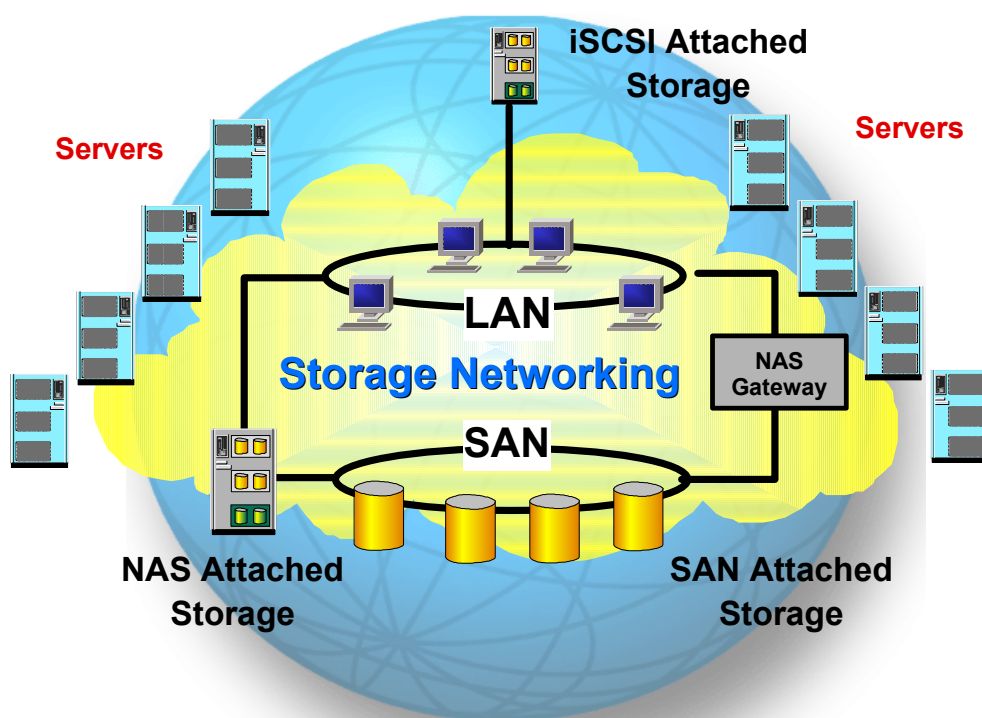


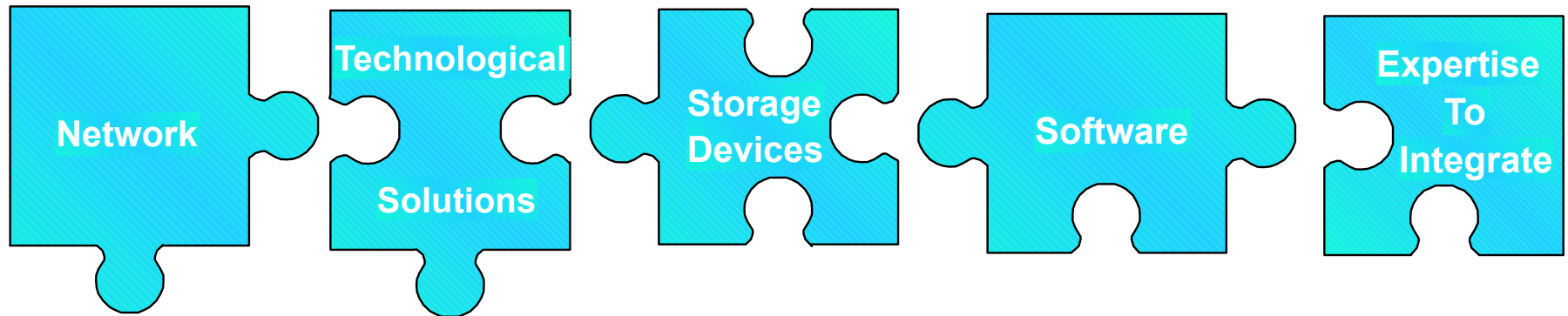
# Storage Networking Overview



## *Module Flow*

- **Business Challenges**
- **Storage Networking Trends and Directions**
- **What is Storage Networking?**
- **Technological solutions to business needs**

