



**i n v e n t**

backup and restore in  
storage area network  
environments

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HP OPENVIEW

Works | Right | Now

# storage drivers and success factors



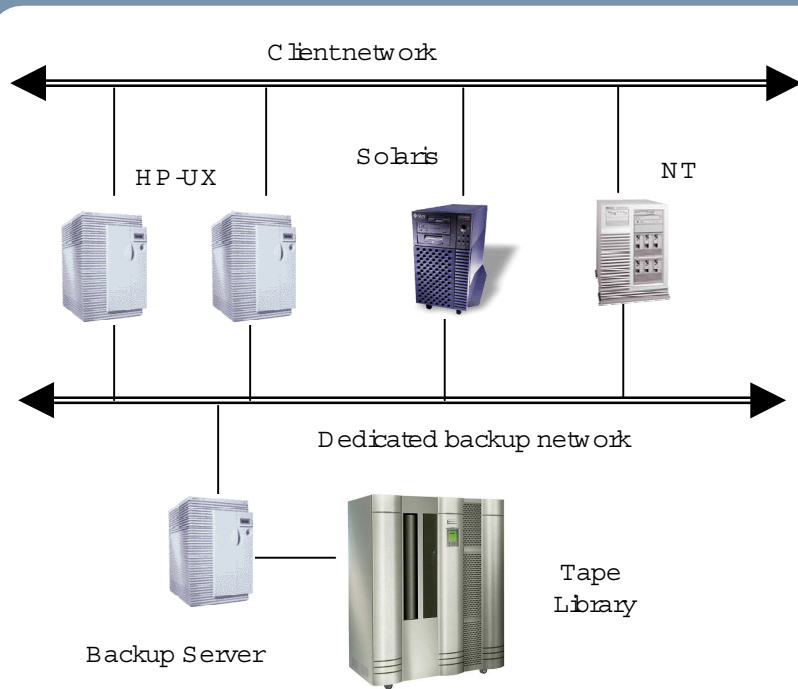
## Critical Success Factors

- Business Continuity
- Service Level Management
- Scalability/Flexibility

## Business Drivers

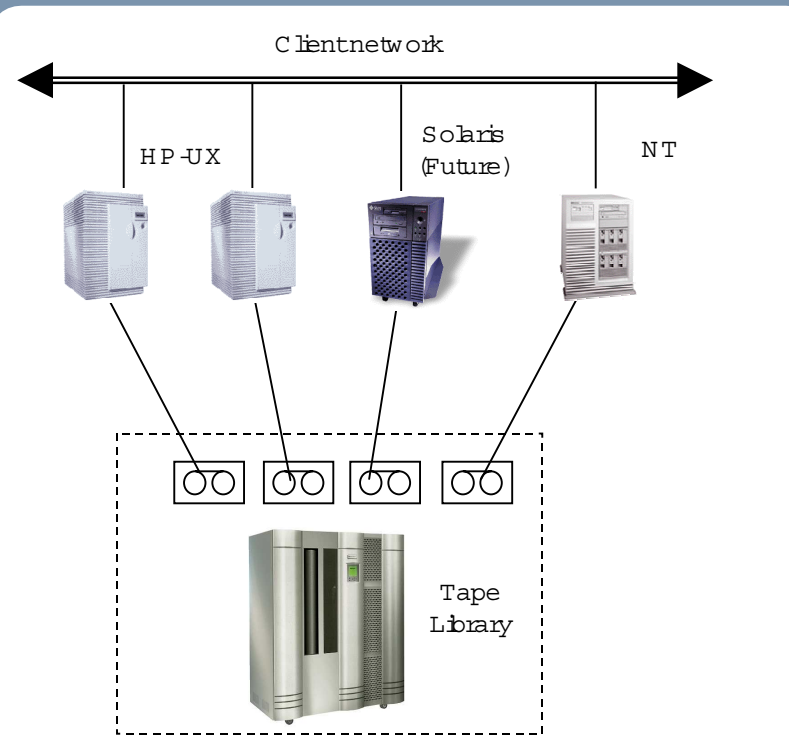
- e-commerce (ISPs, ASPs)
- New applications (ERP, e-mail)
- Data Warehousing

