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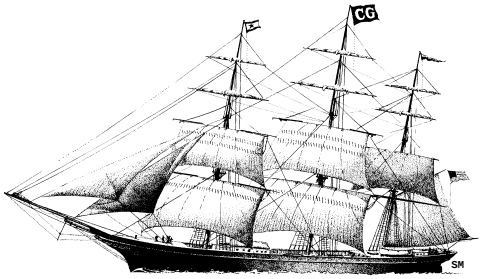

Navigating Information Technology Horizons℠

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The SilkWorm 3900 — Brocade's New Midrange SAN Building Block

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Management Summary

The market for storage area networks (SANs) has grown rapidly for several years and is on track to become the dominant form of storage sold to enterprises, surpassing even traditional direct-attach storage. **SANs are a more cost-effective means for storing and managing information, especially as capacity scales.** Fibre Channel (FC) – the robust, low-latency interconnect that enabled SANs in the first place – continues to dominate SAN deployments. Despite earnest challenges by alternative technologies, it shows no signs of relenting. **The FC SAN is king of the hill.**

If your enterprise wants to ride this FC SAN wave, the next question is how to implement it and what kind of building blocks (i.e., switches) to use. The answer cannot be simple or off-the-cuff because it depends on many factors unique to your situation. **It is like constructing a building, and the best architecture depends on what you are building** (a house, a skyscraper…). Fortunately, there are a range of switches with different port counts, performance and availability characteristics, and price levels. **Choosing the optimal SAN building block requires understanding the storage connectivity, performance, and availability requirements of your enterprise – both today and in the future.** In short, context matters, and there is no one-size-fits-all.

In its continuing effort to offer a range of FC switch products, Brocade recently filled out its "palette" of SAN building blocks with the new *SilkWorm 3900* that offers:

- 32 auto-sensing 1 or 2 Gbps Fibre Channel ports,
- Hardware-enforced zoning and advanced fabric security,
- ISL trunks up to 8 Gbps,
- End-to-end performance monitoring,
- Health monitoring, and
- Centralized SAN management.

Brocade now covers the spectrum with 8-, 16-, and 32-port fabric switches as well as the highly-available *SilkWorm 12000* core switch that scales to 128 ports. The new SilkWorm 3900 fits comfortably in the midrange and can be used to build medium-sized SANs. It can also be used as an "edge" switch to fan out to a large number of servers in a core-edge SAN configuration. **Again, whether the SilkWorm 3900 is right for you depends on what your enterprise needs.** Read on for more details.

IN THIS ISSUE

Building a SAN

To construct a building, one must choose a foundation and framework. In certain parts of the country, a cement foundation poured on level soil might support a two-story house, but an 80-story skyscraper requires a foundation that drills down and rests on bedrock. (A lesson learned from the leaning tower of Pisa!) Furthermore, a wood frame would support the house well, but the tall skyscraper would collapse with a wooden infrastructure. It requires the superior strength of steel girders to bear its weight. At the same time, steel girders would be costly overkill for the house. **It comes down to knowing what you want to build, sorting through the issues and tradeoffs, and choosing an architecture with the right functionality and cost.**

The lessons of building construction apply to SANs, as well. **For many enterprises, the SAN is the foundation of the storage infrastructure.** It connects servers to storage, and mission-critical information is accessed by and through it. It is the key to storage consolidation, faster and more consistent backups, higher capacity utilization, and centralized management – all of which help lower costs. **With such a critical role, it is important to choose an appropriate SAN architecture.**

The first step is to define SAN requirements. **These tend to roll downhill, starting with business objectives, then application requirements, then storage and SAN requirements.** *The box on the right* lists specific factors, and it is important to consider them in light of the present and the future. **If your house will eventually be expanded into a skyscraper, put in the right foundation upfront or you will have to tear down and rebuild later.**

Next, choose the architecture, including the building blocks – switches – and the manner in which they are to be deployed. **It is best to have a range of building blocks from which to select, because a one-size-fits-all approach usually results in over-building (if the capacity is larger than needed) or over-amalgamating with a high integration cost (if many smaller units must be assembled to meet the capacity need).** The best size and type of switch (or switches) depend on the unique requirements of your SAN (*see box on the following page for more details*). **Choosing the right building block is like hitting a tennis ball with the sweet spot of the racket. It strikes a fine balance of performance, availability, manageability, scalability, and cost.**

Brocade helps with the process of SAN design by offering a range of Fibre Channel (FC) switches. Their offering was made even more complete with the recent addition

Defining SAN Requirements

Bearing in mind that SAN requirements are largely determined by business and application requirements, this list provides a good starting point:

- **Connectivity** – How many servers and storage devices will be connected, and will they have redundant connections?
- **Availability** – What is the expected percentage uptime (e.g., 99.999%)?
- **Performance** – What are the expected bandwidth (MB/s), throughput (I/Os), and traffic patterns of the network?
- **Geography** – Is the SAN limited to a local data center? Will it connect to a remote backup and/or mirroring facility, or even span multiple, remote locations?
- **Future growth** – How will SAN requirements change in the future? Most likely, the SAN will grow as information grows and as additional servers and storage devices are connected to it. If the SAN initially will be small and tactical, but you foresee it eventually expanding into a much larger entity, it is better to invest in the right architecture upfront.
- **Budget** – How much can you spend? Are you willing to make any functional concessions?

