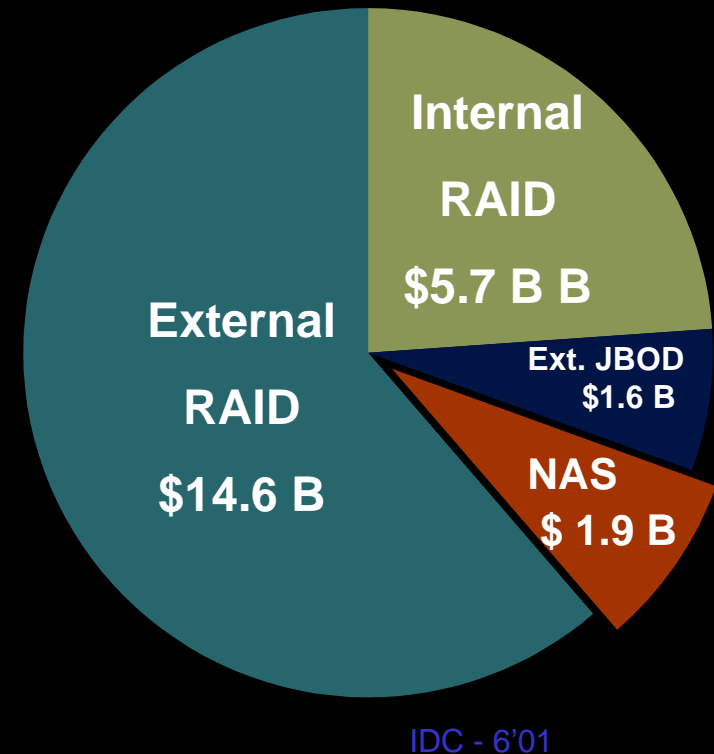


# Storage Networking

Brian Pawlowski  
Senior Technical Director  
Network Appliance, Inc.

# The Storage Market

- NetApp has made incredible inroads in NAS market
- External RAID exceeds NAS market
- Internal disk and RAID exceeds NAS market





# I've seen the future

“Ethernet wins. Again. In time... Ethernet will eventually triumph over all other storage networking technologies, including Fibre Channel”

**Forrester Research, March 2001**

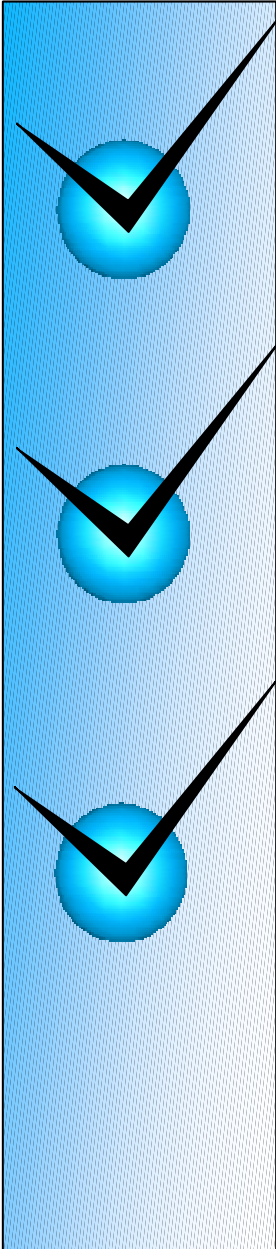
“... 76% of senior IT executives believe IP will make it easier to implement large-scale storage networks”

**Enterprise Storage Group 9/11/2000**



# NAS vs. SAN

- NetApp defined the NAS market
  - Shared storage
  - Scalable Architecture
- SAN market is in disarray
  - Fibre Channel is the ATM of the new millenium
  - Not your father's networking



But, really, who cares?

# NAS is a tough row to hoe

- Application certification
  - Application specific issues
- Vendor support
  - Application support issues beyond certification
- NFS client overhead
  - Can you say DAFS?
- Legacy thinking
  - Direct attach storage paradigm