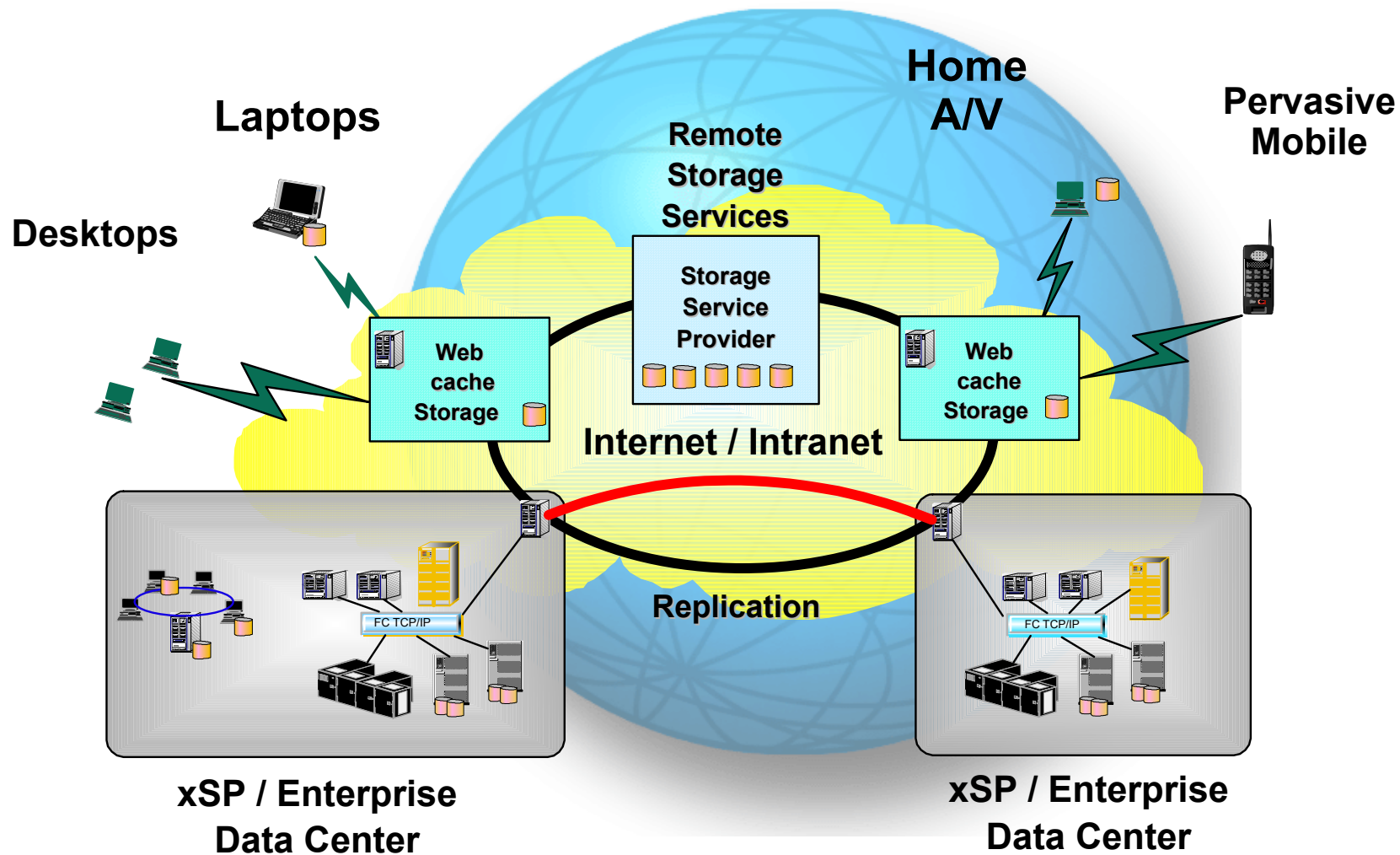
# *What is Storage Networking?*



## *Storage Networking*

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# Where is All the Information ?



