

Cisco N-Port Virtualizer and FlexAttach: Simplify Large-Scale Blade Server Fibre Channel SAN Deployments

What You Will Learn

This White Paper is targeted at server and storage administrators that plan to deploy blade servers with SAN connectivity.

The white paper first highlights the issues faced by server and storage administrators deploying blade servers with SAN connectivity. It then shows how Cisco provides solutions to these problems with its Fibre Channel SAN blade switch. Further, the white paper articulates a comprehensive value-proposition for these customers.

Challenge

Blade server deployments are gaining popularity among enterprise customers. According to industry analysts, blade servers are the fastest growing segment of the server market, and their numbers are expected to increase significantly in the coming years. To meet their need to centralize storage for power efficiency, ease server replacement, and deploy virtual environments, enterprises are increasingly attaching blade servers to Fibre Channel SANs.

As the scale of Fibre Channel SAN blade switch deployment increases, it introduces some challenges for customers. Customers are looking for:

- A simple way to connect hundreds of blade switches to the SAN core without having to worry about scalability problems
- The capability to connect the blade switches to a multivendor SAN core
- The flexibility for server administrators to move, add, and change servers without involving the SAN administrator
- The capability to consolidate and virtualize SANs to get the highest level of resiliency and simplified management tools

Cisco continues to evolve its blade switch solution to meet these customer challenges with the introduction of Cisco® N-Port Virtualizer (NPV) and Cisco FlexAttach.

Business Benefits

The Cisco solution offers these business benefits:

- High scalability for large-scale Fibre Channel SAN deployments
- Transparent interoperability with any SAN core
- Server mobility: flexibility for additions, moves, and changes
- Virtual SANs (VSANs) for consolidation, segmentation, and fault isolation
- Enterprise-class high availability
- Simplified management

Cisco Solution

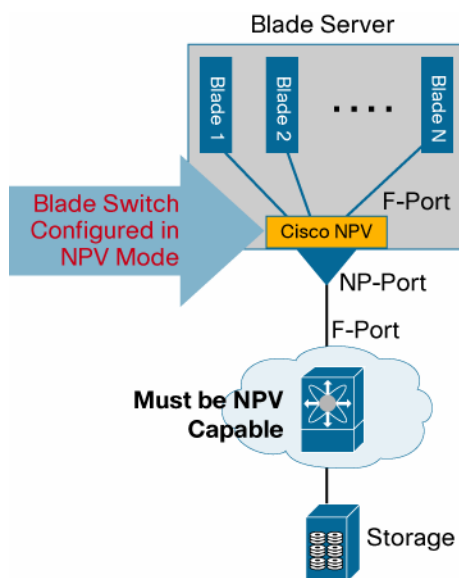
Cisco NPV and Cisco FlexAttach offer a number of important benefits.

Cisco N-Port Virtualizer

Cisco NPV enables blade switches (and other edge switches) to act as host-bus-adapter (HBA) aggregators. Cisco NPV helps blade server customers deploy large-scale SANs and operate them with any vendor's SAN core, without the need to purchase any additional hardware or software. This feature is available in Cisco MDS 9000 SAN-OS Software Release 3.2(1a) and later.

When the Cisco blade switch is used in NPV mode, the blade switch is not seen as a switch by the SAN fabric. Instead, it acts as an HBA aggregator. Cisco NPV relies on the core switch to support and run an industry-standard feature called N-port ID virtualization (NPIV). As shown in Figure 1, the blade switch connects to servers using F-ports and uplinks to the SAN core using N-port proxy (NP) ports. The Cisco blade switch is VSAN aware. Traffic from all servers connected to a particular VSAN is uplinked to the core on NP-ports that carry that VSAN. Cisco NPV also offers significant configuration flexibility, with advanced traffic management capabilities.