# traditional backup



## Network Backup

- Network bandwidth
- Performance impact to network and servers



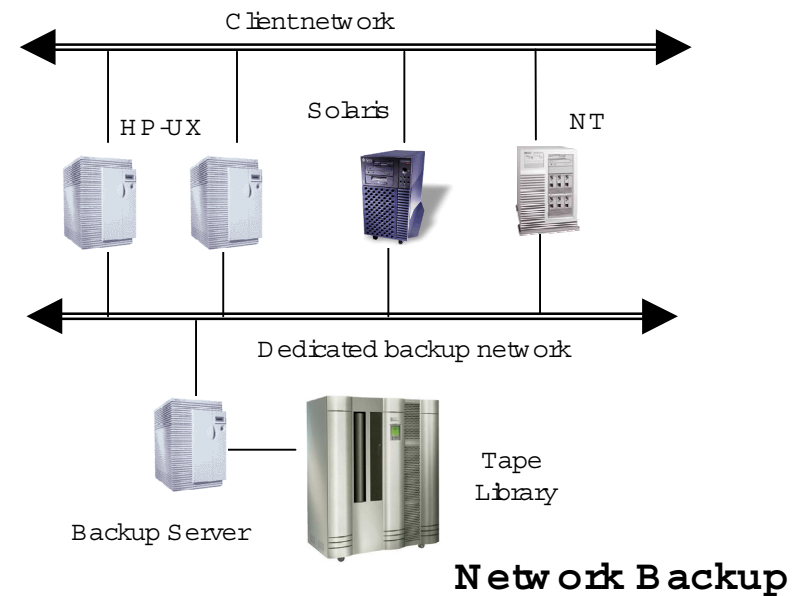
## Direct Connect

- Number of servers limited by number of tape drives in library
- Dedicated tape drive to each server

# traditional lan limitations

## Major Issues

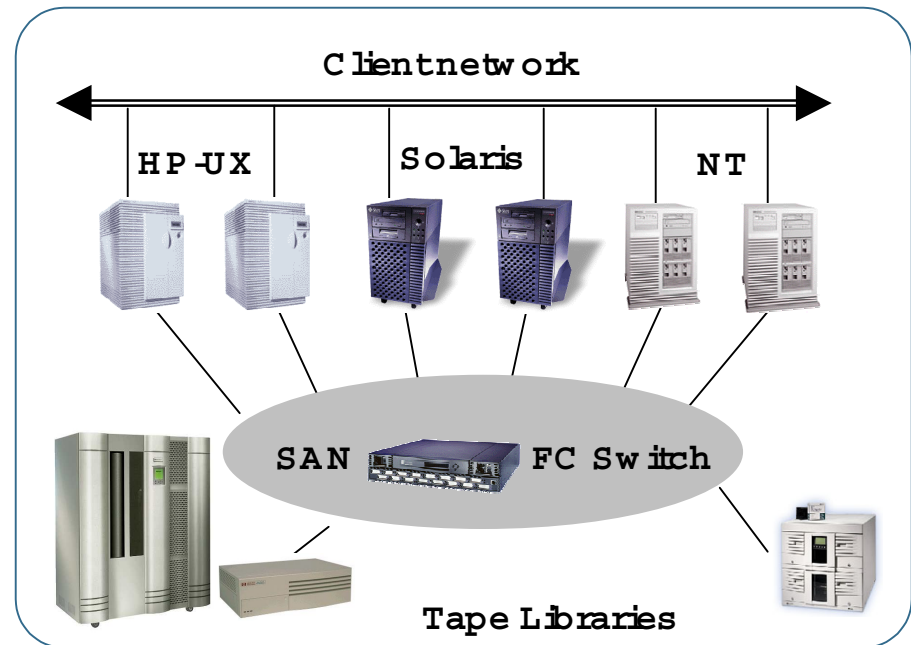
- Network bandwidth
- No resource sharing
- Limitations in connectivity and distance (SCSI)