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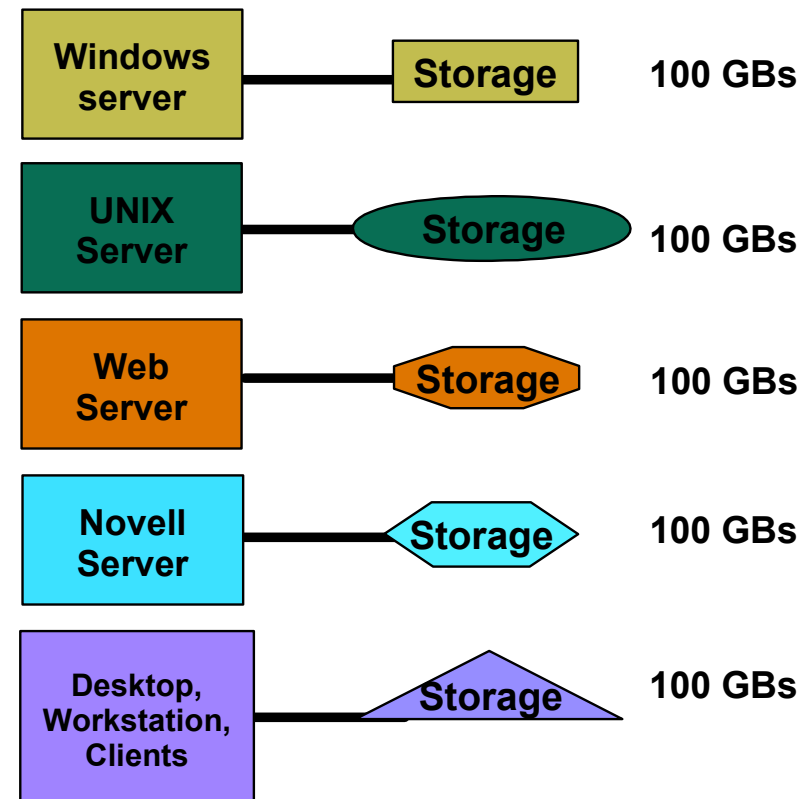
## *And an Exabyte is....?!*

- ◆ Gigabytes ( $10^9$ ) (Billion) of disk storage - most customers
- ◆ Terabytes ( $10^{12}$ ) (Trillion) of disk storage - large customers
- ◆ Petabytes ( $10^{15}$ ) (Quadrillion) of disk storage - a few customers today!
- ◆ Petabytes ( $10^{15}$ ) (Quadrillion) of tape storage - large customers
- ◆ **Exabytes ( $10^{18}$ ) (Quintillion) of tape storage - a few accounts by 2001**
- ◆ Zettabytes ( $10^{21}$ ) (Sextillion) WW digital data by 2008 - (IDC)
- ◆ Yottabytes ( $10^{24}$ ) (Septillion) - How Long will it take?