Figure 1. Cisco NPV Deployment Scenario



Main Benefits of Cisco NPV

Enhanced Scalability with Reduced Domain ID Use

One of the primary challenges for large-scale blade server deployments is the number of Fibre Channel domain IDs that are required. Each Fibre Channel blade switch in a blade server uses one Fibre Channel domain ID and provides Fibre Channel connectivity for up to 16 blade servers. For example, a deployment of 1000 blade servers will require up to 63 Fibre Channel blade switches, which translates to 63 Fibre Channel domain IDs. With a redundant configuration, this setup translates to up to 126 Fibre Channel blade switches, or 126 Fibre Channel domain IDs. This configuration becomes a deployment challenge because storage array providers place an upper limit on the number of Fibre Channel domain IDs in a SAN. This number is typically less than 50, even though the theoretical limit is 239.

With Cisco NPV, the Fibre Channel blade switch behaves like an HBA, and it does not use a Fibre Channel domain ID. Instead, it gets a Fibre Channel ID (FCID) for the blade servers from the core SAN. Thus, a deployment of 1000 blade servers will use only approximately two Fibre Channel domain IDs.

Transparent Interoperability in Multivendor Environments

The existing switch-switch interoperability between multivendor SANs requires configuration of special interoperability modes and a carefully managed ongoing process.

With Cisco NPV the Fibre Channel blade switch behaves like an HBA, and it provides transparent interoperability in multivendor environments. Interoperability between the Cisco Fibre Channel blade switch with NPV enabled and core SAN is no different than interoperability today between a server connected to a SAN using N-port-to-F-port connectivity.

Advanced Traffic Management

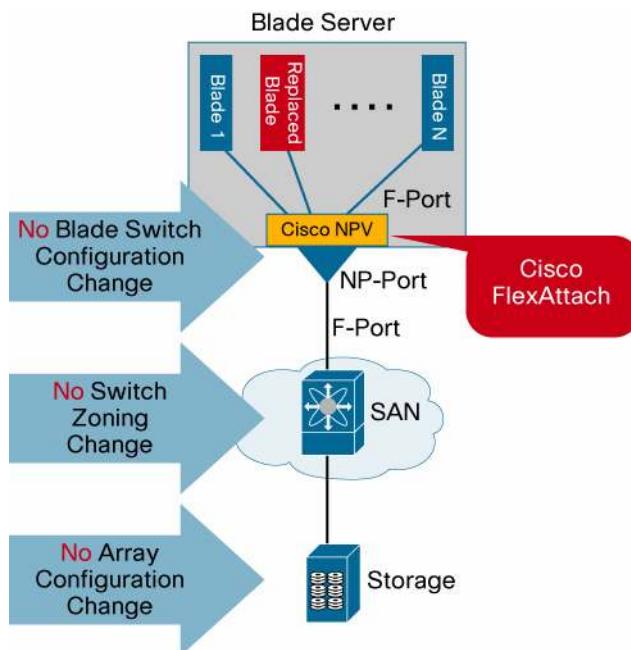
The Cisco Fibre Channel blade switch has advanced traffic management capabilities. Traffic from servers in the same VSAN are automatically load balanced across all uplink NP-ports carrying that VSAN. Servers are uniformly distributed using a round-robin approach. Customers also can specify the NP-port uplink used for each server; this option is available for customers who want to implement their own traffic engineering policies.

If an NP-port uplink failure occurs, all servers on the failed NP-port uplink are redistributed on the remaining available NP-ports. When the link is again available, the servers are automatically evenly redistributed, without manual intervention.

Cisco FlexAttach

Cisco FlexAttach gives blade server customers the flexibility to add, move, or replace servers easily without the need to reconfigure SAN switches or storage arrays and without the need to purchase any additional hardware or software. This feature is available in Cisco MDS 9000 SAN-OS Software Release 3.3(1a) and later.

Cisco FlexAttach helps virtualize the SAN identity for a server, which enables a server to retain its SAN identity even if the server is moved or replaced within or across the blade server chassis. Cisco FlexAttach is also useful in prepositioning a server before it arrives. As can be seen in Figure 2, virtualizing the SAN identity helps avoid reconfiguration of SAN switches and storage arrays. Thus, server administrators can now add, move, or replace servers without having to coordinate every change with the SAN administrator.

