

The Continuing Evolution of SAN-Based Storage Infrastructures

Roger Cox

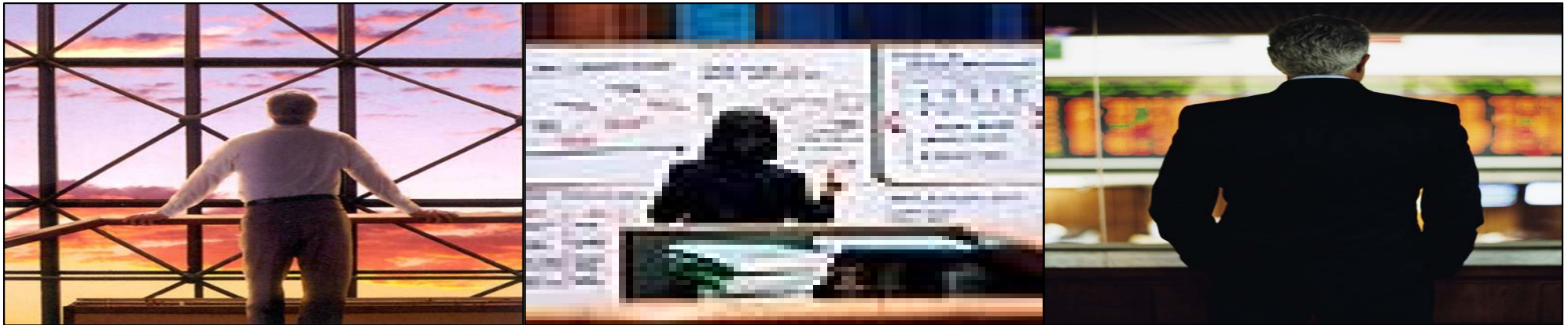


Midsize Enterprise
Summit. 2007



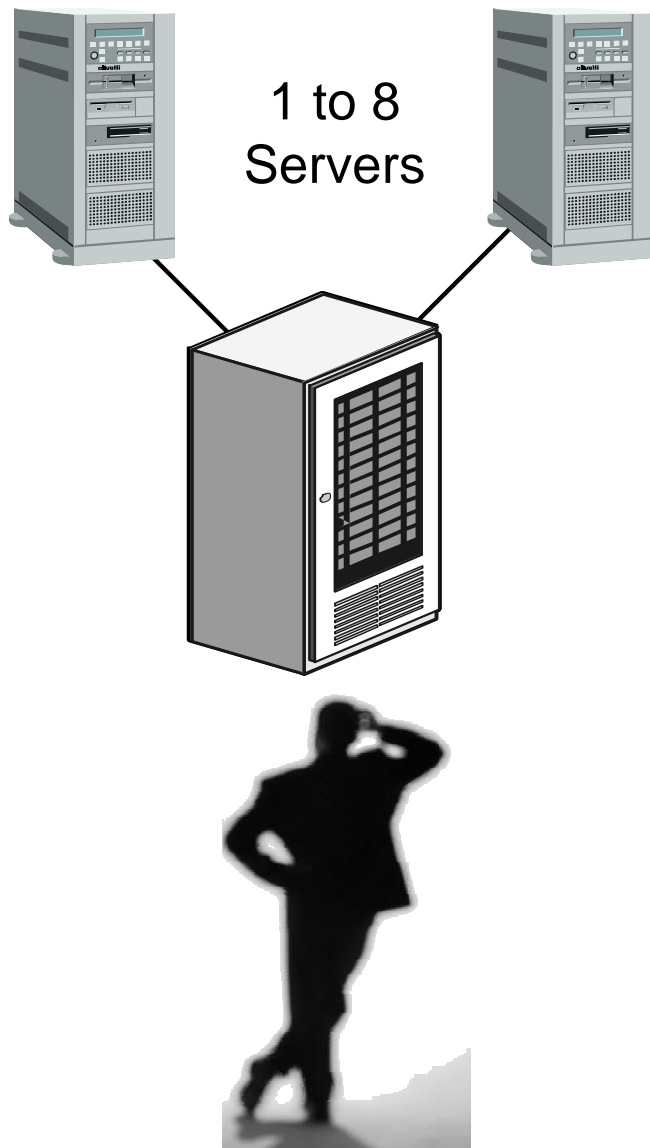
Key Issues

1. When is a SAN-based storage infrastructure the appropriate deployment strategy?
2. How does a midsize organization cost justify a SAN infrastructure?
3. When is an iSCSI-based SAN the right SAN technology?