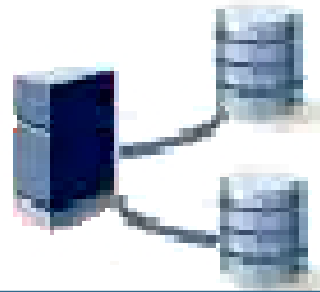
overcome  
limits with  
san

### Benefits

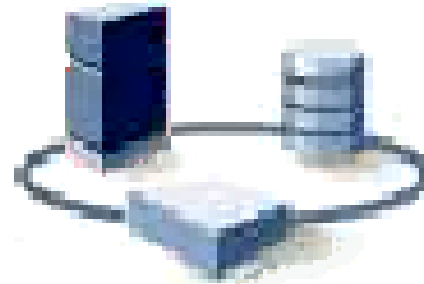
- Increased fault tolerance
- High performance
- Efficiency through resource sharing and pooling



# san topologies



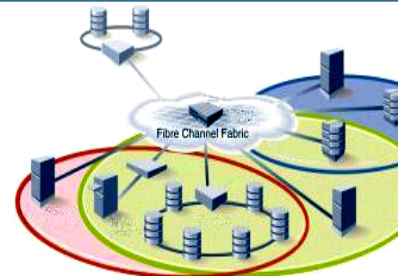
Point  
to  
Point



Arbitrated  
Loop