# Business Problem

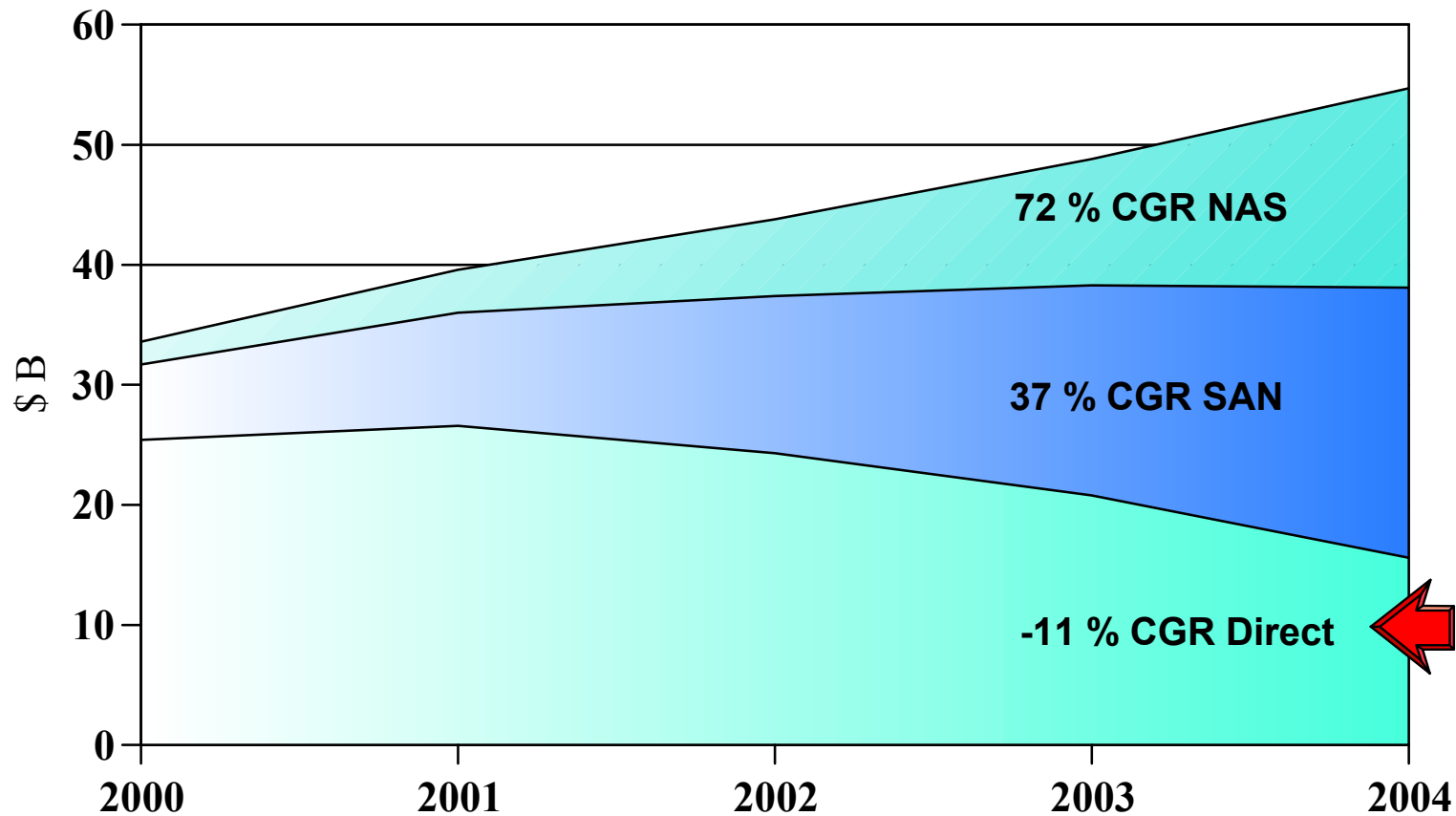
## Client/server solution has its own dedicated storage

- Storage investment is tied to specific server
- Once server is replaced, storage investment is lost
- Migration of data to new server & new storage is required
- Underutilized storage can not be shared by other servers or clients
- Data in storage can not be accessed by other servers or clients
- Storage must be managed as individual entities
- Non-centralized management & data protection



