

# SSA and Fibre Channel Myths and Realities

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*TABLE OF CONTENTS*

Introduction.....4

Myth #1: SSA is a rapidly growing standard being embraced by the industry .....4

Myth #2: FC-AL is evolving and not ready for production, while Parallel SCSI is  
dead.....4

Myth #3: SSA has better fault-tolerant characteristics.....5

Myth #4: SSA has better performance with “Spatial Reuse” .....5

Myth #5: SSA does not incur overhead with large numbers of nodes like FC-AL .....5

Summary .....6

## *SSA AND FIBRE CHANNEL MYTHS AND REALITIES*

### **Introduction**

This paper reviews some myths about IBM® Serial Storage Architecture (SSA), Fibre Channel (FC) and traditional Small Computer System Interface (SCSI) technologies. Some will argue that parallel SCSI is at or near the end of its life cycle while SSA is a newly established architecture with Fibre Channel still evolving. SSA and Fibre Channel, including Fibre Channel-Arbitrated Loop (FC-AL), share many common characteristics:

- Both are serial architectures sending a stream of bits over a communication path
- Both use fiber optics to digitally transmit high-speed serial bit streams
- Both support more devices over longer distances than parallel SCSI
- Both are open standards although SSA is perceived as an IBM proprietary protocol
- Both provide improved bandwidth compared to traditional parallel SCSI with FC being faster

The following are some myths and realities involving SSA, Fibre Channel and parallel SCSI. Similar to parallel SCSI, which evolved from SCSI-1 to SCSI-2 and now SCSI-3, Fibre Channel is deliverable today while still evolving. SSA has also evolved into a stable product with limited support from the industry.

***Myth #1: SSA is a rapidly growing standard being embraced by the industry***

**Fact:** Several vendors have voiced support for SSA; however, very few have delivered products or solutions. Connor® withdrew support for SSA after being acquired by Seagate® (which is firmly committed to FC-AL). There are further signals that IBM may be or will be abandoning SSA and migrating to a new extension called Fibre Channel-Enhanced Loop (FC-EL) that will provide all or most of SSA functionality over Fibre Channel. For customers considering SSA, this raises an issue of investment protection. The Fibre Channel Loop Community (FCLC) is rapidly growing with many products currently shipping including adapters, drives, cabinetry and components.

***Myth #2: FC-AL is evolving and not ready for production, while Parallel SCSI is dead***

**Fact:** Parallel SCSI may be well along its life cycle with many mature products. However, new developments such as Ultra SCSI, with a higher bandwidth, backward compatibility and lower costs, leave plenty of life and investment protection for Parallel SCSI. FC is similar to Parallel SCSI as there is base specification along with extensions including FC-AL and soon FC-EL. Several vendors (Seagate®, Quantum®, Symbios Logic®, Emulex®, HP®, Sun® and others) are shipping FC-based products including disks, adapters and RAID arrays which further demonstrate that FC is ready for production. Additionally, MTI is a member of the Fibre Channel Loop Community (FCLC) and is developing FC-compatible products.

**Myth #3:**      *SSA has better fault-tolerant characteristics*

**Fact:** If two SSA drives fail, an “island” of drives can develop causing loss of data access. Removing an SSA drive can disrupt drives beyond drive removal point and forces host adapters to re-learn the network and re-address pending or in-progress I/O operations. When a device is added or removed from an SSA loop, the hop counts (address) must be adjusted. This causes a delay in I/O operations while the controllers (host adapters) determine what devices are still in the network. Outstanding commands may have to be aborted and re-initialized. Special canisters need to be installed when disk drives are removed and not immediately replaced. These canisters maintain signal integrity of the SSA loop and act as a Bypass Circuit (BPC) for the device or canister. Similar to a disk drive, if one of the canisters is removed, the SSA loop must be reconfigured by the host adapters to re-learn what devices are still attached. The function of the canister is to maintain the loop when a device has been removed or is missing.

**Myth #4:**      *SSA has better performance with “Spatial Reuse”*

**Fact:** SSA proponents promote “Spatial Reuse” as a performance boost over FC and Parallel SCSI. “Spatial Reuse” describes the ability to utilize un-used network bandwidth and support concurrent conversations. SSA allows more than one conversation to take place at the same time over un-used links. In theory, this means more data can be moved if multiple CPUs exist and the network is properly balanced. However, no single data transfer such as a read or write can exceed 20MB per second which is the speed of Parallel SCSI and less than Ultra SCSI (40MB per second). Thus, a read or write to a single SSA device will have the same performance as a Parallel SCSI device, with SSA having the potential to have better performance with multiple devices.

Consider a single host initiator (CPU) and a four target (four disk) dual-ported loop. Each SSA target (CPU or disk) performs two full-duplex (Send/Receive) conversations at the same time. Assume the CPU is performing two disk-to-disk backups (Disk-1 to Disk-2 and Disk-3 to Disk-4). “Spatial Reuse” would result in 80MB per second throughput since the CPU is reading from DISK-1 and DISK-3 over separate links while writing to DISK-2 and DISK-4 also on separate links. By comparison, a full-duplex dual-loop FC-AL configuration would support fewer conversations at a higher per link speed of 100MB per second (200MB per second for the entire loop).

**Myth #5:**      *SSA does not incur overhead with large numbers of nodes like FC-AL*

**Fact:** SSA proponents argue that, on a uni-directional link around a Fibre Channel-Arbitrated Loop, latency (response time) will increase as more nodes are added. This latency, called “wormholing”, occurs when frames are looked at and passed on to the next device. Both SSA and FC perform “wormholing” with actually more time being required with SSA due to overhead so FC will actually be slightly faster.

## **Summary**

Much of the competitive positioning IBM is using against FC is several years old based on prototype products and is not relevant to products shipping today. For customers requiring multi-platform and multi-vendor support, a quick look at SSA should result in either a Parallel SCSI, Ultra SCSI, or Fiber Channel decision. Customers who plan to implement an exclusive IBM shop may find IBM SSA attractive, however, beware of IBM shifting from SSA to FC-EL.

## **Some other interesting SSA things you should know and think about:**

- IBM's top-down strategy is to migrate to Fibre Channel replacing SSA with FC-EL that will include "Spatial Reuse" and many other SSA characteristics.
- With an IBM shift from SSA to FC-EL, how does this protect your SSA investment?
- IBM has been talking about SSA RAID for some time, however, no SSA RAID products exist yet.
- SSA supports Parallel SCSI devices using bridges with NO "Spatial Reuse" capability.
- Only two sources for SSA drives exist: IBM and Xyrantex™ (Ex-IBM plant).
- Not all platforms support SSA or Fibre Channel making Ultra SCSI an attractive alternative.
- Every SSA slot in an SSA loop must contain a device or a canister to maintain the loop and prevent I/Os from being suspended while reconfiguration takes place.

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gschulz@ccmgate.mti.com

## **Additional Information**

The SCSI Trade Association has a wide variety of documents and information on SCSI Parallel Interface Technology, including presentations, articles in periodicals, seminar material and white papers. Please contact Association offices at:

### **The SCSI Trade Association**

404 Balboa Street • San Francisco, CA 94118

Tel: 415-750-8351 • Fax: 415-751-4829

Info@scsita.org • <http://www.scsita.org/>