White Paper

Zoning for Fibre Channel Fabrics

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VIXEL

MAKING THE FIBRE CHANNEL CONNECTION

Introduction

By introducing network connectivity between servers and storage, Fibre Channel is providing an array of powerful new tools for IT managers. No longer bound by parallel SCSI's distance and device limitations, data managers can now creatively deploy servers, storage and tape systems to meet increasingly complex application needs, including e-commerce and Web hosting.

Storage networking behind the server is being forged with proven technology from wide area (WAN) and local area (LAN) networking in front of the server. Although the focus of LAN and WAN topologies differ, some features have universal appeal to customers and have been incorporated by both. SNMP management, for example, is a prerequisite for enterprise-level local and wide area products, including routers, ATM switches, ethernet hubs and ethernet switches.

One very useful feature that has emerged with switching technology in the WAN and LAN is the ability to create *virtual private networks (VPN's)* and *virtual local area networks (VLAN's)*. Virtual private networks and virtual LAN's allow network resources like routers and switches to be shared by a number of workgroups or departments, while insuring that each department's traffic is isolated from the others. Since the logical grouping of users in a VLAN is accomplished by the switch hardware, creating subsets of users does not require the transport overhead associated with IP routing or the cost and complexity of firewalls.

Vixel's 8100 fabric switch leverages VLAN technology for storage area networks via a technique called *Zoning*. Zoning in Fibre Channel environments enables the creation of *virtual private storage networks.*

How Zoning Works

Zoning is typically implemented on a per-port basis, although more complex versions allow Zoning on MAC or network address. In a port-based Zoning scheme, individual ports are assigned to one or more groups. Ports that are members of a group or zone can communicate with each other, but are isolated from ports in other zones. Since a switch may support many devices on a single port (via Arbitrated Loop), it is possible to build large populations of devices within a single zone. In addition, switches can be cascaded together to extend a zone to multiple switched segments.

Benefits of Zoning in Storage Networks

Among the many benefits for storage administrators, Zoning enables:

- Accommodation of heterogeneous platforms on a single switch resource
- Sharing common resources by different functional groups or departments
- Security barriers between applications, operating systems, or work groups
- Reducing total cost of ownership

Heterogeneous Platforms

Zoning facilitates implementation of heterogeneous networks. By defining specific ports as a zone, the devices participating in the zone are unaware of devices on other switch ports. This isolation insures, for example, that an NT server could not inadvertently access a disk array belonging to a Sun Solaris server. This both maximizes switch resources for disparate application platforms, and insures data integrity on each system.