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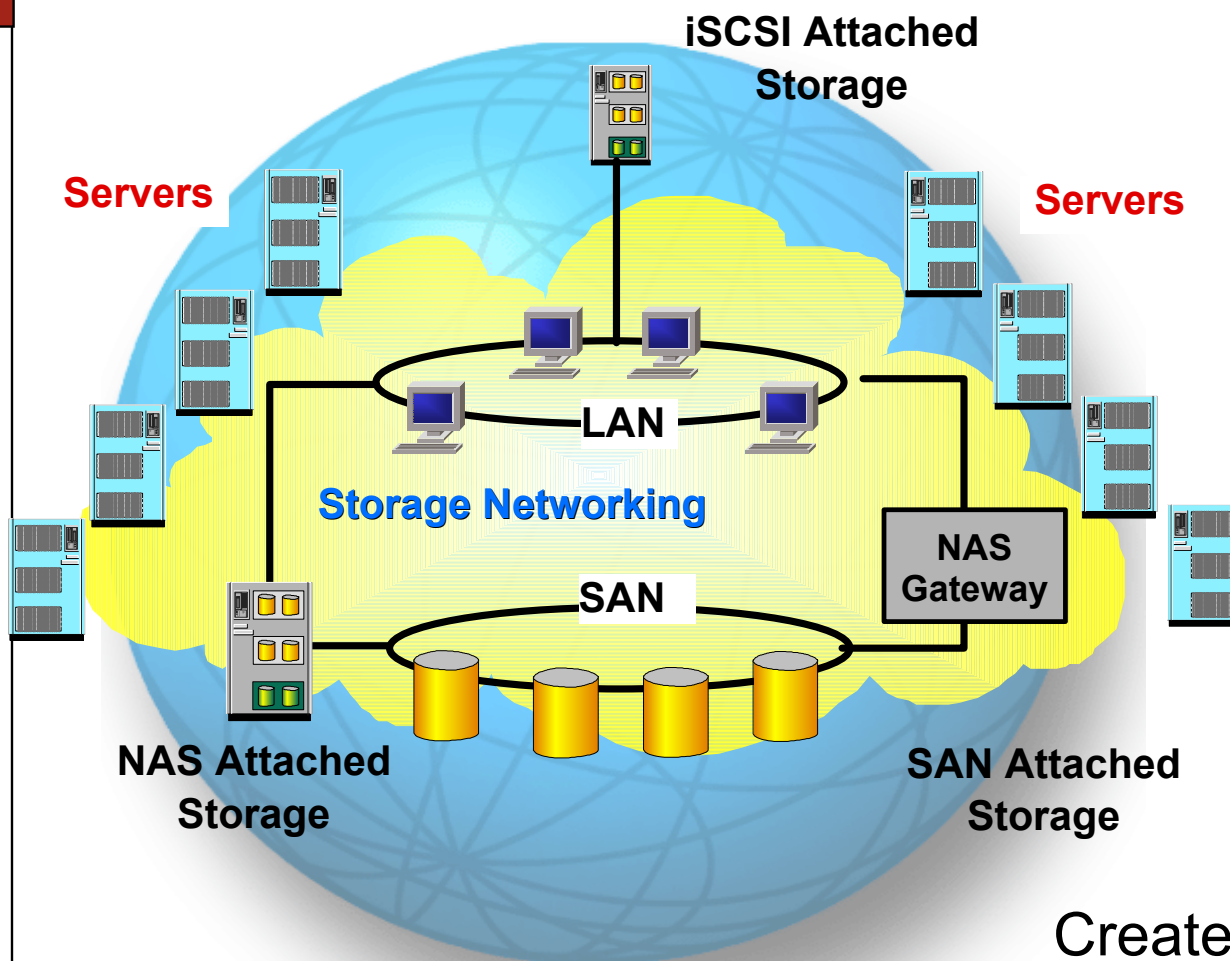
# Growth in Network Storage



