Cisco Delivers Enterprise-Class Fibre Channel Blade Switch Solution

The blade server market is the fastest growing segment of the server market, with a year-to-year growth rate of 30 percent according to IDC. Server consolidation and virtualization are primary causes of the growth in blade server and blade switch deployments. In addition, the SAN attach rate for blade servers is growing at a rate of 40 percent. As blade server deployments in the data center continue to grow, IT departments must address several challenges in terms of the scalability, interoperability, any-to-any connectivity, flexibility, and availability capabilities of Fibre Channel blade switches.

Cisco offers two Fibre Channel blade switch solutions: one for HP c-Class BladeSystem and one for IBM BladeCenter.

Figure 1. Cisco Fibre Channel blade switch for HP c-class BladeSystem.

The Cisco® MDS Fibre Channel Blade Switch for HP c-Class BladeSystem (Figure 1) has two models: the base 12-port model and a 24-port model. A 12-port license upgrade is available to upgrade the 12-port model to 24 ports. In the 12-port model, 8 ports are for internal connections to the server, and 4 ports are external or SAN facing. In the 24-port model, 16 ports are internal for server connections, and 8 ports are external or SAN facing.

Figure 2.   Cisco Fibre Channel blade switch for IBM BladeCenter

The Cisco MDS Fibre Channel Blade Switch for IBM BladeCenter (Figure 2) has two models: a 10-port switch and a 20-port switch. A 10-port upgrade license is available to upgrade from 10 ports to 20 ports. In the10-port model, 7 ports are for internal connections to the server, and 3 ports are external. In the 20-port model, 14 ports are for internal connections to the server, and 6 ports are external.

This document discusses how each of the challenges can be addressed by using the Cisco MDS 9000 family Fibre Channel blade switch solutions to deliver enterprise-class deployments.

Scalability for Large Scale Blade Server Deployments

Challenge: Manage Large Number of Fibre Channel Switches in Large Scale Blade Server Deployment

A primary challenge in large scale blade server deployments is the number switches, and hence the number of Fibre Channel domain IDs, that are required. For example, a 1000–blade server deployment will require more than 60 Fibre Channel blade switches in contrast to just a few in a non-blade deployment. This increase adds both management and performance overhead to the scalability of SANs. Also, the requirement of 60 Fibre Channel domain IDs is not practical given that original storage manufacturers (OSMs) place an upper limit on the number of Fibre Channel domain IDs of typically around 40, although the theoretical limit is 239 in a SAN.

Solution: Cisco Offers Enterprise-Class Scalability Using N-Port Virtualizer

Cisco N-Port Virtualizer (NPV) addresses both management and domain ID scalability concerns using a standard-based technology called N-Port ID Virtualization (NPIV). NPV (Figure 3) converts a Fibre Channel blade switch to a host bus adapter (HBA), which does not use a Fibre Channel domain ID. The HBA gets Fibre Channel IDs (FCIDs) for attached devices from the SAN core switch to which it is connected.

Cisco NPV wizard, which is part of Cisco Enterprise-Class Fabric Manager, simplifies large scale blade deployments by guiding users through a sequence of steps for tasks (such as uplink selection, VSAN specification, and pairing of NPV switches to the correct SAN core) that are required for batch deployment of a large number of blade deployment. The fabric manager also provides configuration and monitoring tools for building and managing large scale SANs.