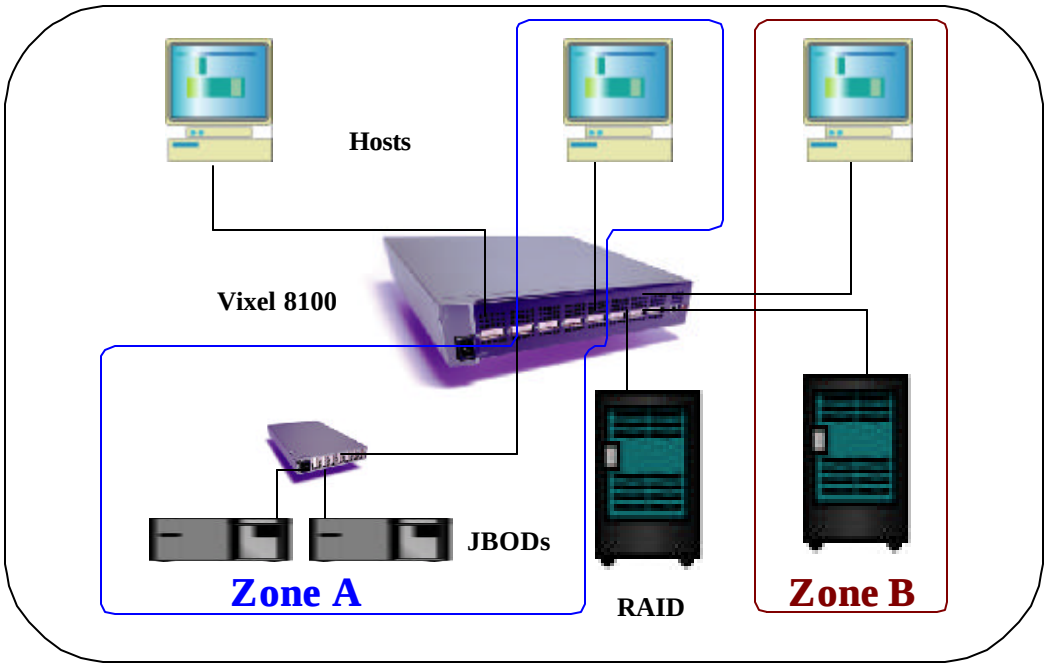

Figure 1. Zone A includes two JBOD's attached to Port 2 and a host attached to Port 5. Zone B includes a RAID attached to Port 7 and a host attached to Port 8. Since any port of the Vixel 8100 can support multiple private Arbitrated Loop devices, large virtual private storage networks can be defined on a single switch.

Resource Sharing

In some configurations, it may be useful to create additional zones specifically to share a common resource. In mixed platform environments, Zoning allows NT and Unix systems to have exclusive access to their respective storage arrays, and share a tape backup subsystem on the same switch. Since both environments have high speed access to a common resource, the storage manager can avoid duplicating both switch and tape backup hardware.

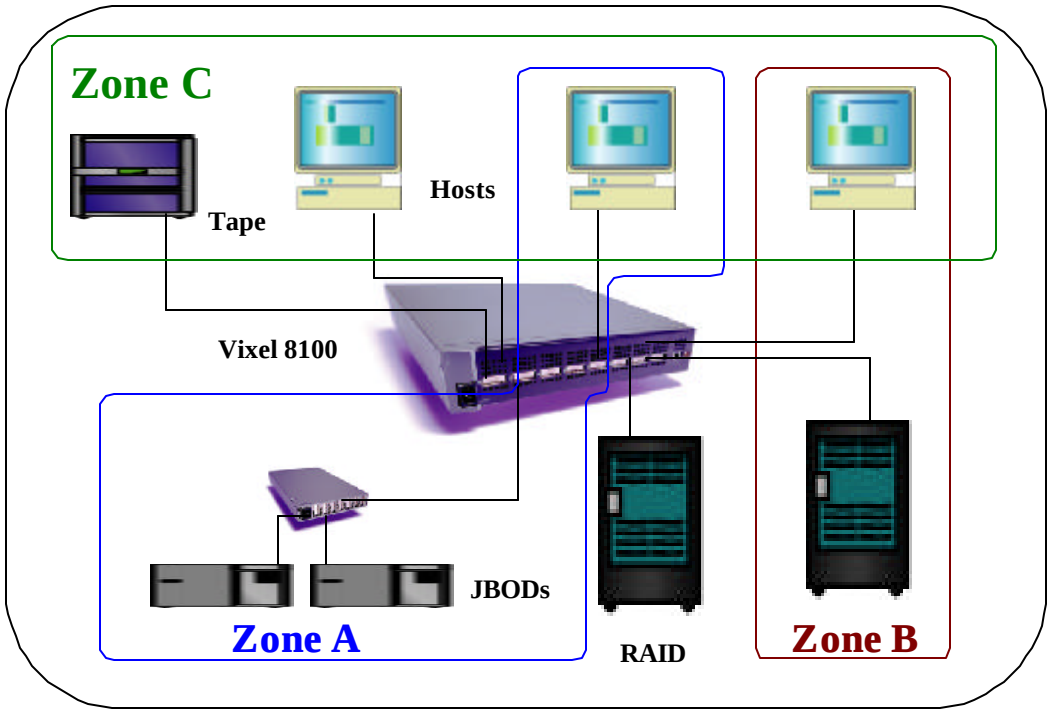

Figure 2. Zone A includes two JBOD's attached to Port 2 and a host attached to Port 5. Zone B includes a RAID attached to Port 7 and a host attached to Port 8. Zone C includes the hosts in Zone A and Zone B, plus a tape backup system. This configuration allows hosts to share a common resource while maintaining exclusive access to their own data storage systems.