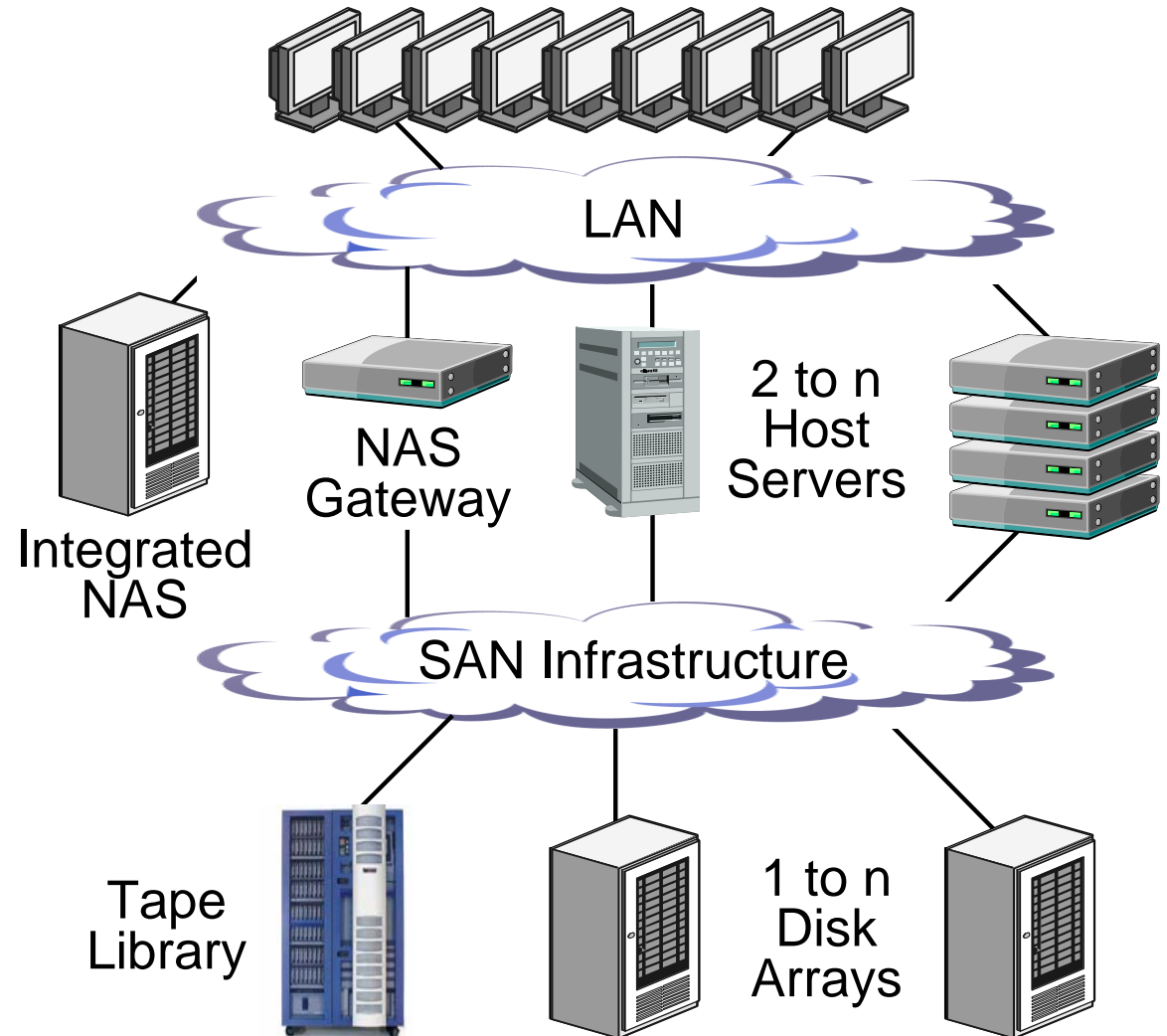


External Controller-Based Disk Storage Paradigm: The Two Models

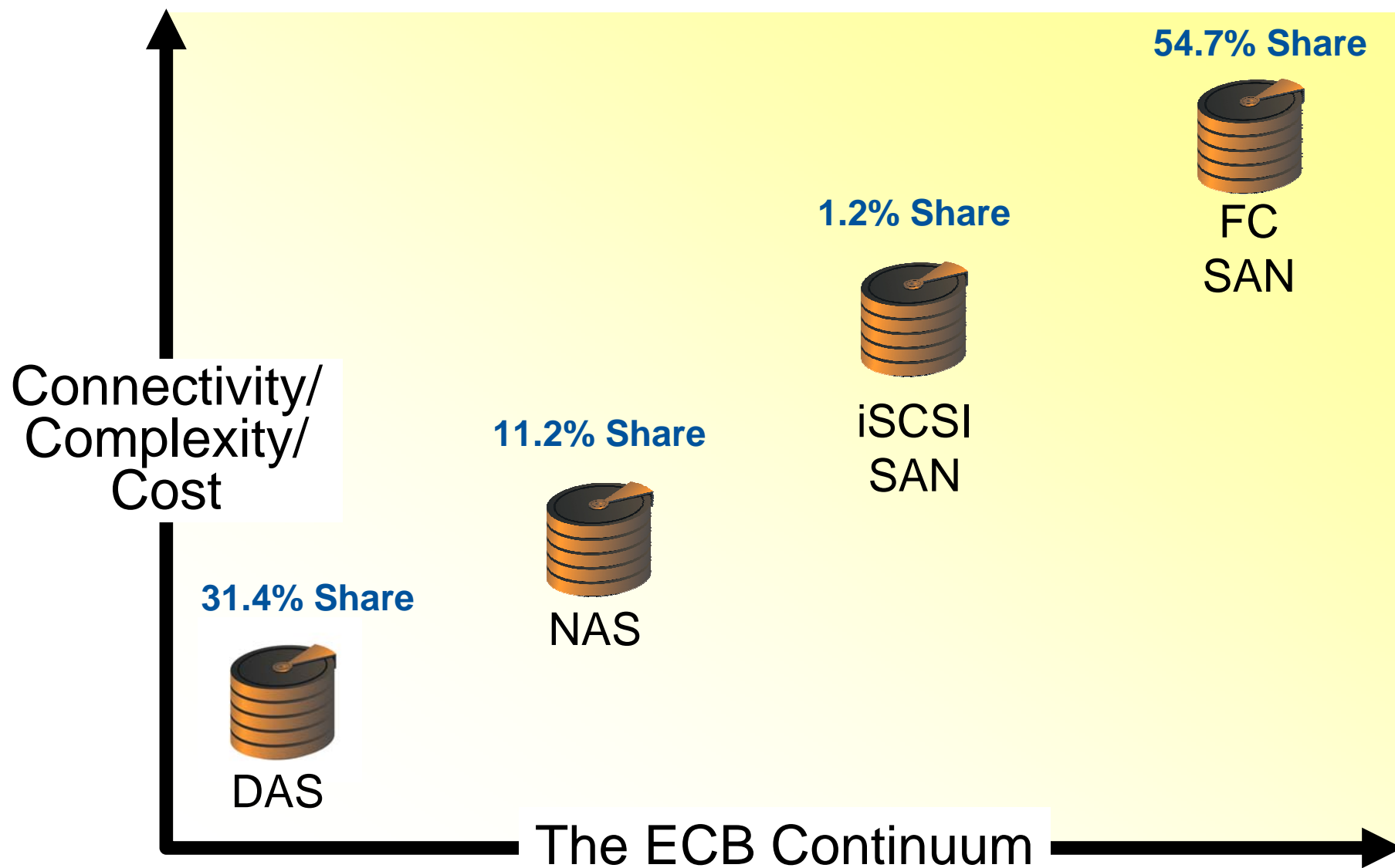
Direct-Attached Model



Fabric-Attached Model



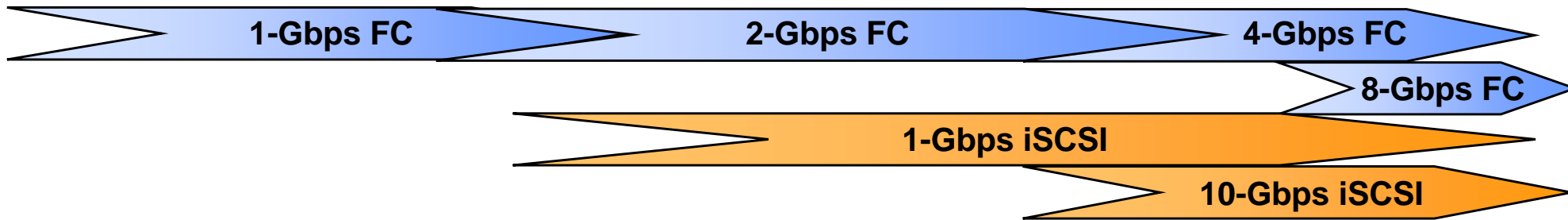
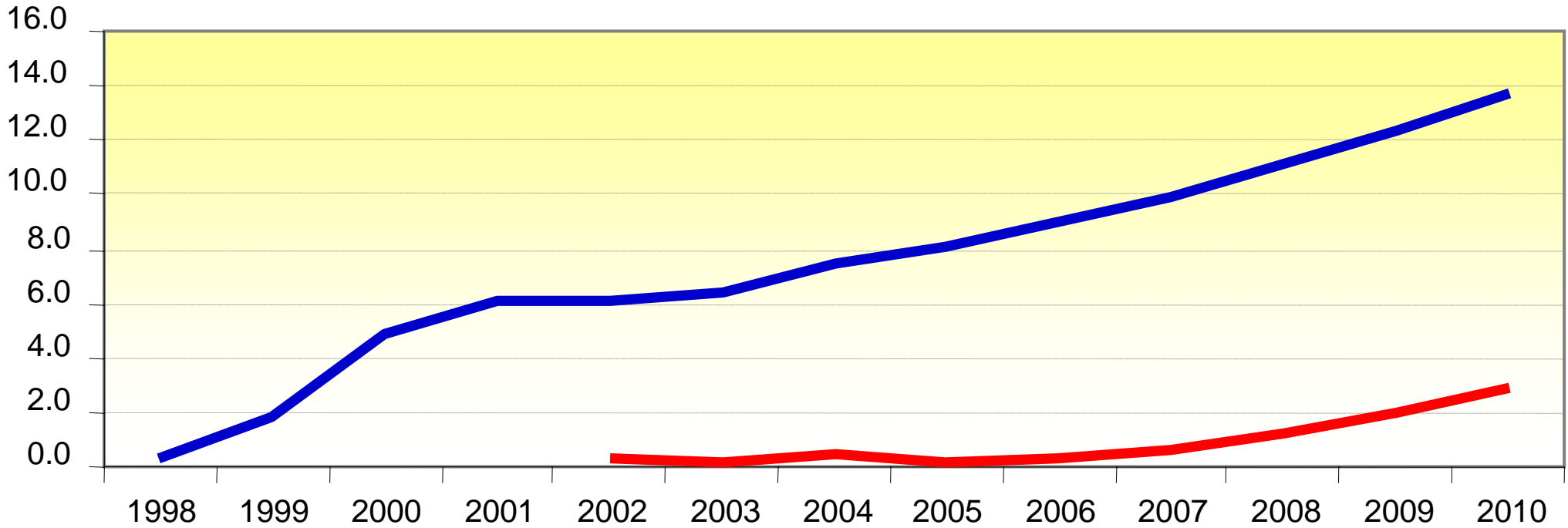
ECB Disk Storage Continuum



SAN Infrastructure Continuum

- SAN-Attached External RAID Controller-Based Disk Storage Vendor Revenue
- iSCSI Attached ECB Disk Storage Vendor Revenue

Annual Vendor Revenue (\$B)



Times to Consider Deploying a SAN



When consolidating distributed servers with host-based internal/external disk storage



SAN-based tape backup

- Offload the LAN
- Share tape backup asset with multiple servers



When the number of servers exceeds the host interface nodes of an ECB disk storage system

