SANnet II Switchless SAN White Paper

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Introduction

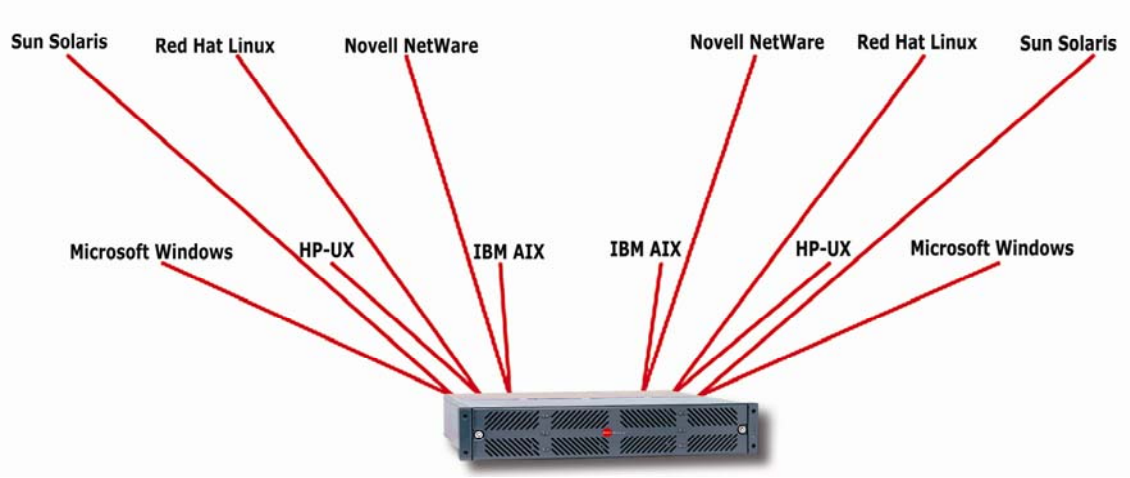
There are two popular methods for connecting storage to servers for block-level access to information – direct attached storage (DAS) and the storage area network (SAN). This white paper will explore an intermediate solution now available from Dot Hill.

The SANnet® II is designed to fill the void between DAS and SAN, using Switchless SAN™ technology within the storage systems to support multiple servers without external switches. Switchless SAN storage solutions are ideal as an entry-level SAN and for storage migration or consolidation, yet can support larger numbers of servers and more sophisticated SAN applications by adding switches.

How a Switchless SAN Works

Switchless SAN technology is used to create Fibre Channel (FC) networks for the server ports within storage systems. Including FC networks inside a storage system creates one or more internal or "embedded" SANs capable of supporting multiple servers without external switches. These internal SANs can operate in a static or dynamic mode depending on the Switchless SAN technology used within a particular storage system.

Storage systems with static Switchless SAN technology generally support a maximum of two server connections without external switches. The two connections can be used to connect single or dual servers with a single connection each, or a single server with dual connections. This flexibility is possible because the static Switchless SAN technology creates internal FC networks that connect each server port to the storage system's controllers.



Connect up to 12 servers without requiring switches

Host-based multipathing software can be added to make dual connections to a server redundant for increased dependability. Multipathing software can also optimize the performance of redundant server connections, but only if the storage system and multipathing software support compatible load balancing. Essentially, the benefits of static Switchless SAN technology are limited to: 1) enabling DAS-like configurations, 2) supporting multipathing software, and 3) facilitating failover for redundant controllers.

The use of dynamic Switchless SAN technology like that used in the SANnet II results in a superior storage system. The most noticeable enhancement is a greater number of server ports versus storage systems using static Switchless SAN technology. For example, the SANnet II with its dynamic Switchless SAN technology includes six server ports per controller to support up to twelve servers without switches. Dot Hill's advanced storage systems include four internal FC networks for server connections, rather than two, doubling the bandwidth available to servers. Storage systems with dynamic Switchless SAN technology provide greatly enhanced connectivity, bandwidth and manageability.

When used with advanced storage networking software, such as Dot Hill's SANpath®, dynamic Switchless SAN technology enables advanced path management far beyond that provided by multipathing software alone resulting in: 1) redundancy and load balancing using more than two server connections (paths), 2) transparent routing of traffic around unreliable or failed paths, 3) detection and restoration of service for recovered or repaired paths, 4) path reconfiguration without server interruption, 5) provisioning or reallocation of storage without server restarts, and 6) secured assignment of storage volumes to servers.

By definition, the internal FC networks of storage systems using static Switchless SAN technology are fixed – and commonly hidden to the storage system and its management software. Dynamic Switchless SAN technology provides the ability to control the internal FC networks of storage systems. This alone makes dynamic Switchless SAN technology more valuable.