Security

Defining a group of devices into a common zone provides an inherent security for different workgroups or applications. It may be desirable, for example, to zone a development workgroup or sensitive application from other users on the fabric. Application testing or proprietary data could thus be secured from disruption or access. Enforcing exclusive access within a zone prevents inadvertent data corruption and fulfills security policies that otherwise would require a more expensive solution.

Reducing Total Cost of Ownership

In addition to heterogeneous configurations and departmental segmentation, Zoning is a useful technique for amortizing the cost of a switch between several workgroups. An engineering department may require switch bandwidth for moving large image files, while human resources may want to transport employee records with embedded photos and scanned documents. Although neither department needs to access common data, both could use a single switch resource to fulfill their application requirements. Zoning reduces the total cost of ownership by allowing multiple departments, workgroups, or intranets to share the fabric investment while each enjoys the benefit of a high performance storage network.

Vixel's Implementation of Zoning

Vixel's switch zoning is implemented in hardware on a port by port basis. Any port may be associated with other switch ports to create a zone, and any port may participate in multiple zones. Zone configuration is accomplished with SNMP management via Vixel's SAN InSite™ graphical interface. By providing an intuitive graphical configuration screen, SAN InSite eliminates the tedium of Telnet or console commands and provides the user with a snapshot of all zones. In the configuration screen for Zoning, explicit permissions are defined for each port. Once a zone is defined, ports within the zone are isolated from other switch ports.

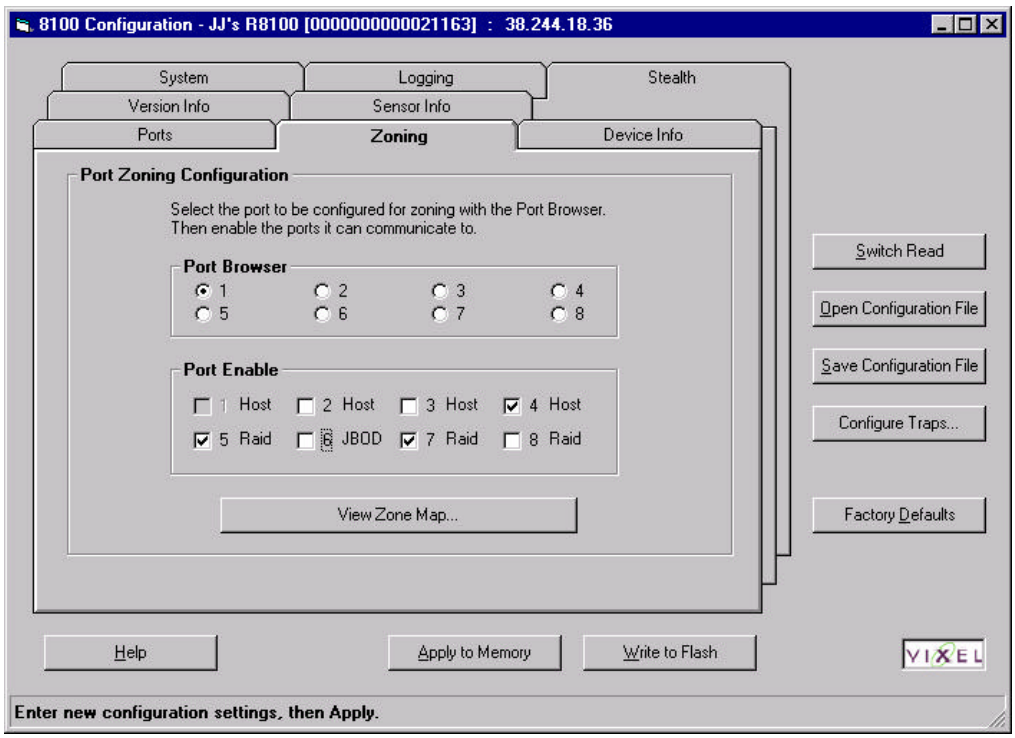

Figure 3. Vixel SAN InSite software provides a graphical interface for defining zones for each port on the 8100 fabric switch. The user selects a port and enables or disables other ports for communication with that port.