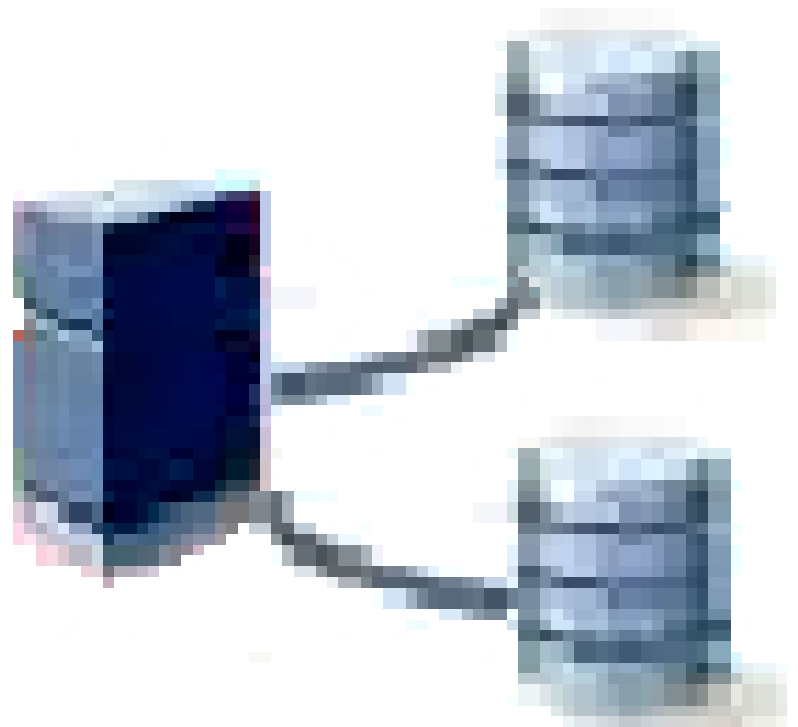


Switched  
Fabric



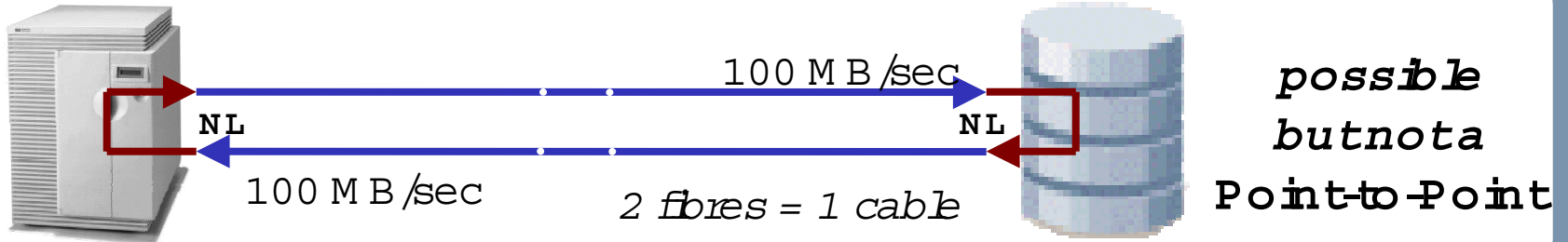
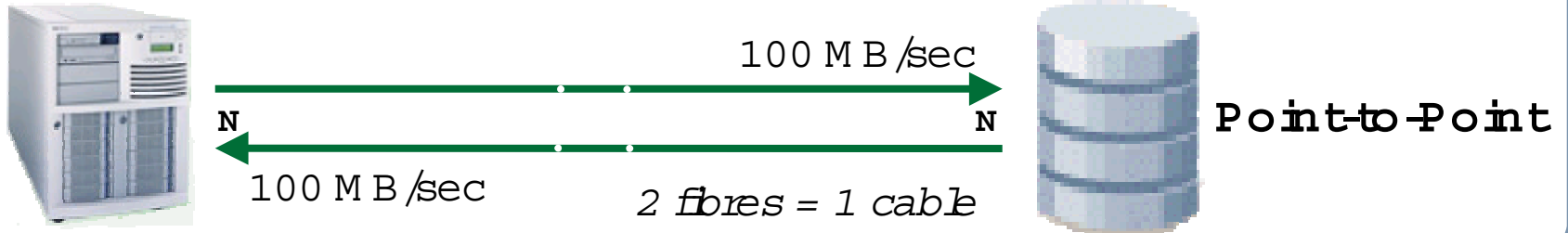
Zoning

point to point  
topology





# point to point



- ⇒ Predictable bandwidth
- ⇒ Maximum possible bandwidth

⇒ Expensive (#S bts)

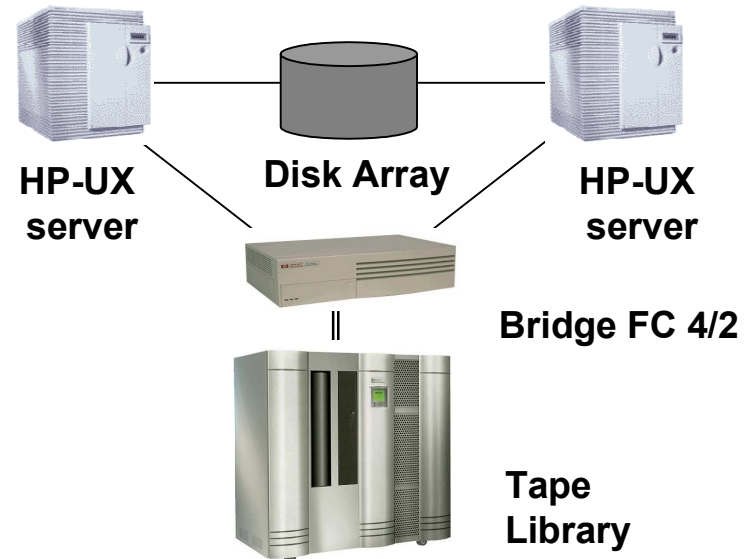
# point-to-point backup today (hp-ux)