Source IDC 9/00

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# Business Challenges



Manage the Growth

Make it Accessible

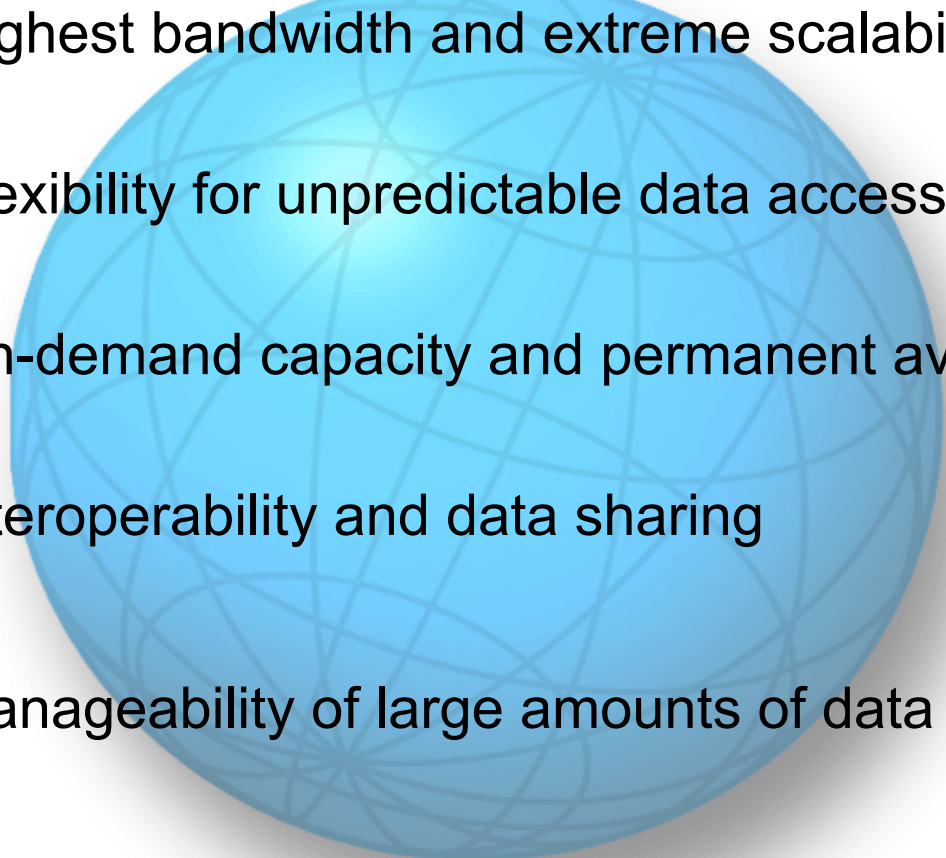
Contain the Costs

Create competitive advantage

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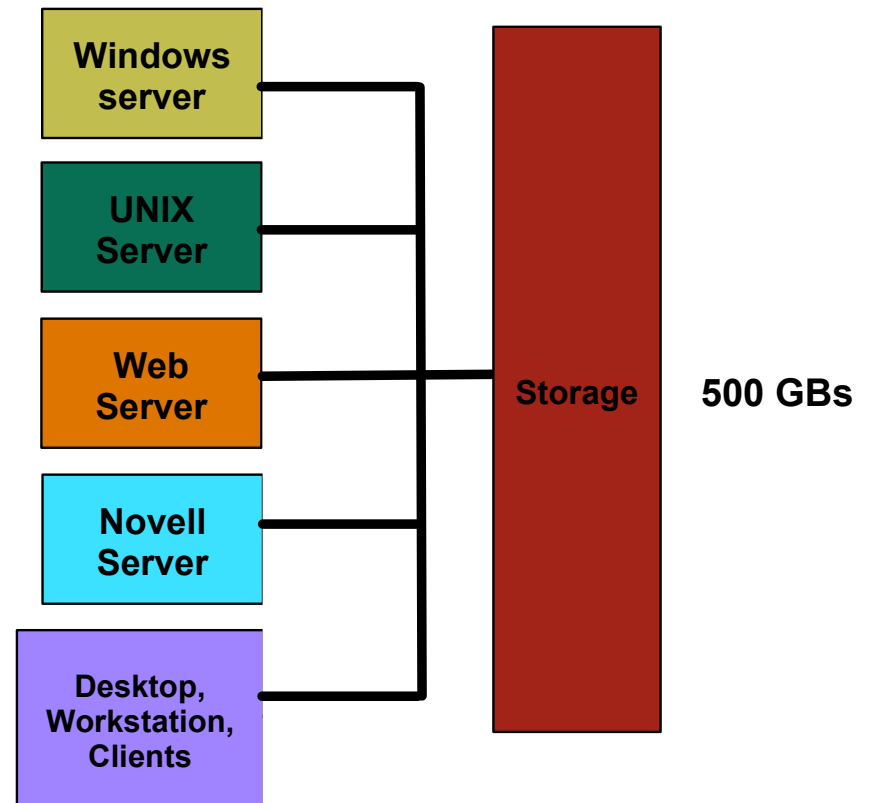
## *Challenges Create Business Needs...*

- 
- Highest bandwidth and extreme scalability
  - Flexibility for unpredictable data access
  - On-demand capacity and permanent availability
  - Interoperability and data sharing
  - Manageability of large amounts of data
  - 99.999% Availability (5 minutes downtime/year)

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# Business Solution -- Pooled Storage

- Investment Protection
- Storage Consolidation
- Data Sharing and Access
- High Utilization of storage
- High Scalability
- Centralized Management
- Data Protection
- Disaster Tolerance