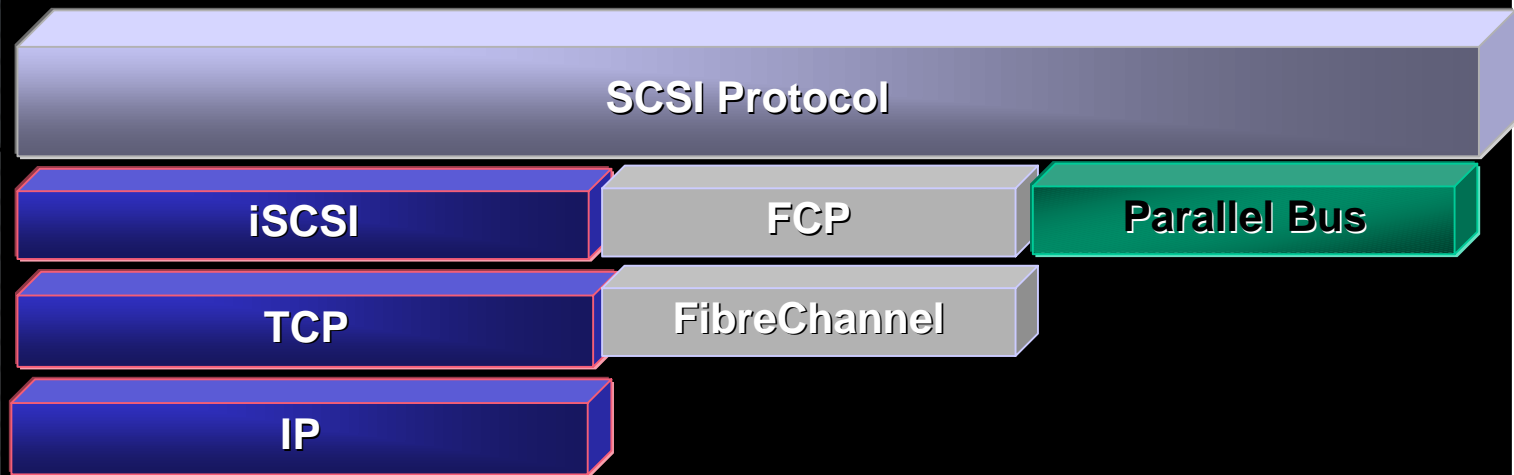


# Trends

- Don't bet against TCP/IP
  - And don't bet against Ethernet
- 2 Gb/s Fibre Channel is a yawner
  - 10 Gb/s Ethernet is compelling
- TCO is the magic word
  - The economics of IP storage



# iSCSI background



- **TCP/IP Transport for SCSI command sets**
  - **SCSI block protocol access**
- **Emerging Internet standard**
  - **IETF working group**
- **iSCSI is a direct replacement for FCP**
  - **FCP is the SAN fabric today**



# iSCSI means leverage

- Leverage existing Gigabit → 10 Gigabit networking infrastructure
- Leverage existing rich set of management tools
- Leverage existing base of skilled personnel
- ... in the future

	Direct (direct transfer to memory)	Network (TCP/IP)
Block		SCSI over IP
File		



But wait...

This sounds all so familiar

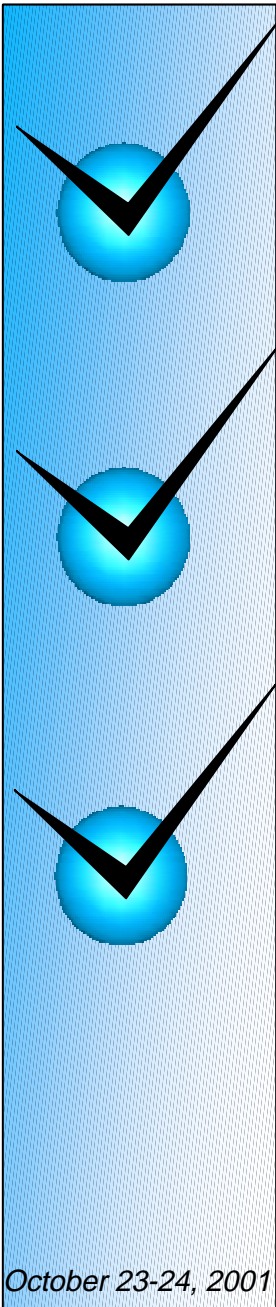
# The NAS market redux

- Leverages traditional networking
  - CIFS and NFS run on TCP/IP and Ethernet
- Defines a model for sharing and collaboration
  - Scalable architecture
  - Without the limitations of clustering file systems
- Lower TCO



# What went wrong...

- Client performance issues
  - Overhead vs. local attach disk was problematic
- Client reliability issues
- No agreed to standard
  - CIFS dominates the Windows space
  - NFS dominates the \*NIX space



iSCSI is not a panacea.

beepy, October, 2001

# The future

- TCP/IP and Ethernet rock
  - Never play cards with a man called Pops...
- “SAN” and NAS will co-exist
  - Fibre Channel is to iSCSI as ATM is to Ethernet
  - SCSI is the MS-DOS of storage protocols
- Customers need cost effective solutions
  - Total cost of ownership will drive future of storage networking



# Questions?

(and I didn't even mention NFS Version  
4!)



# NFS Vendors Conference