Choosing a SAN Architecture

A SAN architecture includes both the size and type of switch as well as network topology. There are several considerations and tradeoffs:

- **SANs scale by connecting more switches to the fabric via inter-switch links (ISLs), but keep in mind that ISLs affect latency and reduce the number of usable ports** – As more switches are interconnected in a mesh, a greater percentage of ports are needed for inter-switch links (ISLs), reducing the number of usable ports. The ISLs can also become a bottleneck that limits the aggregate bandwidth (MB/s) of the fabric, and greater latency is incurred from more switches in the data path (i.e., more hops). From a management perspective, it is more complex to manage many devices versus few. Barring other considerations, it is better to use large SAN building blocks (i.e., higher port count) – even if it means paying more upfront – to avoid these performance, manageability, and cost issues as the SAN scales. For instance, it would be better to build a SAN wit a target / future port count of 64 to 128 ports with 32-port switches rather than 8- or 16-port ones.
- **Cost per port generally increases as you move up the line** – Entry-level 8-port switches cost the least per port; highly available and scalable core switches are the highest; and midrange switches fall in between.
- **If high availability is critical, use core switches and / or redundant configurations** –Core switches are built with highly-redundant, replaceable components and deliver 99.999% availability (i.e., 5 minutes of downtime per year) in a single unit. Furthermore, connecting each server to two or more different switches, whether core or fabric, also improves availability. For example, two 16-port switches achieve higher availability than one 32-port switch, but with a tradeoff of higher costs from ISLs and redundant server connections.
- **A core-edge topology works well for many large SANs** – This configuration uses large switches as the backbone and smaller fabric switches for fanning out to a large number of servers. This topology minimizes the number of hops and ISLs – maintaining adequate performance – while holding down the average cost per port.

The bottom line is that there is no quick and easy answer to the question of SAN design. There are many factors to wrestle, but it is worth taking the time to make a good decision.

of the *Brocade SilkWorm 3900*.

SilkWorm 3900: Midrange SAN Building Block

The *SilkWorm 3900* is a 32-port FC fabric switch that complements Brocade's 8- and 16-port fabric switches. Brocade's high-end offering is the *SilkWorm 12000*, a core switch with highly redundant, hot-swappable components that scales from 32 to 128 ports within the same chassis. All are forward- and backward-compatible.

Like other current members of the Brocade switch family, the 3900 offers a variety of intelligent features that enhance SAN performance, availability, security, and manageability:

- **Auto-sensing 1 or 2 Gbps ports** – Supports the fastest version of FC at 2 Gbps while still interfacing with previous-generation switches.
- **Hardware-enforced zoning** – Securely restricts access to members of the same user-defined zone. It closes security loopholes like World Wide Name (WWN)

spoofing by enforcing access at the port and World Wide Name (WWN) level.

- **Advanced fabric security** – Complements zoning and enforces fabric access at the management interface, switch, and device levels.
- **ISL trunks up to 8 Gbps** – Combines up to four links into one logical entity for better utilization of bandwidth. It load balances across the links while preserving frame sequence.
- **End-to-end performance monitoring** – Enables more precise and effective SAN management by tracking performance statistics. This can improve utilization of the fabric and ensure consistent quality of service.
- **Health monitoring** – Brocade's Fabric Watch utility continuously monitors the fabric for faults and automatically alerts the administrator.
- **Extended distance connectivity** – Provides Fibre Channel connections as long as 120 km.
- **Centralized SAN management** – Fabric Manager and Web Tools provide full, top-down management of Brocade fabrics.
- Fabric Access API – Allows third-party developers to access and manage Brocade fabrics.

With the new member of the SilkWorm family, Brocade delivers a broad and deep palette of SAN building blocks for a variety of enterprise needs.

With 32 ports, the SilkWorm 3900 is a midrange fabric switch. It can function as the primary building block for medium-sized SANs, such as those with a target / planned port count of 32 to 128 ports (a reasonable multiple of the 32-port base). It can also reside at the edge of a core-edge topology to "fan out" to a large number of servers or storage devices. Per-port pricing is expected to be in the same range as the 16-port *SilkWorm 3800* – about $1,200 list price.

Conclusion

The SilkWorm 3900 is a versatile product that satisfies a spectrum of requirements in the midrange. More importantly, it helps fill out Brocade's "tool box" of FC switches.

If your enterprise wants to deploy a FC SAN, make sure you know your requirements. Perhaps the new SilkWorm 3900 has exactly the right size and set of capabilities to fit the sweet spot of your SAN architecture.

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