Building Open SANs with Multi-Switch Fabrics

FC-SW-2 E_Port Standards Come of Age

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E_Port is the standard that allows switches from multiple vendors to exist in the same fabric

The long awaited switch interoperability standard, now ratified and published by the ANSI T11 Fibre Channel standards committee, allowing Fibre Channel (FC) switches from multiple vendors to co-exist in the same heterogeneous Storage Area Network (SAN), is finally here! The focus of this paper is to examine the state of switch interoperability, what's available today and what's not yet implemented. It provides guidelines on what end users should expect when implementing a SAN with switches from more than one vendor. It also examines some of the reasons why an organization would want to implement a SAN with switches from multiple vendors. QLogic bases this paper on its extensive work and involvement in the evolution and ratification of the interoperability standards, as well as first-hand experience in implementing multi-vendor SANs.

The State of E_Port Today

Fibre Channel switch interoperability is governed by an industry standard, called FC-SW-2. It is defined by the ANSI T11 standards body and is commonly referred to as the E_Port standard. With the ratification of the E_Port standard, it is now viable to create a SAN that uses FC switches from multiple vendors. There has been significant work done by all the vendors independently in several lab environments. Through the collaborative

efforts of many of the switch vendors to resolve the technical issues of deploying multi-switch environments, several companies have worked together to form a heterogeneous multiple vendor SAN demonstrated at several leading industry trade shows recently.

Additionally, the Fibre Channel Industry Association (FCIA) verifies product conformance to the FC-SW-2 standard with its SANmark Certification. This certification is intended to benefit the entire storage networking industry by offering standardized testing criteria that ensures all products comply with the standards and heterogeneous SANs are a reality.

QLogic engineering personnel actively participate in the standards committee aiding development of these standards. The switch vendors then work to support the standard, implementing the rules and signals the switches use to communicate with each other. The lab testing and plug-fests are multi-vendor events that debug and validate these implementations to ensure they are workable in user environments. The result is that from these efforts, there now exists concise documentation that guides the implementation of these SANs. It ensures that what has been achieved does not have to re-discovered debugged and verified every time another interoperability requirement arises. While we are still in the early market stages of E_port deployment, what has been achieved in a relatively short period of time will rapidly move to mainstream SANs in early 2002.

While out of the scope of this paper, QLogic has documented step-by-step instructions on how to build a multi-vendor interoperable FC SAN. It is available by contacting QLogic.

Why multi-vender switches in a SAN?

The multiple switch SAN decision can be based on several factors. The reasons are much the same as other networking technologies that deploy multiple vendor solutions.

First, the customer's SAN solution provider may recommend a switch that is not the same as the current switch in his existing SAN. It may be in the customers best interest to expand his existing SAN with a solution from a vendor like SUN Microsystems who can provide a complete server-to-storage solution. This can provide the customer with a fully supported solution that allows for future expansion and growth. They can now attach the SUN switch into what was once a proprietary SAN and expand and grow in an open SAN architecture.

Secondly, an end user can now consider and evaluate more than one switch to provide the best solution to fit the needs of their business. Whether it's technology, price, performance or support, they will now be able to obtain the most cost-effective, interoperable solution. In the past he may have been forced to choose a single vendor and

unable to obtain the best SAN solution for his requirements. This is good news for the industry as well. With multi-vendor interoperability comes SAN growth.

One of the biggest obstacles to widespread SAN deployment has been the high price of SANs. This was true of all the networking technologies. When there were no interoperability standards, there were no chances for multiple vendors to compete in the same market, prices stayed artificially high and impeded wide spread growth. Take a look at the prices of Ethernet switches over the lifespan of the technology. Interoperability standards created competition that lead to widespread adoption along with considerable price reductions in the technology.

The switch features needed for your SAN may not be provided with a single vendors product. Customers do not like to be told they only have one choice when considering making an investment in the capital equipment that drives their business. They need to be able to evaluate multiple products and weigh the features of each vendor's gear and base their decision on who provides the best overall solution for the customer's unique needs.

Support, though listed last here, is of paramount importance to the customer. When the total cost of ownership of a SAN is considered, the number of vendors involved in the support process can be costly. If solution providers are able to supply an end-to-end SAN solution that includes one call for support this can be extremely attractive to the customer. It means the customer isn't hassled with multiple calls to multiple vendors for problem resolution.

Investment Protection with E_port

When data centers begin to look at consolidating their SAN resources to reduce overall support costs they realize that with all the switch ports in the SAN to support that they might not be able to realize any cost savings on support.   They very quickly determine that they really have to move to a director-class switch with it's high port count, self-directed interconnects and 5 nines of availability to achieve their objectives. Brocade has been a major supplier of 16 port switches to the SAN marketplace and this presents an immediate dilemma to the consolidation planners. Brocade has no director-class switch products. This problem is easily addressed with E_Port interoperability. The customer can purchase a director-class switch to provide the data center switching consolidation effort at the core of the SAN and still utilize the current switches as departmental edge switches in the same fabric. This allows the customer to move to a cost-effective data center SAN and still utilize the legacy 16-port edge switches in departmental SAN connected to the data center for control of backups and management.

Today's Limitations

As with any new standards that involve several 3rd parties, there are limitations. As the standards progress these issues will be resolved.

There are some zoning limitations in an E_Port environment. The most prominent zone limitation is no support of hard zones in the FC-SW-2 standard. (Hard Zones are now being defined in FC-SW-3). Hard zones as defined by QLogic are the most secure zones. Our SANguard hard zoning is hardware-based and prevents any data transfers between hard zones for the ultimate in data security. Hard zones are the most proprietary of the zoning methods. Each switch vendor enforces hard zoning in a different and unique manner. However, the most common method of zoning employed in today's SANs is Name Server Zoning or as it's often referred to as "soft zones". Name Server Zoning is supported across all E_Port connections with all the switch vendors.

Another consideration is that one vendor's management software must be the primary fabric management method. This makes sense because all the zone merging must be maintained and initiated from a single point within the fabric. The good news is that all the switches can be managed from the same management interface.

The last consideration is that the firmware for this is being enhanced on a regular basis to address these limitations and as with all software cycles, it becomes longer and longer between updates.

Summary

The state of multi-switch open SANs today is stable. End users can now evaluate multiple switches from multiple vendors and be assured that they can safely implement them together in a common heterogeneous SAN. The concept of a multi-switch SAN has moved from strictly a lab environment to an end user production environment and will swiftly move to mainstream adoption by early next year. This should propel the adoption of SANs as the obvious solution for many businesses facing storage consolidation and rapid data growth. For more detailed information on implementing multi-vendor SANs with QLogic SANbox switches, contact QLogic at http://www.qlogic.com.