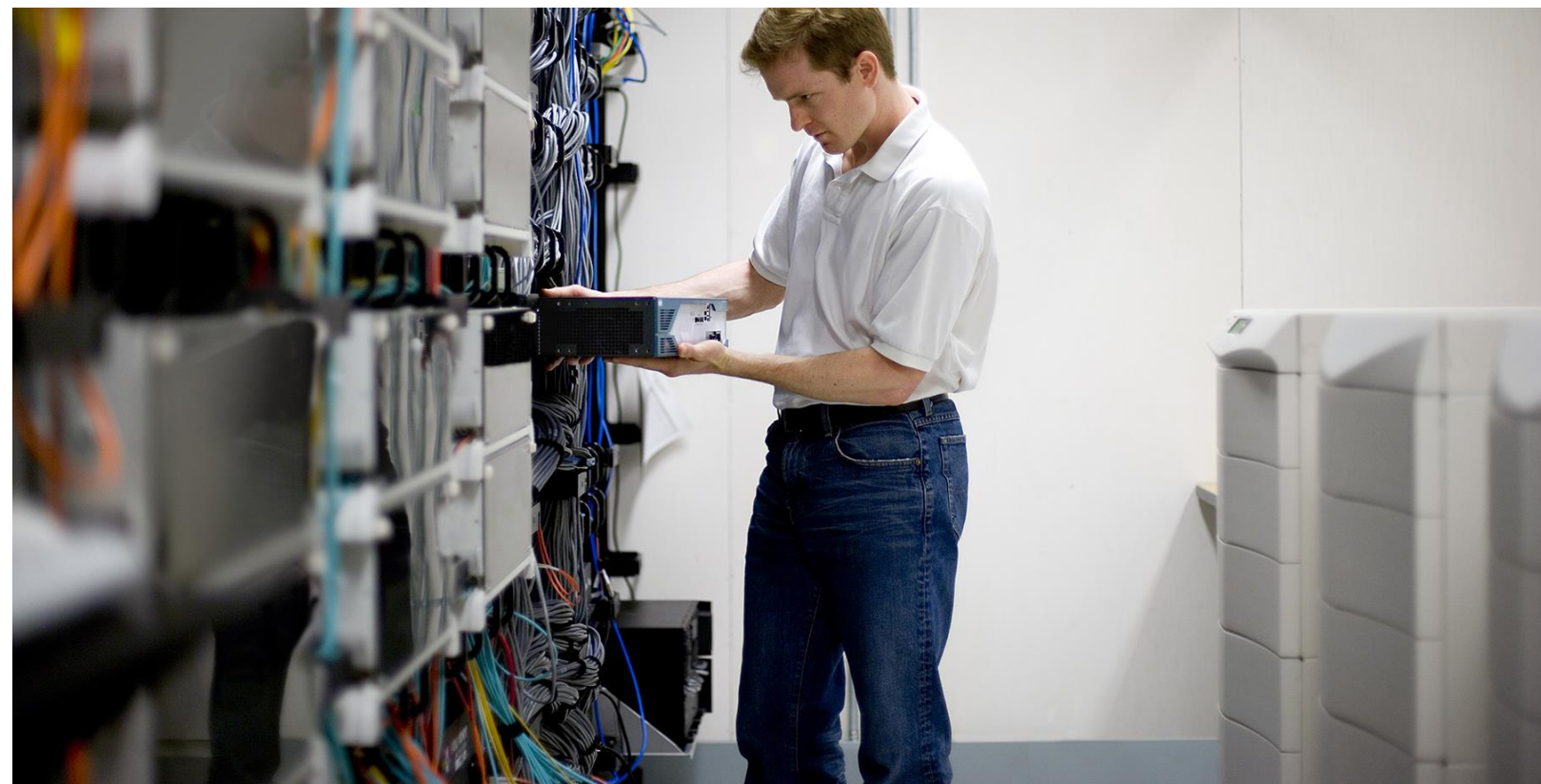


# Cisco Nexus 9000 Series Switches Nested NPIV SAN Profile

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## Profile introduction

This document focuses on the deployment of Cisco Nexus® 9000 Series Switches and NetApp C-mode in a data center. This data center platform hosts infrastructure software and business applications in virtualized and bare-metal environments. The platform has been tested and validated across leading hypervisors and operating systems from VMware, Red Hat, and Microsoft.

### **Application optimization**

Host multiple instances of mixed applications, consolidated on a shared infrastructure with centralized, simplified management. Scale out and scale up as workloads increase, adding storage and computing layers as organization demands grow.

### **Hybrid-cloud flexibility**

Operate across hybrid-cloud resources with the software-defined capabilities of NetApp Data Fabric, while maintaining security, control, and workload portability with Cisco Intercloud Fabric™.