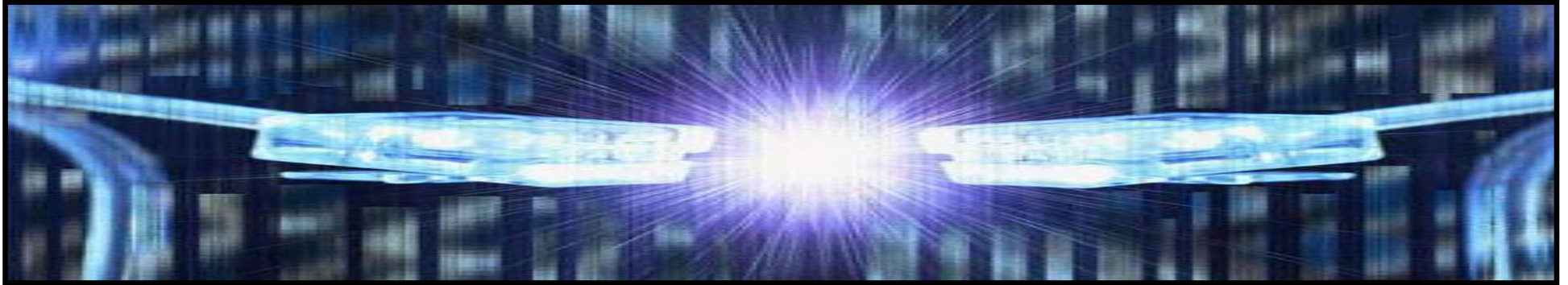


When storage requirements exceed a single, ECB disk storage system's scalable capacity

SAN Infrastructure Technology Overview

Benefits of SAN-Based Storage

- Increased storage asset utilization
- Centralized storage management
- Broader host server connectivity
- Better TCO



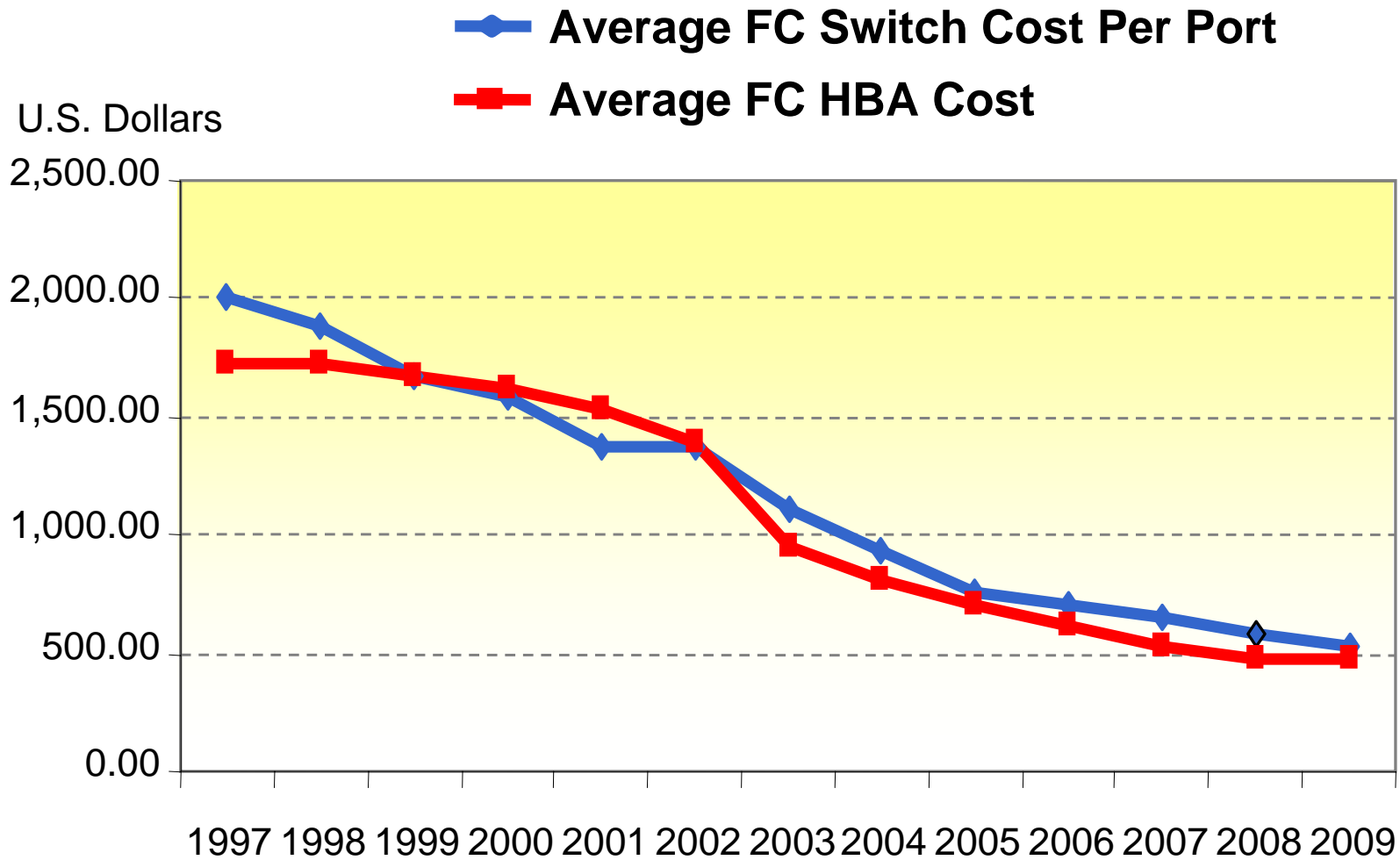
Fiber Channel SAN

- High performance (2 to 4 Gbps)
- Expensive, but declining
- Complex
- Limited interoperability
- Limited skilled personnel