## Benefits

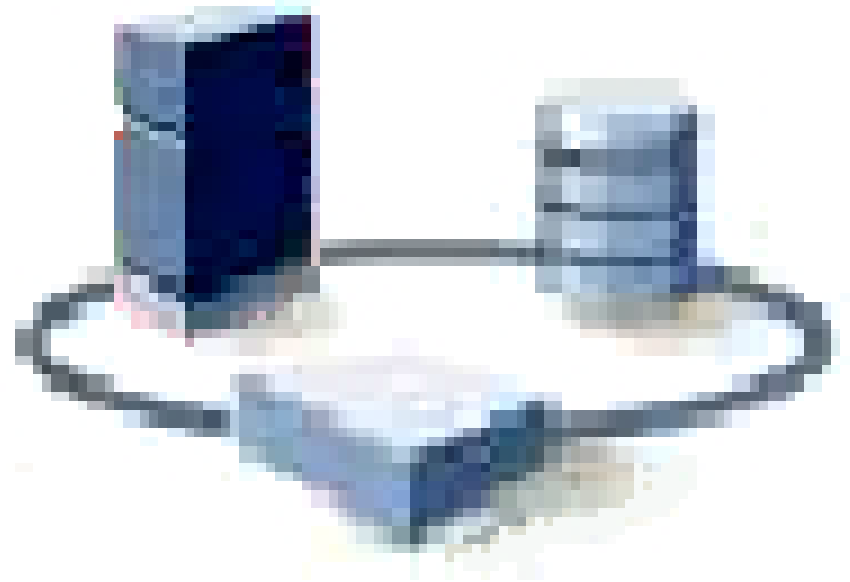
- Centralized Management
- Shared use of large Library
- FC point-to-point

## Limitations

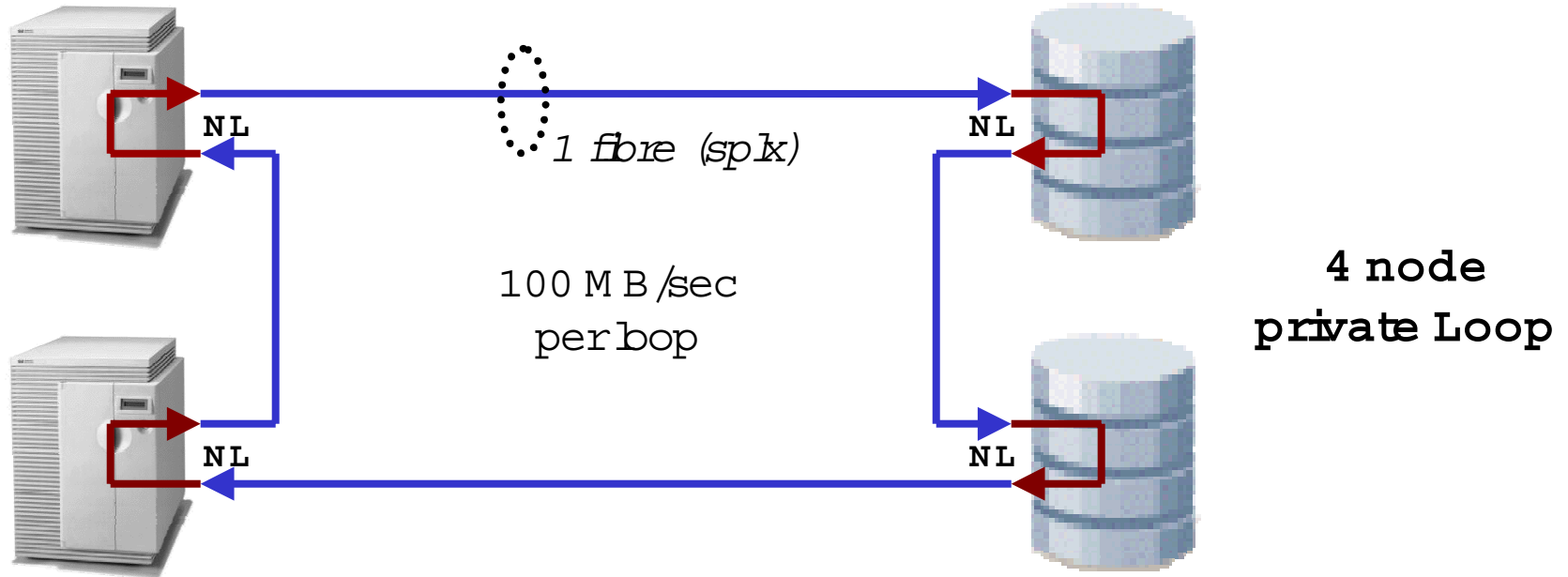
- Only 2 systems per bridge
- Separate SAN infrastructure for tape and disk