Figure 2. Cisco FlexAttach Deployment Scenario

Cisco FlexAttach offers some unique capabilities to customers:

- Customers can deploy Cisco FlexAttach in a virtual server environment. Thus, a virtual server running Cisco NPV with each virtual machine having its own virtual worldwide name (WWN) can use Cisco FlexAttach.
- Servers can be moved across blade server chassis and still retain the Fibre Channel SAN identity, giving server administrators much more flexibility.

Main Benefits of Cisco FlexAttach

Flexibility of Server Mobility

Cisco FlexAttach enables enterprises to more easily add, move, and replace blade servers, without the need to reconfigure the SAN switch and storage arrays. Cisco FlexAttach virtualizes the server SAN identity (the physical WWN) and presents a virtual identify (virtual WWN) for provisioning. When the physical server is changed, no reconfiguration of SAN switches or storage arrays is required, because the virtual identity remains the same, and the new physical address is automatically mapped to the virtual address. Servers can even be moved across blade server chassis.

More Efficient Operations

When servers are added, moved, or changed, the server administrator often needs to wait for the SAN administrator to reconfigure the SAN switch or the storage array. Cisco FlexAttach eliminates the need for server and SAN administrators to coordinate server changes, thereby enabling more efficient operations.

Other Benefits of the Cisco Solution

VSANs for Consolidation, Segmentation, and Fault Isolation

VSAN, an industry standard for fabric virtualization, allows more efficient storage network use by consolidating multiple isolated physical SAN environments within a single physical SAN fabric or switch. It also helps enterprises reduce their capital investments. Up to 16 VSANs are supported per blade switch. Each VSAN supports role-based access control (RBAC) and has separate configuration and separate fabric services and operates as a separate SAN. Traffic in each VSAN is segregated. Individual blade servers or a group of blade servers can be on one VSAN, offering maximum flexibility and resiliency, and faults or outages in one VSAN do not affect other VSANs.

Enterprise-Class High Availability

Cisco NPV, along with its inherent Cisco MDS 9000 SAN-OS Software capabilities, offers enterprise-class high availability for blade server deployments. Cisco MDS 9000 SAN-OS Software supports in-line service software upgrade (ISSU) or nondestructive software upgrade. With dual HBAs in the server, dual homing of servers to fabric switches combined with a two-core design eliminates any single point of failure. HBA failure, blade switch failure, or link failure is handled without any loss of connectivity.

Simplified Fibre Channel Blade Switch Management

Cisco Fabric Manager is a responsive, easy-to-use, GUI application that simplifies the management of Cisco Fibre Channel blade switches. Cisco Fabric Manager offers storage administrators fabric wide management capabilities, including discovery, multiple-switch configuration, continuous network monitoring, and troubleshooting. This powerful approach greatly reduces switch setup times, increases overall fabric reliability, and provides robust diagnostics for resolving network problems and configuration inconsistencies.

Management is also simplified by:

- End-to-end Cisco switches, helping ensure the use of common Cisco MDS 9000 SAN-OS Software and thereby a consistent feature set and user interface
- Comprehensive port and flow statistics to facilitate sophisticated performance analysis and diagnostics
- Centralized authentication, authorization, and accounting (AAA) server for authentication
- RBAC on a per-VSAN basis
- Switch as an HBA, requiring minimal configuration and management

Feature Support Matrix

Cisco NPV Support:

HP BladeSystem: Cisco MDS 9000 SAN-OS Software Release 3.2(1a) and later

IBM BladeCenter: Cisco MDS 9000 SAN-OS Software Release 3.3(1a) and later

FlexAttach Support:

HP BladeSystem: Cisco MDS 9000 SAN-OS Software Release 3.3(1a) and later

IBM BladeCenter: Future

Conclusion

Cisco recognizes that many customers are deploying blade servers. These customers often are looking for a simple and flexible SAN connectivity solution for large-scale blade server deployments. Cisco Fibre Channel blade switches running Cisco NPV and FlexAttach offer a highly scalable, flexible, resilient, and manageable SAN connectivity solution for these customers.

For More Information

For more information, visit us on the web at <http://www.cisco.com/go/bladeswitch> or contact your local account representative.



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