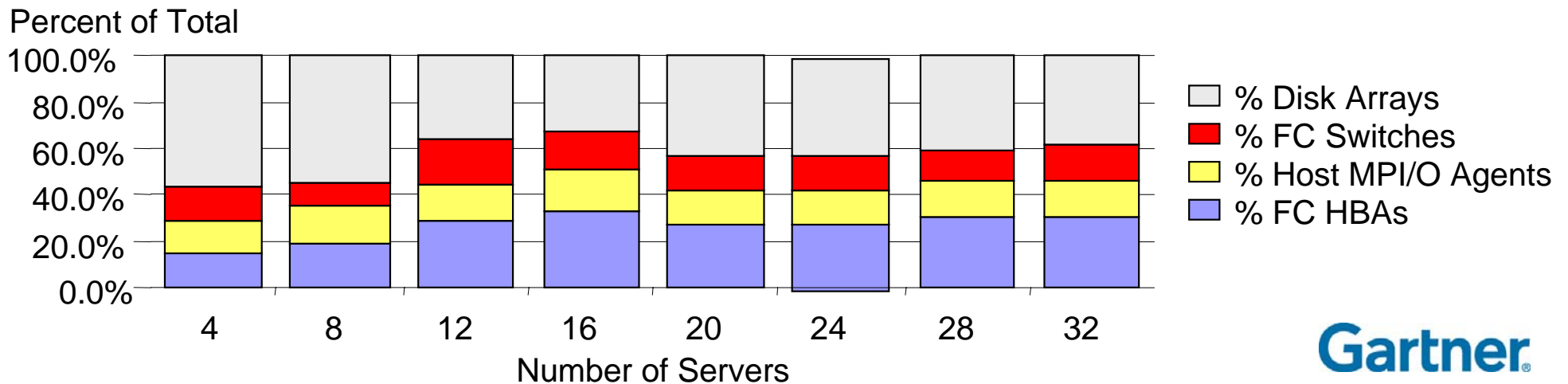
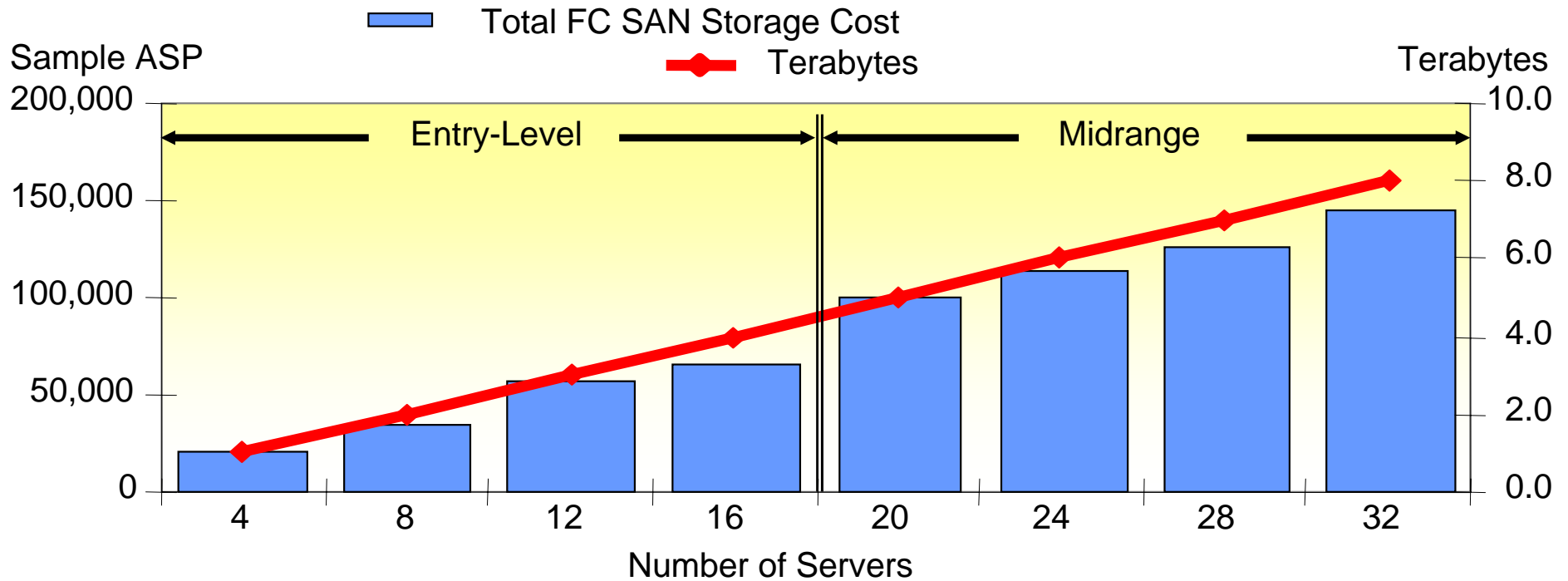
iSCSI SAN

- Familiar network infrastructure
- Broad technology knowledge
- Lower host and infrastructure cost
- Addresses interoperability
- Drove Fibre Channel cost down

FC Component End-User Cost Analysis



High-Availability FC SAN Infrastructure Costs for the SMB



Best Practice Recommendations

- ✓ Configure host servers with two FC HBAs for failover and load balancing.
- ✓ Include host-based failover and load balancing software if required by the disk array.
- ✓ Include two fabric switches for high availability.
- ✓ Disk array should be configured with two active/active or active/passive RAID controllers for high availability.
- ✓ Standardize on switch firmware, HBAs and HBA drivers by operating system.

iSCSI Observations



Particularly
Applicable to
Windows & Linux
Environments



Security
Represents a
Risk



Management
Software & Scale
Are Issues



Cost Savings
Come From the
Infrastructure



iSCSI Savings Are Real

Total Acquisition Cost (TAC)