Manage data from flash memory to disks to the cloud with the simplicity of a single set of tools.

Optionally use OpenStack software on FlexPod to create a private or hybrid cloud.

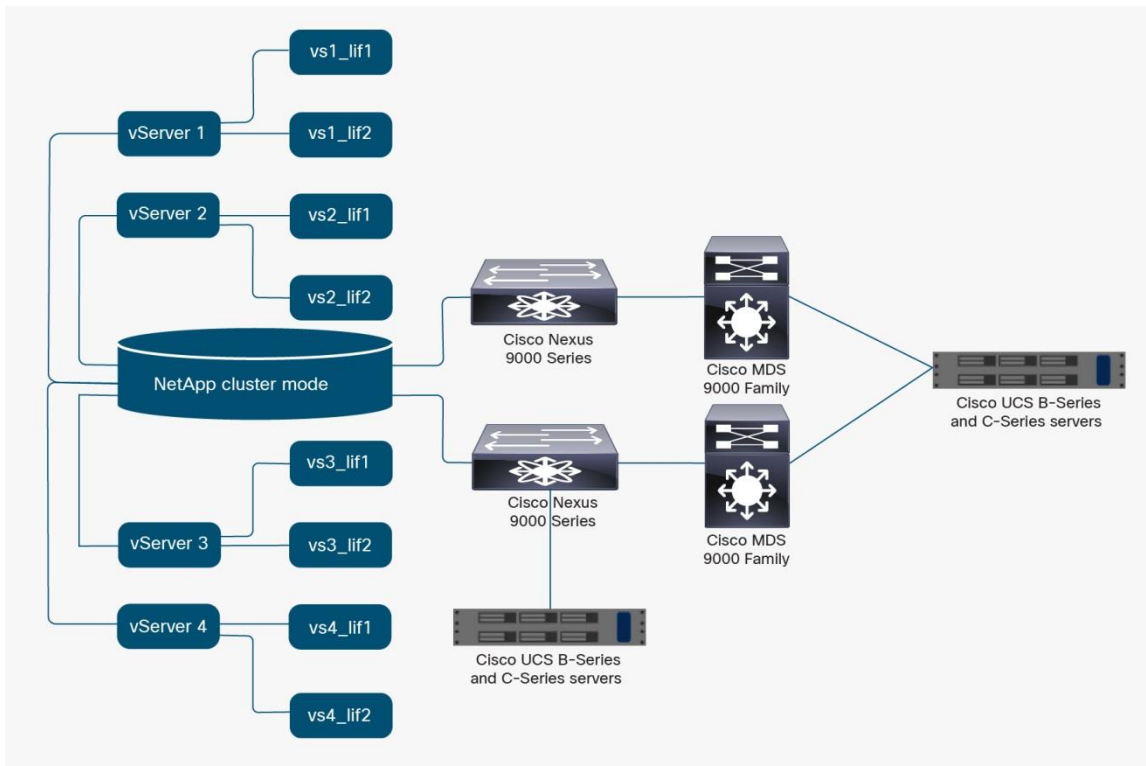
### **Simplified IT infrastructure**

Use Cisco UCS® Director for end-to-end, single-view automation and orchestration, freeing IT staff to focus on new services. Validated designs help you deploy this platforms in a wide range of operating environments with less risk and accelerated ROI.

## Network profile

Based on research, customer feedback, and configuration samples, the profile presented here is designed with a generic deployment topology that can easily be modified to fit any specific deployment scenario. Figure 1 shows the topology.

**Figure 1.** Deployment topology



NetApp C-mode is a classic example of a scenario with one fabric login (FLOGI) and multiple fabric discovery (FDISC) requests. Here, the virtual servers (NetApp Vservers) are the virtual storage devices (equivalent to virtual machines in VMware ESX), and the logical interfaces (LIFs) are the virtual converged network adapters (vCNAs) associated with every Vserver.

In this scenario, FLOGI request is issued between the NetApp cluster CNA and the Cisco Nexus 9000 Series Switch. Then, each LIF (vCNA) performs fabric discovery (an FDISC process) to log in to the SAN fabric.

The Cisco Nexus 9000 Series Switch is in N-Port Virtualization (NPV) mode (enable the N-Port ID Virtualization [NPIV] feature), meaning that it issues a FLOGI request to log in to the Cisco MDS 9000 Family switch, and the FLOGI and FDISC requests from NetApp also pass through to the MDS 9000 Family switch. This process is known as nested-host NPIV.

### Hardware profile

Table 1 lists the relevant hardware, servers, test equipment, and endpoints used to complete the end-to-end profile deployment.

The hardware, the relevant software versions, and the roles of these devices complement the physical topology shown earlier in Figure 1.

