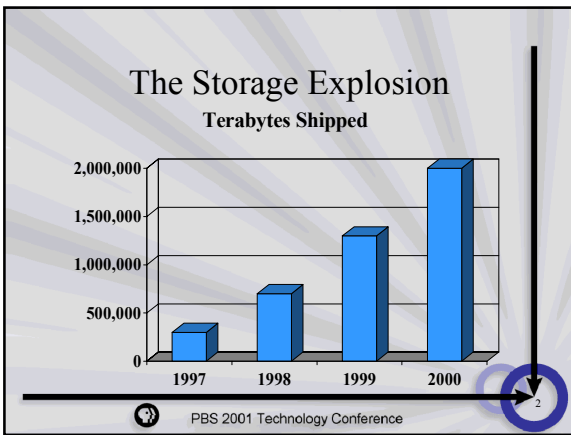


Enterprise Storage Networking

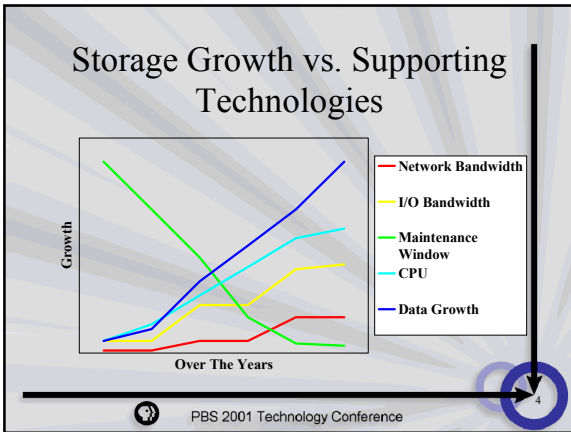
Could a SAN or NAS Solve Your Storage Problems?

Ken Walters, PBS Information Technology

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- ## What is Fueling the Growth?
- The Internet and e-Commerce
 - Data Warehousing
 - Digital Media Assets
 - Paper to Digital Conversion
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- ### Traditional Storage
- Server Attached
 - Held hostage
 - Colocated
 - Decentralized management
 - SCSI Attached
 - Scalability limits
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- ### Challenges
- Where to store it
 - How to protect it
 - How to move it faster
 - How to share it
 - How to manage it
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The Enterprise Storage Network

An ESN Requires

- Storage device
- Dedicated network



Resulting in

- Standard way to manage, protect, and share data

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The Storage Device

- **NAS**
 - A server with attached storage tuned for file sharing and network performance
- **SAN**
 - Large, scalable, highly available disk array
 - Stand alone with heterogeneous connectivity
 - High throughput

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The Dedicated Network

NAS

- Shared IP network
- Dedicated IP network

SAN

- Completely separate Fibre Channel Network dedicated to storage I/O

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What Is A NAS?

- Turnkey file server
- File system based storage
- TCP/IP provides the networking protocol
- Objects transferred are **complete files**
 - http, nfs, Cifs
- Tuned thin OS

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NAS

Three Types

- Entry level
- Workgroup
- Department/Enterprise

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Entry Level NAS

- One or two hard disk drives
- Limited RAID functionality, expandability, and fault tolerance
- Examples: Quantum, Maxstor
- Price: approximately \$2000
- Serves: about 12 users

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Workgroup NAS

- Up to seven hard disk drives typically with RAID 5 protection
- Hot swappable components
- Example: Compaq
- Price approximately: \$50,000
- Supports more users and larger files

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Departmental/Enterprise NAS

- More than seven hard drives - up to 12TB
- Various-levels of RAID and fault tolerance
- Dual Controllers, dual-servers, fail-over
- Examples: Network Appliance, EMC
- Price: \$100,000 and up
- Serves: thousands

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NAS Advantages

- Simple installation & administration
- Ideal for ASP/ISP model
- Perfect for content delivered by Internet or Intranet
- Centralized point of management
- Good for sharing same data by many hosts

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What Is A SAN?