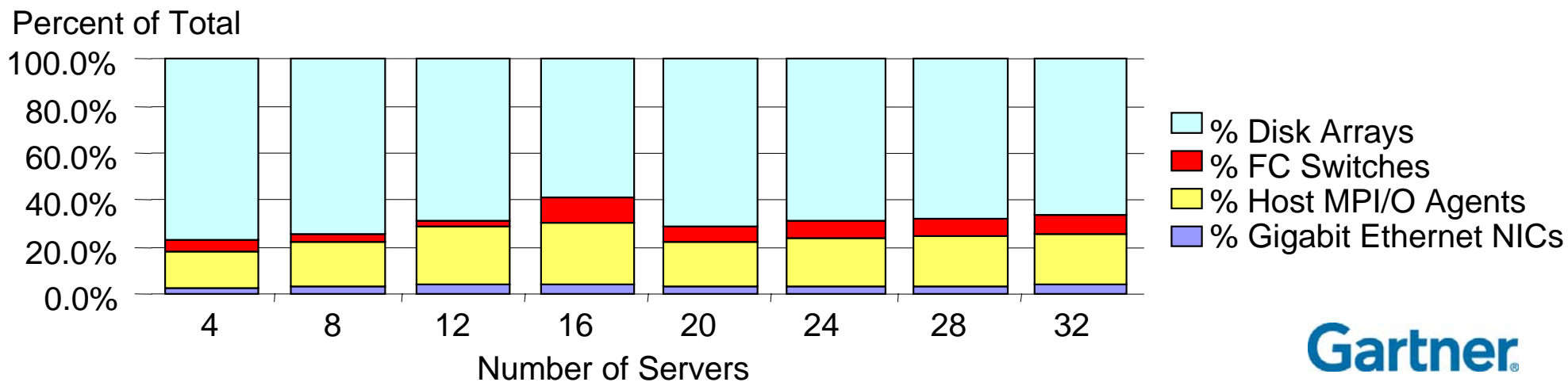
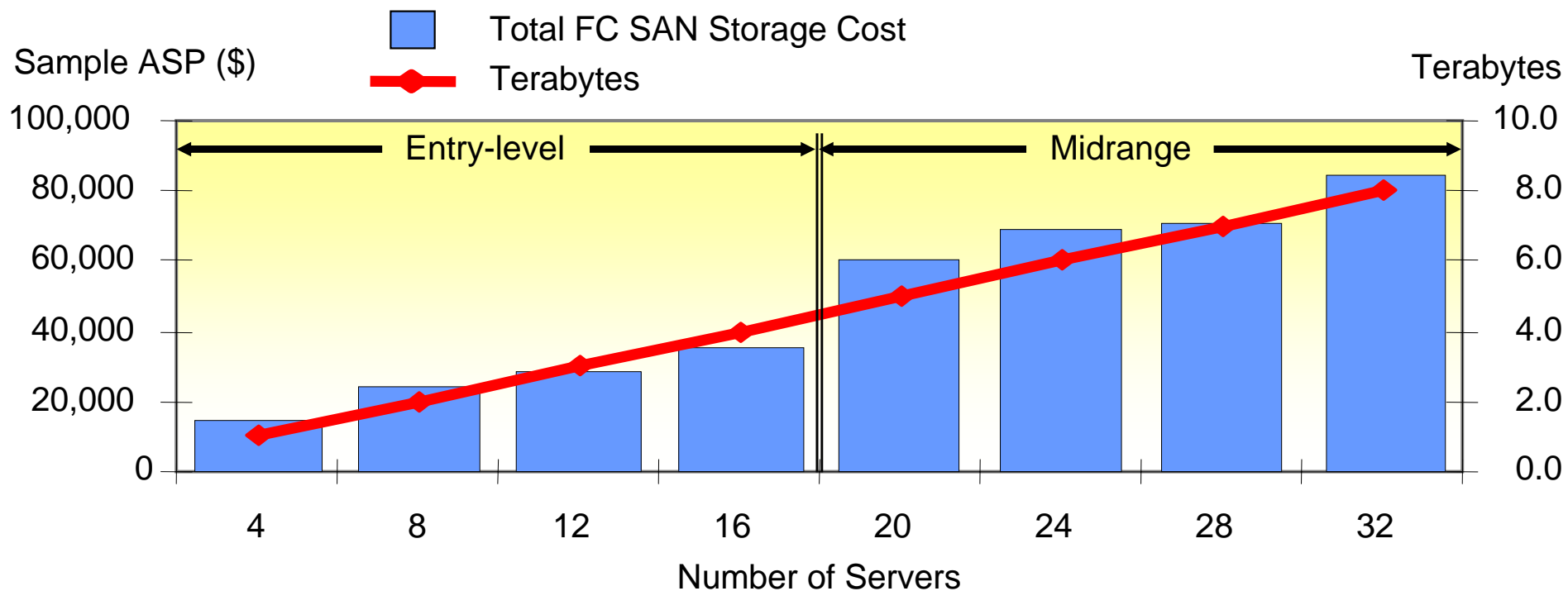
- iSCSI TAC advantage magnifies as number of servers and SAN infrastructure increases.
- Don't forget to include warranty uplift and after-warranty maintenance.
- Make "apples to apples" comparisons.