Figure 3.   NPV enables large scale blade server deployments
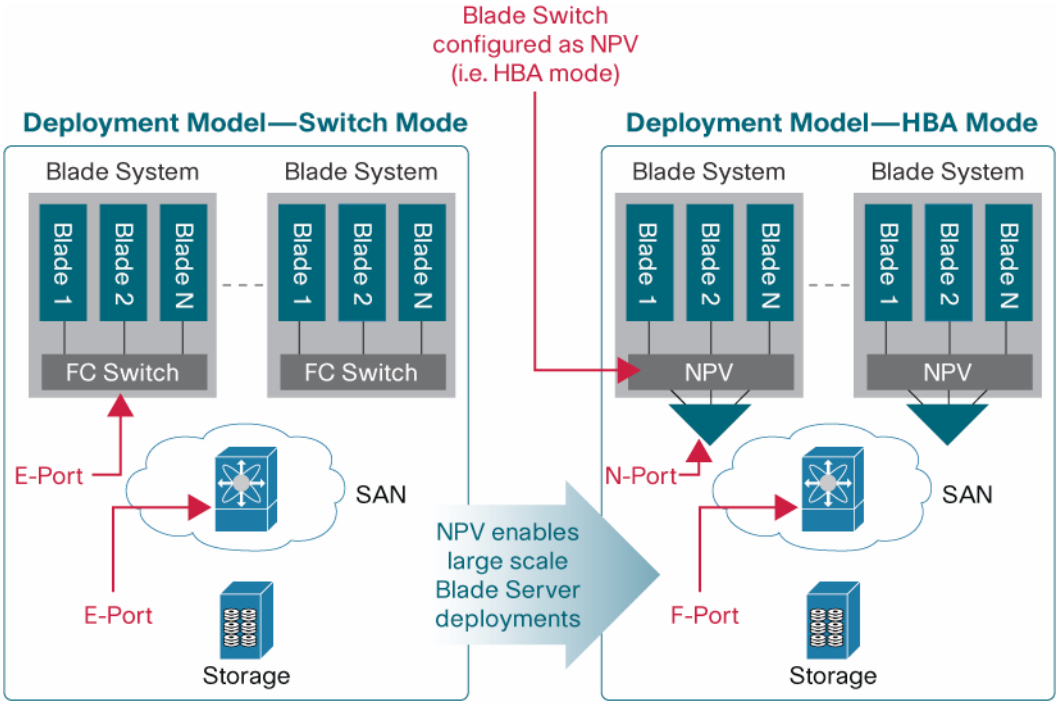
	Blade Switch Attribute	
Fibre Channel Switch Model (E-Port)	Deployment Model	HBA Model (N-Port)
One per Fibre Channel Blade Switch	Number of Domain IDs Used	None (Uses Domain ID of Core Switch)

Cisco blade switches also support NPIV and hence provide flexibility for controlling and monitoring at the virtual machine level, opening new ways to gain the benefits of server virtualization. Cisco blade switches can support the highest levels of virtual machine scalability per port and per blade switch in the industry.

Hence, the Cisco NPV-based blade switch solution addresses the challenge of managing a large number of blade switches and delivering outstanding enterprise-class scalability for large virtual machine deployments.

Flexibility for Agility

Challenge: Coordinate Change Management between SAN and Server Administrators
According to Share Survey, the two of top virtualization priorities for business are greater flexibility and agility in the IT environment and simplified management and administration of resources. As the scale of Fibre Channel SAN blade switch deployments increases, it introduces challenges in providing agility for both virtual and physical resources. For example, the capability for server administrators to move, add, and change servers without involving the SAN administrator provides flexibility and helps simplify management of resources.

Solution: Cisco FlexAttach Provides Flexibility for SAN and Server Administrators

Cisco FlexAttach eliminates the need for SAN and server administrators to coordinate server changes, thereby increasing the availability of servers and the efficiency of operations. It virtualizes the server SAN identity (the physical port worldwide name [WWN]) into virtual port WWNs to increase the agility of the server provisioning.

Figure 4.   FlexAttach provides flexibility for SAN and Server Administrators
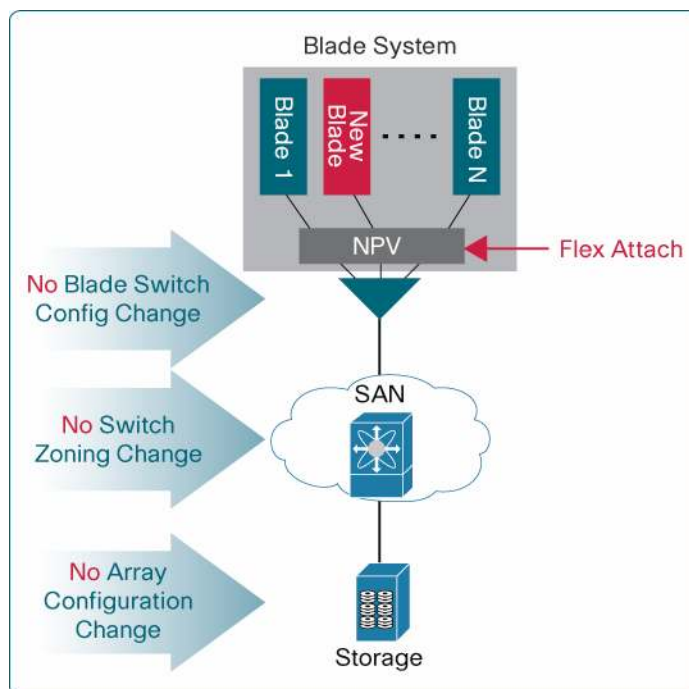
When the physical server is changed, no reconfiguration of SAN switches or storage arrays is required because the virtual identity remains the same and the new physical address is automatically mapped to the virtual address. Servers can even be moved across blade server chassis, with the virtual WWNs moved with the physical server. Thus, server administrators can now add, move, or replace servers without having to coordinate every change with the SAN administrator (Figure 4).