**Table 1.** Hardware profile of servers and endpoints

Virtual machines and hardware	Description
Cisco Nexus 9504 Switch	Cisco NX-OS Software Release 7.0.3.15 Fibre Channel over Ethernet (FCoE) 10-Gbps line card
Cisco MDS 9700 Series Multilayer Directors	Cisco NX-OS Release 6.2.7 or later
Cisco Unified Computing System™ (Cisco UCS) server	Manages and hosts the virtual machines
NetApp target	Storage device

## Use-case scenarios

### Test methodology

The scenarios listed in Table 2 were tested using the topology defined in Figure 1 along with the test environment already explained in this document.

### Use cases

Table 2 summarizes the use cases that were tested using the unified fabric converged network profile. The tests were divided customer use-case scenarios as listed in the table.

The customer use cases consist of system upgrade and bring-up, network events and link flaps, and resiliency and error recovery.

**Table 2.** Use cases

Number	Focus	Use case
<b>System upgrade and bring-up</b>		
1	<ul style="list-style-type: none"> <li>Vserver creation on NetApp</li> <li>Vserver deletion on NetApp</li> </ul>	Use the Command-Line Interface (CLI) or .NET GUI to create and delete Vserver.
3	<ul style="list-style-type: none"> <li>LIF creation on Vserver</li> <li>LIF deletion on Vserver</li> </ul>	Use the CLI or .NET GUI to create and delete LIFs on Vservers.
4	<ul style="list-style-type: none"> <li>NPIV disable on Cisco Nexus 9000 Series Switch</li> <li>NPIV enable on Cisco Nexus 9000 Series Switch</li> </ul>	Enable and disable NPIV on Cisco Nexus 9000 Series Switch to verify that LIFs are logging in and logging out.
5	<ul style="list-style-type: none"> <li>NPIV disable on core switch</li> <li>NPIV enable on core switch</li> </ul>	Enable and disable NPIV on Cisco Nexus 9000 Series Switch to verify that LIFs are logging in and logging out.
<b>Network events and link flaps</b>		
6	<ul style="list-style-type: none"> <li>Shut off server interface on Cisco Nexus 9000 Series Switch</li> <li>No shut off of server interface on the Cisco Nexus 9000 Series Switch</li> </ul>	Flap the server port (the port being used for FLOGI and FDISC: that is, the connection between NetApp and the Cisco Nexus 9000 Series Switch) to verify the FLOGI and FDISC operations.
7	<ul style="list-style-type: none"> <li>Shut off external interface on Cisco Nexus 9000 Series Switch</li> <li>No shut off of external interface on Cisco Nexus 9000 Series Switch</li> </ul>	Flap the external interface (the connection between the Cisco Nexus 9000 Series Switch and MDS 9000 Family director) to verify the FLOGI and FDISC operations.
8	<ul style="list-style-type: none"> <li>FLOGI check on core switch</li> <li>SAN boot of hypervisor</li> </ul>	Verify the internal FLOGI (port login [PLOGI]) and process login (PRLI) from the core switch. Create a zone, assign a Logical Unit Number (LUN) to the host, and perform a SAN boot.
9	<ul style="list-style-type: none"> <li>Shut off SAN A path and boot on SAN B</li> <li>No shut off on SAN A</li> <li>Shut off SAN B path and boot on SAN A</li> <li>No shut off on SAN B</li> </ul>	Shut one SAN path to boot from the other SAN path.
10	<ul style="list-style-type: none"> <li>Traffic test (network-attached storage [NAS] traffic)</li> </ul>	Create a Network File System (NFS) volume on NetApp and present that volume on the Cisco UCS host to send NAS traffic on the same port on which the SAN traffic is running.

Number	Focus	Use case
11	<ul style="list-style-type: none"> <li>Traffic-based triggers</li> </ul>	Flap one SAN path to verify that traffic is failing over to the other path.
<b>Resiliency and error recovery</b>		
12	<ul style="list-style-type: none"> <li>System switchover</li> </ul>	Perform a system switchover to verify that no traffic is being dropped.
13	<ul style="list-style-type: none"> <li>Copy run start and reload operation on Cisco Nexus 9000 Series Switch</li> <li>Copy run start and reload operation on MDS 9000 Family switch</li> </ul>	Perform a copy run start operation and reload to verify that all the previous configurations are intact.
14	<ul style="list-style-type: none"> <li>ISSU on Cisco Nexus 9000 Series Switch</li> <li>ISSU on MDS 9000 Family switch</li> </ul>	Perform ISSU on the Cisco Nexus 9000 Series and MDS 9000 Family switches to verify that no traffic has been lost.

## References

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[https://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/flexpod/flexpod\\_overview.pdf](https://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/flexpod/flexpod_overview.pdf)



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