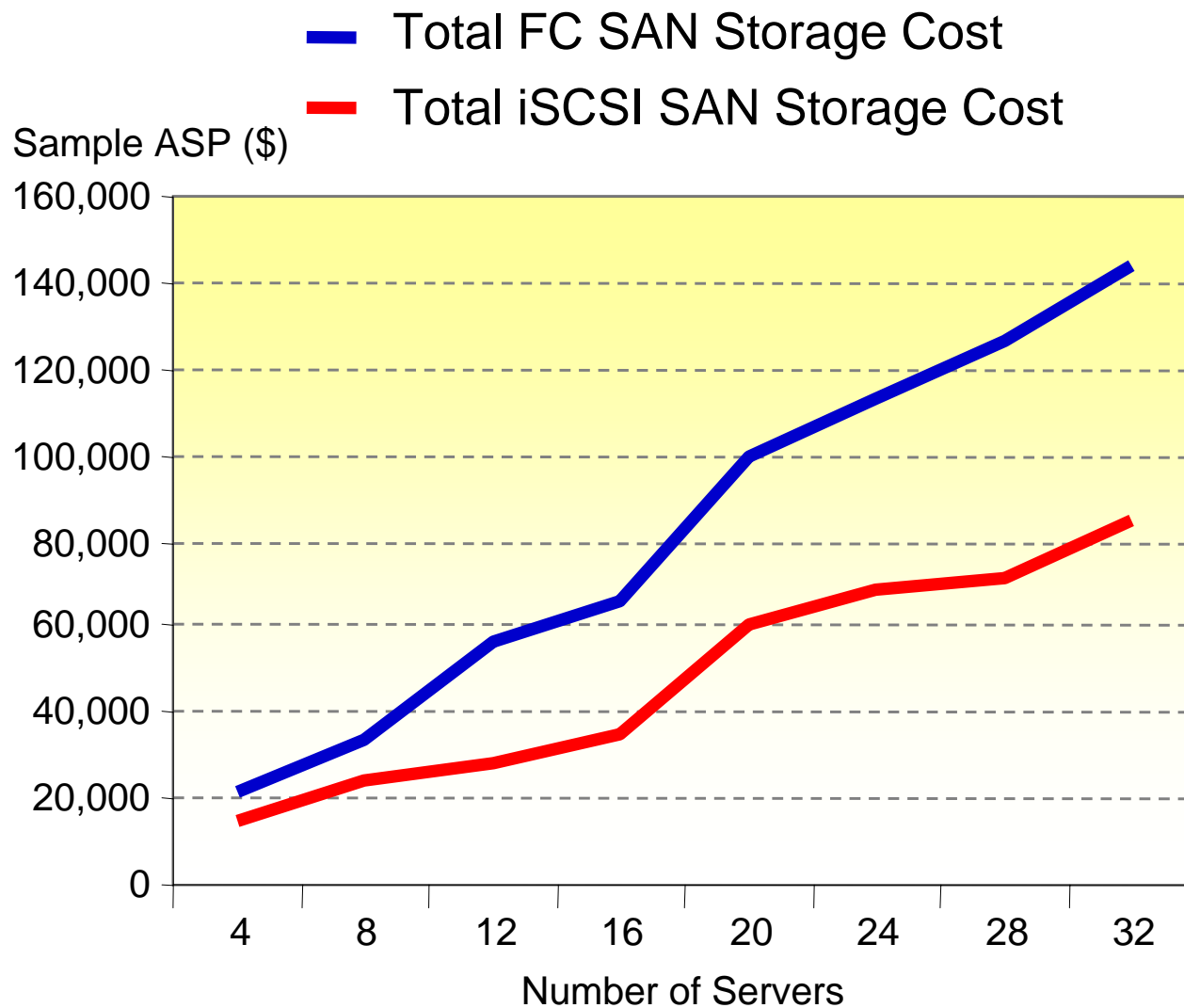
Total Management Cost (TMC)

- iSCSI-based SAN infrastructures do not reduce TMC.

High-Availability iSCSI SAN Infrastructure Costs Analysis



High-Availability FC/iSCSI SAN Infrastructure Cost Comparison

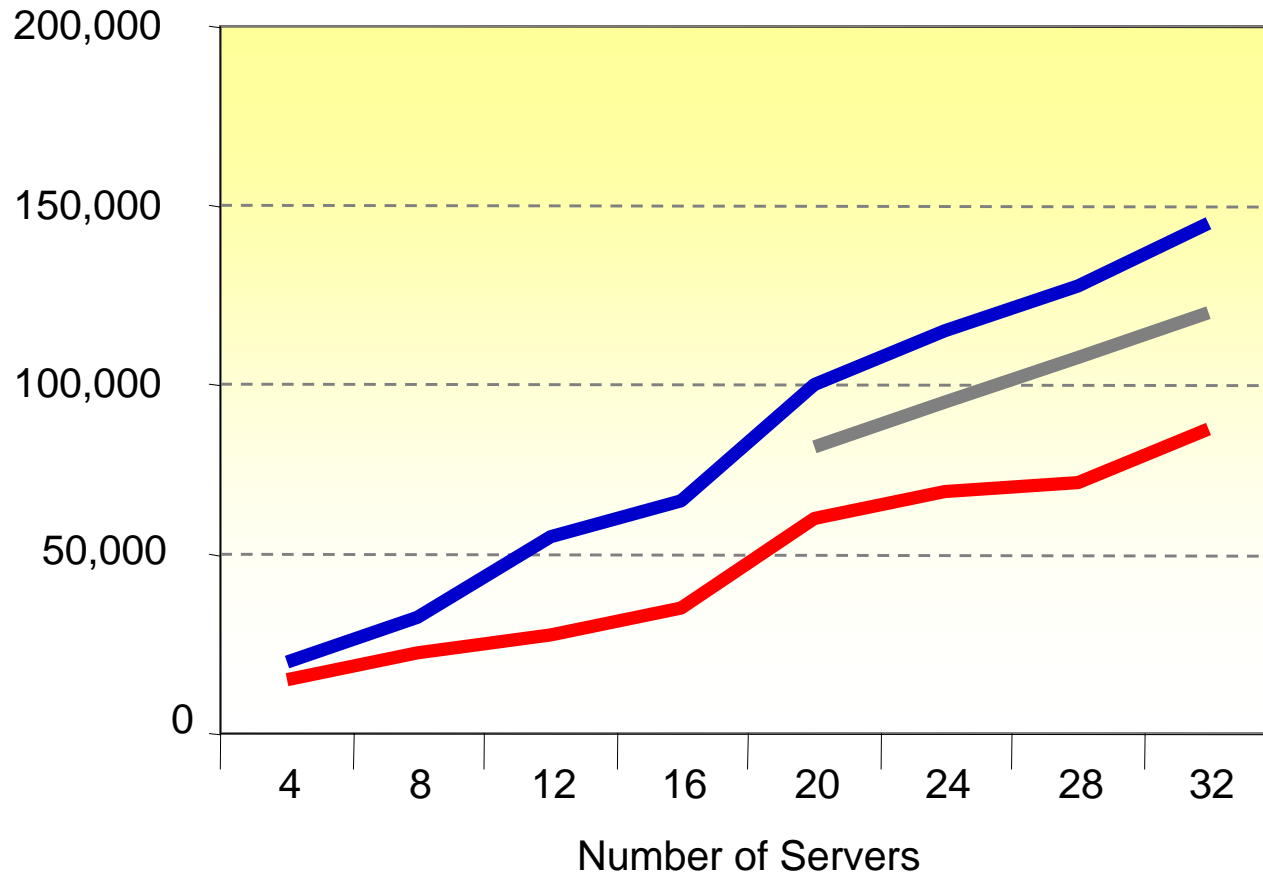


No. of Servers	iSCSI Variance
4	30.8%
8	29.4%
12	50.0%
16	46.4%
20	39.7%
24	39.3%
28	44.0%
32	41.2%