Cisco also offers a simplified management tool called Server Admin tool to help with server replacement and mobility using FlexAttach.

FlexAttach together with the Server Admin tool delivers enterprise-class flexibility to increase the agility of physical and virtual resources.

Any-to-Any Connectivity for Storage Consolidation

Challenge: Achieve Flexibility to Share Resources in Different SANs while Achieving Traffic Isolation

Blade chassis typically is managed by server administrators. Hence, the isolation of blade infrastructure from other SAN segments is important. The capability to divide the SAN into smaller, logical SANs to achieve isolation and management scalability is mandatory in blade switch deployments. However, sharing of existing valuable resources such as backup tape among the SAN islands is also important.

Solution: Cisco Offers Enterprise-Class Any-to-Any Connectivity

Figure 5.   Any-to-Any Connection Using VSAN and IVR
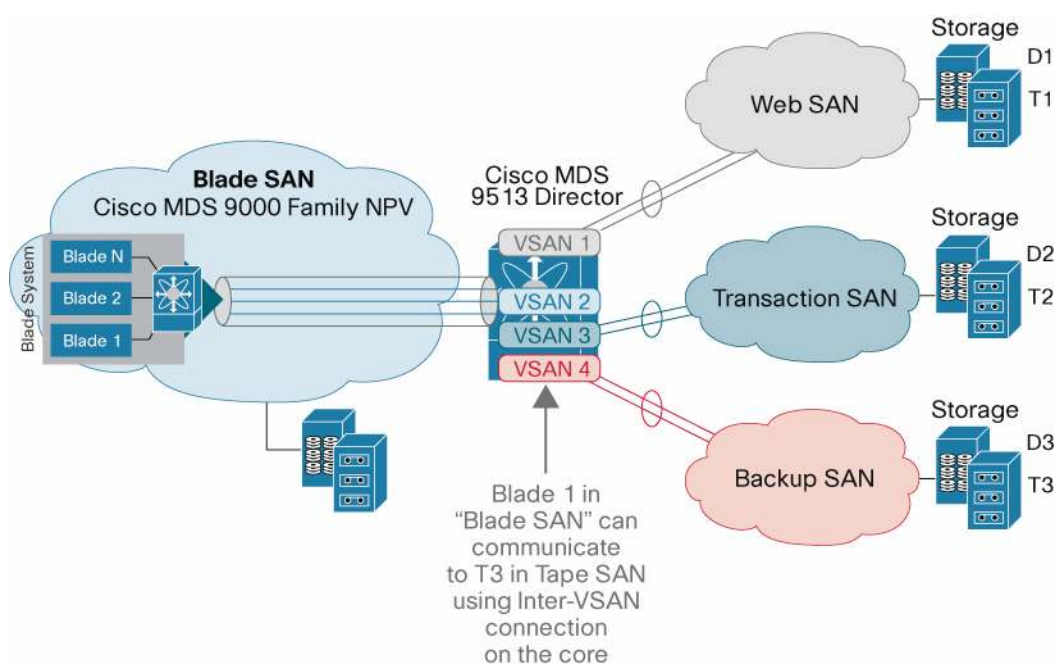
Cisco VSAN, the first and only switch virtualization solution, enables the logical segregation of switches into logical SANs. In addition to traffic isolation, the VSAN enhances switch utilization, enabling creation of more scalable SANs. For example, the blade infrastructure could be deployed in its own logical VSAN to keep it separate from other SANs. The flexibility of VSAN-based quality of service (QoS) enables optimized performance from the SAN. Inter-VSAN Routing (IVR) enhances the flexibility of the Cisco Fibre Channel blade switches by enabling any-to-any connectivity between the shared resources in different VSANs (Figure 5).

With VSAN and IVR, Cisco blade switch solutions deliver enterprise-class any-to-any connectivity.

Availability

### Challenge: Support Mission-Critical Applications for Blade Server Deployments

Availability of network resources such as switches and network links are critical for any type of server deployment. Availability is even more critical in a virtual server farm with a dynamic virtual machine scheduler such as VMware Distributed Resource Scheduler (DRS), where small resource failures can cause churn in virtual machine scheduling that can affect performance and operation.