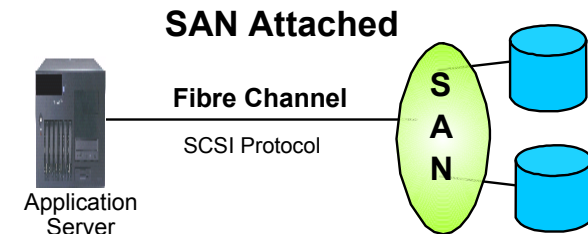
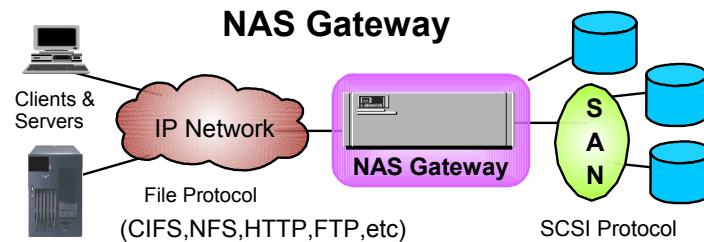
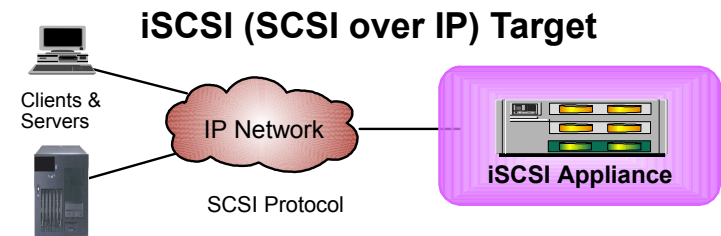
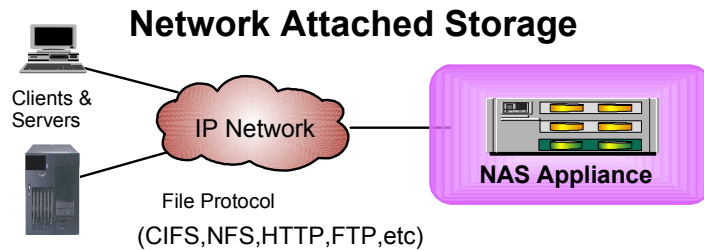
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## *Two Types of Storage Networks*

- ✦ Storage connected directly to IP Networks
- ✦ Storage connected directly to Fibre Channel Networks

**"Versus"** may be giving way to **"Convergence"**  
One picks up where the other's weakness leaves off.

# Flexibility of Storing Data

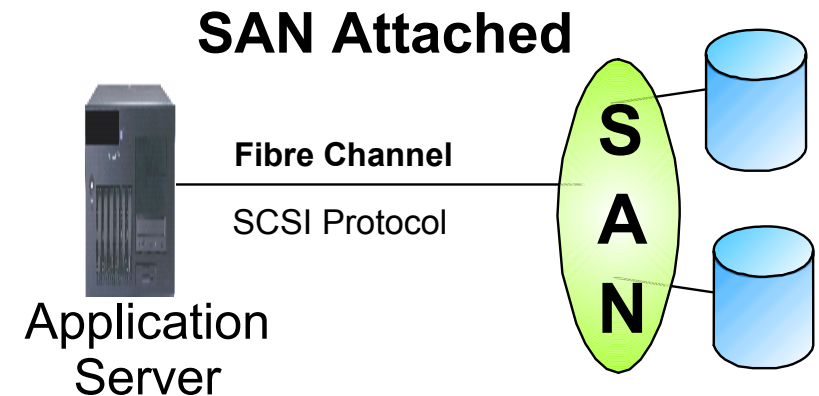


Mixing these solutions can provide higher values to customers

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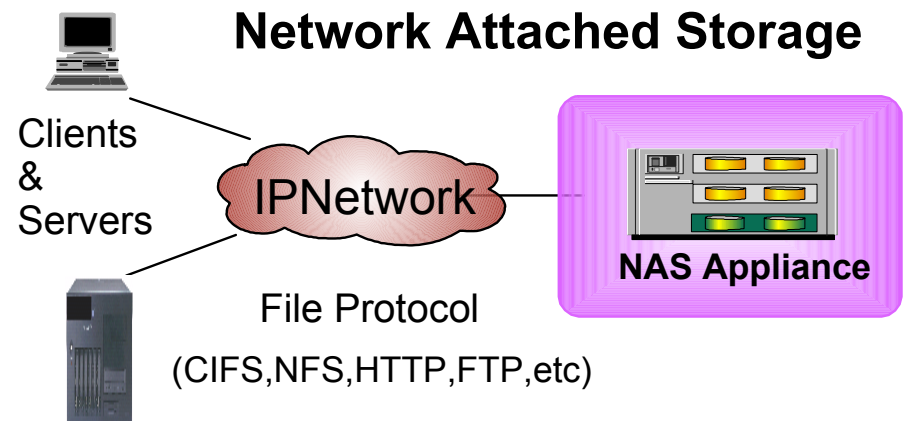
# SAN Characteristics