Benefits of the Switchless SAN

Fibre Channel is an open-standards technology that provides reliable and fast communication at high speeds. It is most commonly used to connect servers and storage to switches in a SAN. The Switchless SAN uses the same Fibre Channel and storage networking technology and provides similar benefits, such as:

- Reduced costs
- Storage consolidation
- Fast performance
- Maximum efficiency
- Superior dependability

Reduced Costs

Storage systems such as the SANnet II that support a Switchless SAN provide significant total cost of ownership (TCO) advantages over DAS or SAN with switches using the simple yet effective principles of consolidation, integration and centralization. For example, a Switchless SAN enables a single storage system to provide consolidated storage for up to 12 servers rather than requiring 12 individual direct-attached storage systems or a SAN with external switches. Because the FC network is internally integrated into a Switchless SAN, less storage components are required reducing costs even further. Centralizing storage using a Switchless SAN decreases management requirements and costs down to a single storage system. Remarkably, these benefits increase as the number of servers grows and the Switchless SAN expands.

Storage Consolidation

Storage consolidation inherently reduces storage acquisition costs considerably. But consolidating storage with a Switchless SAN not only reduces costs, it simplifies management and future growth. For example, using the SANnet II in a Switchless SAN configuration to provide storage for just two servers can be accomplished for less than the cost of a DAS configuration. Each additional server connected to the Switchless SAN can be provisioned with storage by assigning available storage capacity from existing disks (best case) or new disks (worst case). Using DAS requires adding a new storage system and a significant number of new disks whenever storage is needed for additional servers. While a SAN with switches can provision storage like a Switchless SAN, a Switchless SANnet II of similar capacity costs much less.

Fast Performance

The FC technology in a Switchless SAN is similar to that used for a SAN with switches and more advanced than the SCSI technology widely used for DAS. A Switchless SAN is faster than DAS storage systems, often providing performance equivalent to several DAS storage systems combined and comparable to that of a SAN with switches. Therefore, a Switchless SAN greatly improves performance for every server versus DAS and similar performance for every server versus SAN with switches.

Maximum Efficiency

Another aspect of storage utilization involves the unusable disk capacity required for RAID protection and spare disks. For example, providing a server with approximately 500GB of RAID 5 storage plus a spare disk could require four 250GB SATA disks using DAS. Two servers would require two sets of four disks, or eight disks total. The result is a total capacity of 2,000GB, with only 1,000GB usable – an efficiency of just 50%. A Switchless SAN could use eight 250GB disks as one group of RAID 5 disks with one disk as a spare resulting in the same total capacity of 2,000GB, but a higher usable capacity of 1,500GB – an efficiency of 75%. Usable storage capacity is increased by 500GB, or the equivalent of two disks. The efficiency of a Switchless SAN grows as storage is provisioned to larger numbers of servers.

Superior Dependability

The common measure of dependability for storage systems is Reliability, Availability and Serviceability (RAS). These ratings will differ among storage systems. Detailed information on RAS and other dependability parameters can be found on vendor web sites or in data sheets, user guides and technical documentation. The dependability of a Switchless SAN is better than SAN with switches since there are fewer components and far superior to DAS storage systems due to the natural redundancy of FC technology, options such as multipathing software, and other features enabled by Switchless SAN technology. For example, SANnet II features a comprehensive high availability design with fully automated failover. All major components, including disks, controllers and power supplies, are redundant, hot swap removable and field serviceable. SANnet II features built-in diagnostics, visual status indicators and more for fast and easy customer support.

Conclusion

Technology innovations continue to result in an increasing number of choices among storage systems. Some products are so different their benefits are uncertain or difficult to attain. Others however, offer genuine improvements beneficial to all.

SANnet II storage systems with Switchless SAN technology are an excellent choice to sensibly reduce costs. They use popular and field proven technologies – such as external RAID, direct server connections, Fibre Channel and storage networking – to provide practical storage for multiple servers at costs lower than DAS or SAN with switches.

About Dot Hill

Dot Hill Systems Corp. (NASDAQ:HILL) is a leader in the innovative design and delivery of storage networking solutions to channel partners worldwide. The company has nearly two decades of expertise in designing and implementing storage solutions.

Dot Hill designs open standards-based storage solutions that provide superior dependability. These storage solutions cost-effectively bring enterprise class features and functionality to the workgroup and departmental level as well as to small and medium businesses. Dot Hill has a global network of knowledgeable channel partners to show you how our solutions will add value to your IT infrastructure today.

About SANnet II

The SANnet II family of storage solutions provides industry leading 99.9998+ percent uptime in compact, rack-optimized enclosures. SANnet II brings carrier-grade reliability and enterprise-class features to open systems platforms. The common modular architecture of the SANnet II family provides seamless scalability for future growth within storage networking and direct attached environments.

All SANnet II products feature hot-swappable, field-replaceable components including drives, controllers, power supplies, fans and event monitoring units. This product line meets MIL-STD-810F standards for the U.S. Department of Defense and is certified to the telecommunications industry NEBS Level 3 standard.