Solution: Cisco Offers Enterprise-Class Availability Using In Service Software Upgrade, NPV, and F-Port Channeling and Trunking

The Cisco MDS 9000 family Fibre Channel blade switch solution is designed for mission-critical availability. Every Cisco MDS 9000 family switch, including blade switches, supports In Service Software Upgrade (ISSU) to upgrade software with no downtime, and automatic process restarts to provide enterprise-class high availability.

In addition, NPV offers automatic load balancing to minimize disruption due to uplink failures. Servers on the failed link are automatically transferred to available uplinks. NPV also redistributes the server loads when the failed links become available again. NPV also optimizes utilization of the uplinks to the SAN.

Figure 6. F-Port Port Channeling and Trunking to deliver mission-critical availability
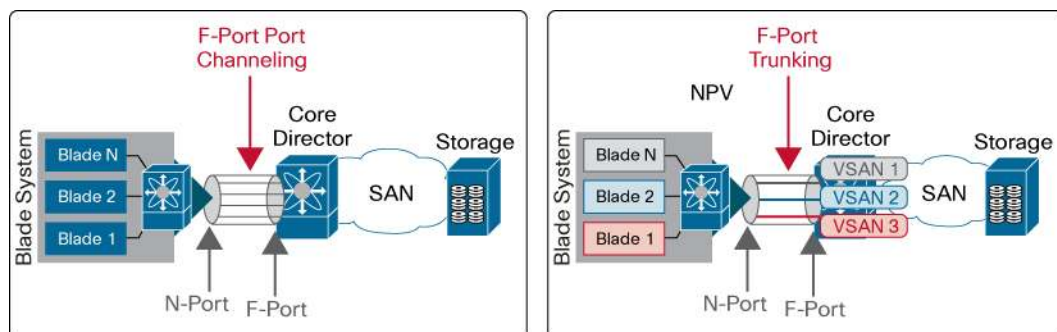
The new F-port PortChannel bundles multiple ports (up to 16 physical ports) into one logical link. This bundle can sustain the failure of any physical links without causing a reset. Hence, the server does not experience disruption if cable, port, or line card fails while using the available uplink bandwidth optimally among servers. In addition, using F-port trunking, uplinks can support multiple VSANs, enhancing availability of the links to the SAN core (Figure 6).

ISSU, NPV, and F-port port channeling and trunking help Cisco bring director-class availability to blade switches.

Interoperability with Existing SANs

Challenge: Achieve Interoperability with Multivendor SANs

Another big challenge in deploying blade servers is interoperability of the blade switches in existing multivendor SANs. Interoperability based on E-port connectivity requires configuration of special interoperability modes and must be managed carefully in an ongoing process on each switch.

Solution: Cisco Offers Enterprise-Class Interoperability Using NPV

Figure 7.   NPV offers Interoperability with Multivendor SANs
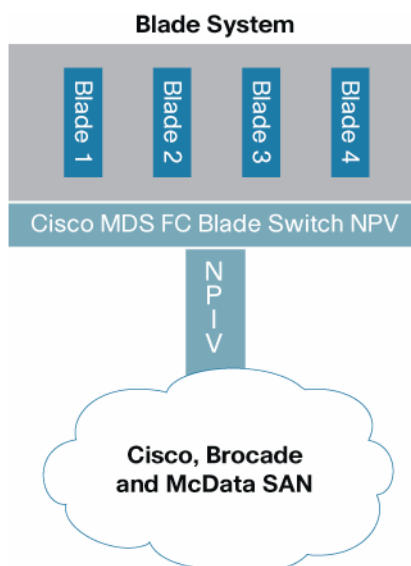
Cisco NPV provides transparent interoperability in a multivendor environment by using NPIV to connect to the SAN core. Thus, interoperability between Fibre Channel NPV blade switches and the SAN core is no different than interoperability today between a server connected to a SAN using N-port to F-port connectivity (Figure 7).

NPV enables multivendor connectivity with the existing SAN core in enterprise-class blade server deployment solutions.

Conclusion

Large scale blade deployments bring scalability, interoperability, any-to-any connectivity, flexibility, and availability challenges. The enterprise-class feature set that is part of the Cisco MDS 9000 family blade switch solutions help meet these challenges. While NPV helps solve the problems associated with scalability and interoperability, VSAN and IVR address the any-to-any connectivity challenges. FlexAttach helps provide server availability and mobility. ISSU and F-port trunking and channeling contribute to director-class availability. Cisco truly delivers an enterprise-class Fibre Channel blade switch solution for large scale blade deployments.

For More Information

- http://www.cisco.com/go/storage
- http://www.cisco.com/go/bladeswitch

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