- **An architecture, not an Appliance**
  - ★ Dedicated network storage solution
- **Attaches Storage Appliance to LAN**
  - ★ Using IP hub or switching capability
  - ★ Uses IP block I/O architecture
- **Providing Flexibility & Scalability**
  - ★ Scalable storage - Unlimited
  - ★ Distance limitations

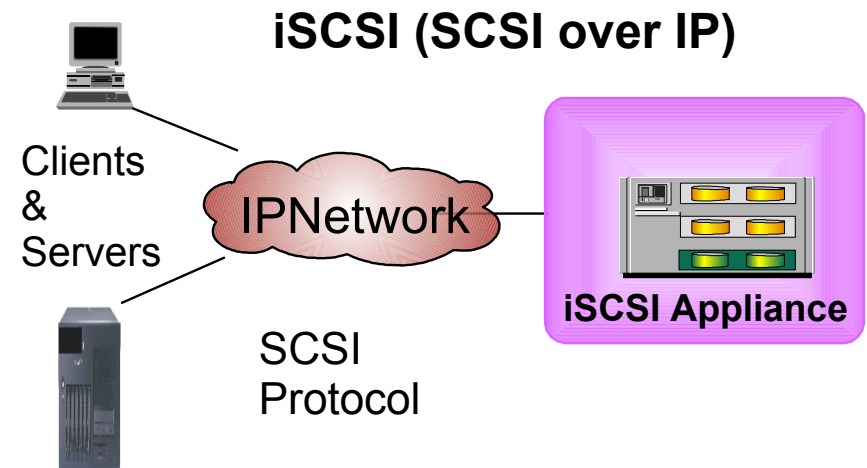


# NAS Characteristics

- **A Storage Appliance**
  - ★ Fully integrated dedicated storage solution
  - ★ Scalable storage - GBs to TBs
- **Attaches Storage Appliance to LAN**
  - ★ Uses IP file I/O architecture
  - ★ Supports multiple file formats (CIFS, NFS, HTTP, etc)
- **Providing Flexibility & Scalability**
  - ★ Ease-of-use
  - ★ Pervasive distance



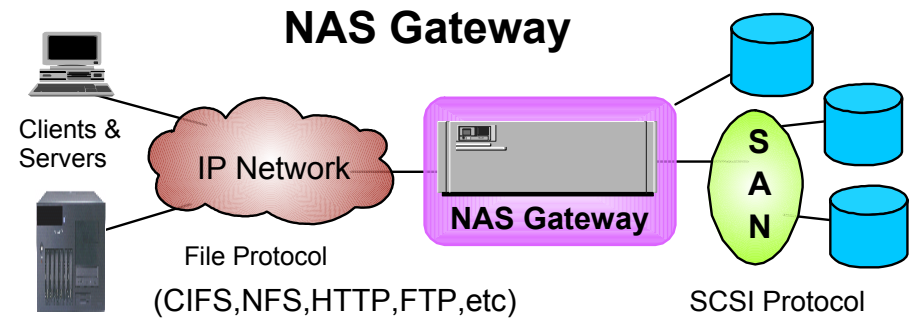
# iSCSI Characteristics



- ★ **New and emerging technology**
- ★ **Provides routing of SCSI protocol over IP networks**
- ★ **Standards Based**
- ★ **Prior to iSCSI there was no standardized method to transport "Block I/O Formats" over IP networks**

# NAS Gateway Characteristics

- Connects to IP networks
- Heterogeneous file sharing
- Clustering & failover features
- NAS Gateway does not have integrated disks for data storage





# Storage Networking Value

- **Enhanced Services to Customers**
  - Enhanced Data Access
  - Provide Shared Services
  - Provide Rapid Recovery
- **Enhanced Benefits to I/T Organization**
  - Achieve Economies of Scales
  - Improved Storage Management
  - Improved Business Continuity
- **Enhanced Business Impacts**
  - Remove Inhibitors to Growth
  - Improve Business-Never-Sleeps Strategy