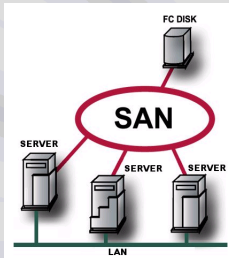
- Dedicated storage network that traffics in serial SCSI I/O
- Storage connection is via Fibre Channel
- Objects transferred are **device blocks**



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SAN



- Servers
- Host Bus Adapters
- Storage Devices
- FC Switches & Hubs
- Tape Devices
- FC to SCSI routers



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SAN Fault Tolerance

- System design is Fault Tolerant
 - Disks
 - Controllers
 - Cache
 - Data is not locked into a server



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SAN Disaster Recovery

- Backup and recovery much faster
- Can take place over greater distances
 - 10 to 20 km
- Remote Copy and Replication become possible
- Flash Copy

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SAN Network Performance

- SAN network moves only I/O data
- 100MB/sec, 200MB/sec Full Duplex
- 2 Gbit FC starting to ship
- Data only uses the Ethernet to serve the client

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SAN Scalability

- SCSI distance limitations eliminated
- With a SAN you put the storage where it fits
- Most mass storage devices allow for substantial expansion

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SAN Manageability

- Storage Resource Management
 - Configuration
 - Monitoring
 - Administration

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SAN Cost Effectiveness

- Economies of scale
- Less orphaned space
- Supports heterogeneous environment
- Capacity can be redistributed as needed
- Unused space is centrally pooled

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In Summary

- A SAN is a dedicated storage network providing the channel between a server and its data
- A NAS is a plug & play server tuned for serving files over TCP/IP

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NAS and SAN Backup

Traditional

- Local backup
- Network backup

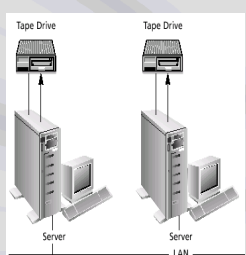
New Backup Options

- LAN-less
- Server-less

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Local Backup



- Low network utilization
- Good performance

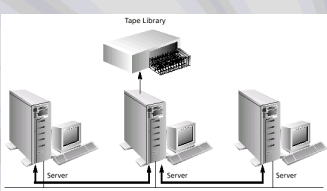
But...

- Management headache
- High failure rate

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Network Backup



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Network Backup Pros

- Greater automation
- Centralized administration
- Lower administrative costs

Result: More reliable backups

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Network Backup Cons

- Data moves across IP network

Which requires...

- Significant network bandwidth

Resulting in...

- Poor performance

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LAN-less Backup

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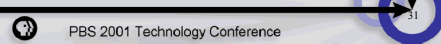
Backing Up a NAS

- Too much data to backup over LAN in most cases

What are your choices?

- Local Backups
- Add an Host Bus Adapter to NAS server and go LAN-less

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Backing Up a SAN

- Network backups become unmanageable
- Local backup of many servers unmanageable

Leverage your SAN investment

- Go LAN-less as soon as possible
- Move to LTO or FC based tape technology

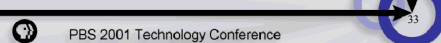
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The Future of SAN Backups

- Integrated Media and Devices
 - Add performance & capacity policies into tape device selection
- Server-less Backups
 - Data moves between storage device and tape device
 - This is the one to wait for

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Future Directions

- Improved SAN management
- iSCSI
 - Ubiquitous IP Protocol
 - Currently slow compared to FC
- Gigabit Ethernet
- 2 and 4Gb FC, 10Gb FC and Ethernet by 2005

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Resources

Books

- *Building Storage Networks*, Marc Farley

White Papers

- veritas.com, jni.com, qllogic.com, emulex.com, inrange.com

Periodicals

- wwpi.com, infostore.com

Gartner Group

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Questions

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