High-Availability FC/iSCSI SAN Infrastructure Cost Comparison

- Total FC SAN Storage Cost
- Total iSCSI SAN Storage Cost w/ TOES (TCP Offload Engines)
- Total iSCSI SAN Storage Cost

Sample ASP (\$)



No. of Servers	iSCSI Variance	iSCSI/TOEs Varaince
4	30.8%	
8	29.4%	
12	50.0%	
16	46.4%	
20	39.7%	19.0%
24	39.3%	17.4%
28	44.0%	16.7%
32	41.2%	18.2%

iSCSI and Security

Exposure: Unauthorized access to data

- Windows-based iSCSI targets

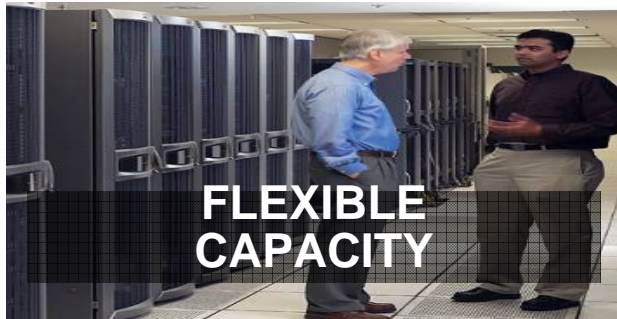


Protection Alternatives

- Host Servers
 - Authentication features enabled
- Element Managers
 - Administrative passwords
- Dedicated Ethernet network
- Shared LAN
 - VPN and encryption

iSCSI and Storage Management Software

- The basics are good enough for small networks
 - Element managers for iSCSI disk arrays
 - Fabric management for the network
- More is needed to support larger iSCSI networks
 - SAN management
 - SRM/provisioning
 - End-to-end root-cause and performance analysis



Microsoft Storage Software Technologies

- Windows Storage Server 2003 (R2)
 - Single-Instance Storage
 - Full Index Text Search
 - Improved NFS Performance
 - **iSCSI Target**
- iSCSI Host Support Leadership — iSCSI Initiator; iSCSI Remote Boot
- Windows Storage Server "Longhorn"
 - Storage Explorer: SAN Visualization
 - Server Backup: Data Protection Application
 - SMB 2.0: File Sharing Solution to Reduce Chattiness
 - Transaction Frameworks: Data Consistency

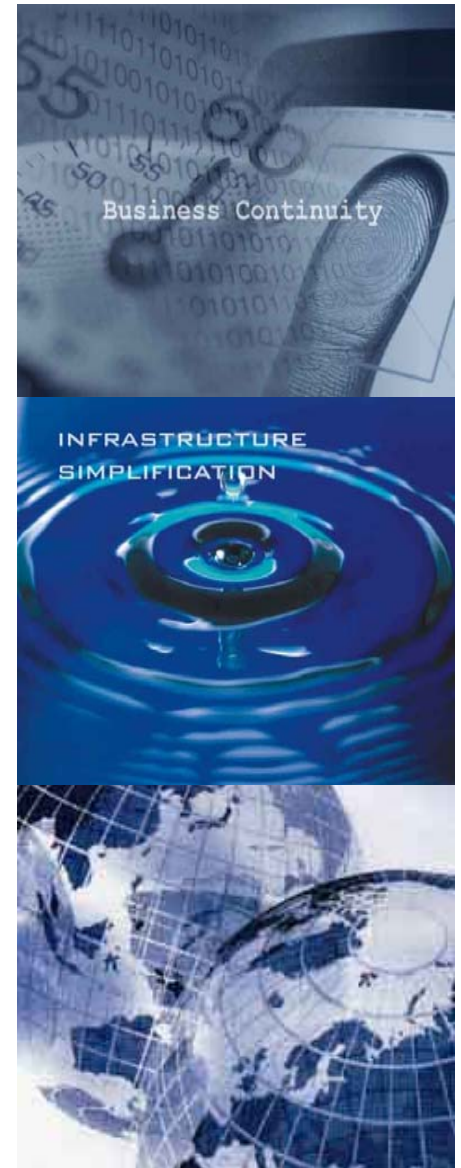


Best-Practice Recommendations

- ✓ Configure host servers with two Gigabit Ethernet NICs for failover and load balancing.
- ✓ Include host-based failover and load balancing software if required by the disk array.
- ✓ Include two managed Gigabit Ethernet switches for high availability.
- ✓ Disk array should be configured with two active/active or active/passive RAID controllers for high availability.
- ✓ Configure host servers with two Gigabit Ethernet HBAs with TOES for performance and server scalability.

Closing Thoughts

- ✓ Do not sacrifice high availability when implementing a SAN-based storage infrastructure.
- ✓ Buy an integrated and tested solution from an experienced source.
- ✓ Implement an iSCSI-based SAN on a dedicated Ethernet infrastructure.
- ✓ In an FC SAN environment, standardize infrastructure components to reduce interoperability issues.
- ✓ Plan SAN infrastructure for change.



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