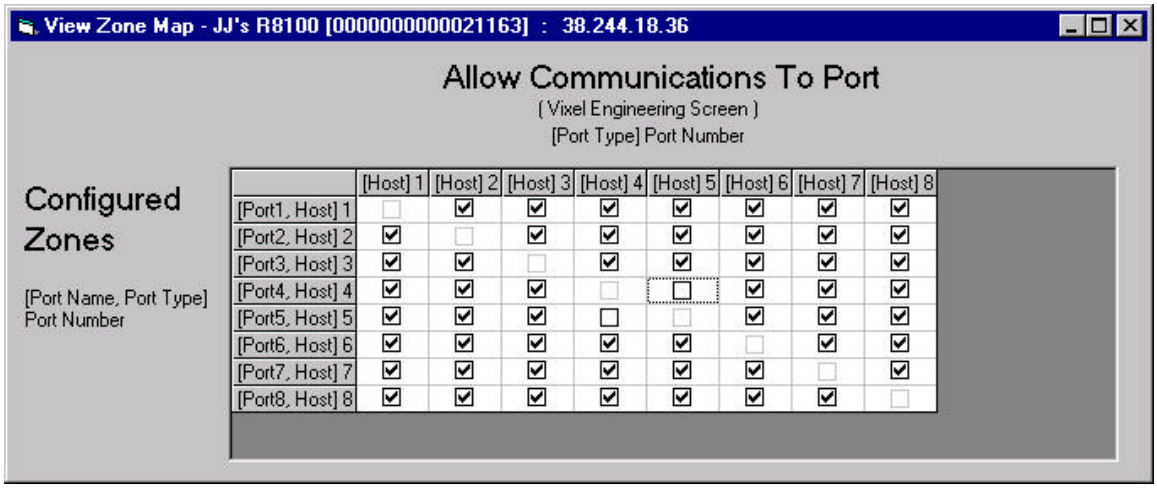

Figure 4. Zones can also be defined via a Zone Map. The grid format allows port associations to be created by simply checking the appropriate boxes for each set of communicating ports.

Because the Vixel 8100 fabric switch is managing zone definitions, port level Zoning does not require software changes or middleware to be run on the end nodes. The end nodes attach as usual, and are unaware that the switch is assigning them to a particular zone. This removes a substantial burden in terms of time and cost from administration.

Hardware-based Zoning is also more secure than other implementations. Since the separation of zones is controlled by the switch's routing engine, a user cannot circumvent a zone by attempting to attach to a resource directly via software or manual configuration.

Vixel's Zoning feature is included as a standard feature of the 8100 fabric switch. It requires no external server, software licensing, administration or additional cost. By incorporating Zoning functionality in every switch, Vixel offers storage managers greater flexibility in allocating fabric resources and maximizes their investment in storage network infrastructure.

Conclusion

Zoning is an efficient means to implement heterogeneous platforms, maximize common resources, implement security policies, and amortize storage network investment. Vixel's implementation of Zoning requires no additional cost or administration overhead, and provides greater flexibility for implementing intricate fabric configurations. Leveraging the proven technology of local and wide area networking, creating virtual private storage networks with the Vixel 8100 fabric switch will give storage managers additional tools for resolving today's pressing storage issues.

About the author:

Tom Clark is Technical Marketing Director for Vixel Corporation and the author of *Designing Storage Area Networks: A Practical Reference for Implementing Fibre Channel SANs*, Addison Wesley Longman.

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