb-1 Port A	10Gb-1 Port B	FC-1 Port 1	FC-1 Port 2	FC-2 Port 2	FC-2 Port 1
Onboard Ethernet Ports					
		10Gb-2 Port 1	10Gb-2 Port 2	1Gb-1 Port 3	1Gb-1 Port 4

Table 4 shows the same information as Table 3 but with a different orientation. The same background colors are used for both block diagrams.

Table 4) Logical block diagram for SolidFire FC nodes: orientation 2.

Slot	Port	Position	Type	Switch/Fabric
1	A	Left	10Gb	10Gb-A

Slot	Port	Position	Type	Switch/Fabric
1	B	Right	10Gb	10Gb-B
2	1	Left	FC	FC-A
2	2	Right	FC	FC-B
3	2	Left	FC	FC-B
3	1	Right	FC	FC-A
Onboard	1	Left	10Gb	10Gb-A
Onboard	2	Right	10Gb	10Gb-B
Onboard	3	Left	1Gb	1Gb-A
Onboard	4	Right	1Gb	1Gb-B

5 SAN Zoning

SolidFire FC nodes support both port and worldwide name (WWN) zoning. Given its port-independent nature, NetApp recommends WWN zoning for SolidFire FC nodes. When an FC node suffers a hardware failure and must be replaced, the new FC node is assigned the same WWPNS as the failed node. Therefore, SAN switch zoning can remain the same even during node replacement. NetApp recommends that you implement single initiator zoning in which each host initiator WWPN is put into a zone with all the SolidFire target WWPNs. So, for example, a server with four FC ports (two per fabric) would need four zones, one per initiator port: two on fabric A, and two on fabric B. If desired, zoning can be further isolated to one initiator WWPN and one SolidFire target WWPN per zone.

Note: For zoning purposes, the WWPN should always be used instead of the SolidFire cluster worldwide node name (WWNN). In the WWPN configuration, traffic is spread equally between all paths by the multipathing software on the host.

Note: In the event of a hardware failure, the failed FC node should be removed from the cluster prior to adding the new replacement node. This process assigns the new FC node with the same WWPNS used for the failed node.

6 10Gb Network Bonding Configuration

Due to the high throughput required for the SolidFire FC nodes, the Link Aggregation Control Protocol (LACP) is the only recommended bonding mode for the Bond10G interface. Using any other bonding mode might result in a significant reduction in performance and possible failover issues.

All SolidFire FC ports should be connected to your FC fabric. The four SolidFire Bond10G network connections should be connected in one LACP bond group at the switch level. This allows for the best overall performance for FC systems.

Note: See [Best Practices for Networking and Network Maintenance on NetApp SolidFire Storage Systems](#) for guidance on high-performance SAN deployments.

7 Configuration Limitations

SolidFire Element® OS 9 imposes some limitations on cluster size and configuration values. These limitations change as the product continues to advance. Table 5 lists the current set of configuration limitations.

Note: None of the noted limitations are hard limits enforced by the cluster.

Table 5) Configuration limits.

Item	Limitation
SolidFire FC nodes	Minimum: 2 FC nodes per FC cluster Maximum: 4 FC nodes per FC cluster
SolidFire storage nodes	Maximum: 40 storage nodes per FC cluster Note: Any size SolidFire node can be used
FC initiators and volumes	<p>There is a limitation on the total number of sessions currently supported by SolidFire FC nodes. Use the following formulas to calculate your current session usage (V = volume access group).</p> $V_{Total} \leq 16,384^*$ $V_{Total} = V_1 + V_2 + \dots + V_N$ $V_x = \text{volumes}_x * \text{FC initiators } X = V_x * I_x$ <p>Examples:</p> <p>$V_1 = 60$ initiators and 60 volumes $60 * 60 = 3,600$ [supported]</p> <p>$V_1 = 32$ initiators and 36 volumes, $V_2 = 4$ initiators and 200 volumes $(32 * 36) + (4 * 200) = 1,152 + 800 = 1,952$ [supported]</p> <p>$V_1 = 60$ initiators and 256 volumes $V_2 = 60$ initiators and 256 volumes $(60 * 256) + (60 * 256) = 30,720$ [not supported]</p> <p>Note: A server with two FC ports (two connected WWPNs) has two initiators. Simply put, every WWPN added to a volume access group is an initiator for this calculation.</p>

*The limit for Microsoft Windows hosts should be less than or equal to 1,024.

8 Next Steps

Now that your SolidFire FC nodes are cabled and zoned, you are ready to add them to the cluster and begin creating volumes. Next steps are listed here at a high level. See the [SolidFire Element OS9 User Guide](#) for details about each of the steps.

1. Add the FC nodes to a new (or existing) SolidFire cluster.
2. Create an account for volume ownership.
3. Create volumes under the new account.
4. Create a volume access group with the appropriate FC initiator WWPNs.
5. Assign volumes to the volume access group.
6. Change the preassigned LUN IDs if required.
7. (Optional) Add iSCSI initiators to the volume access group for mixed-protocol access to the same volumes.

9 Contacting NetApp SolidFire Active Support

You can contact NetApp SolidFire Active Support if you have any questions or comments about the SolidFire documentation or SolidFire products in general. Visit [NetApp SolidFire Active Support](#) or e-mail ng-SF-Support@netapp.com for help with NetApp SolidFire systems.

Refer to the [Interoperability Matrix Tool \(IMT\)](#) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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