arbitrated  
loop  
topology



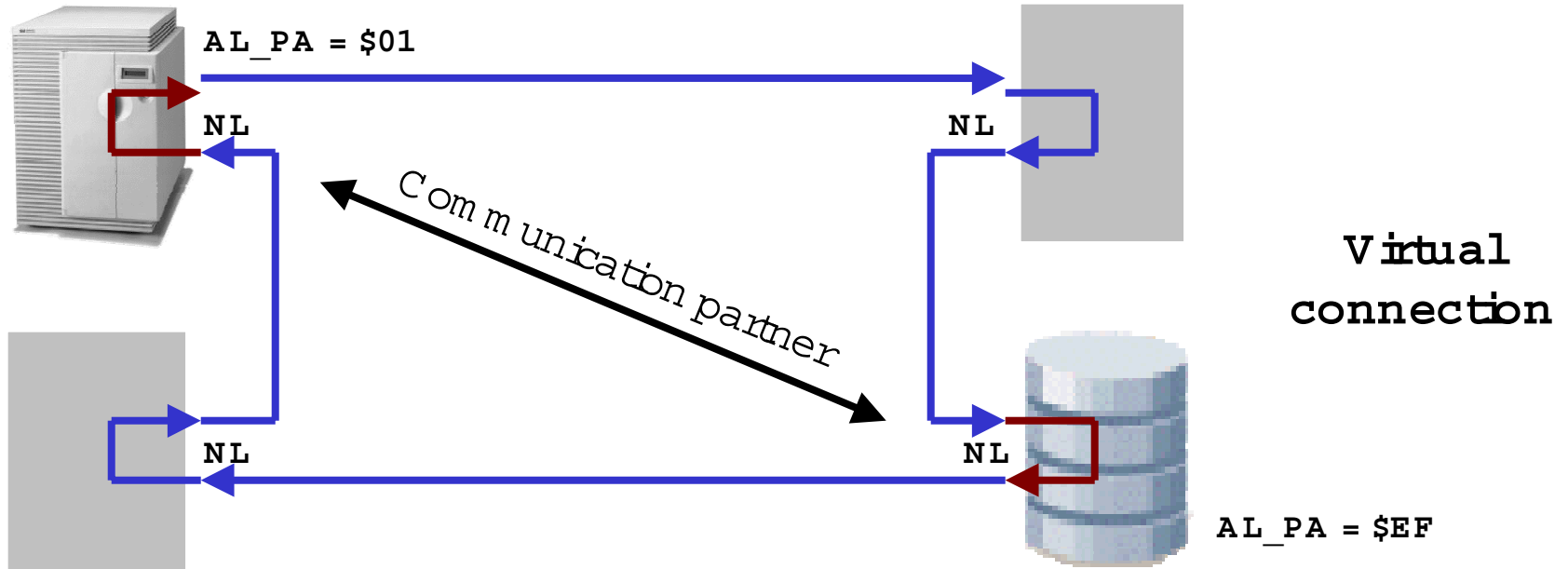
# arbitrated loop [public or private]



⇒ Good \$/performance

⇒ Max 126 nodes/AL

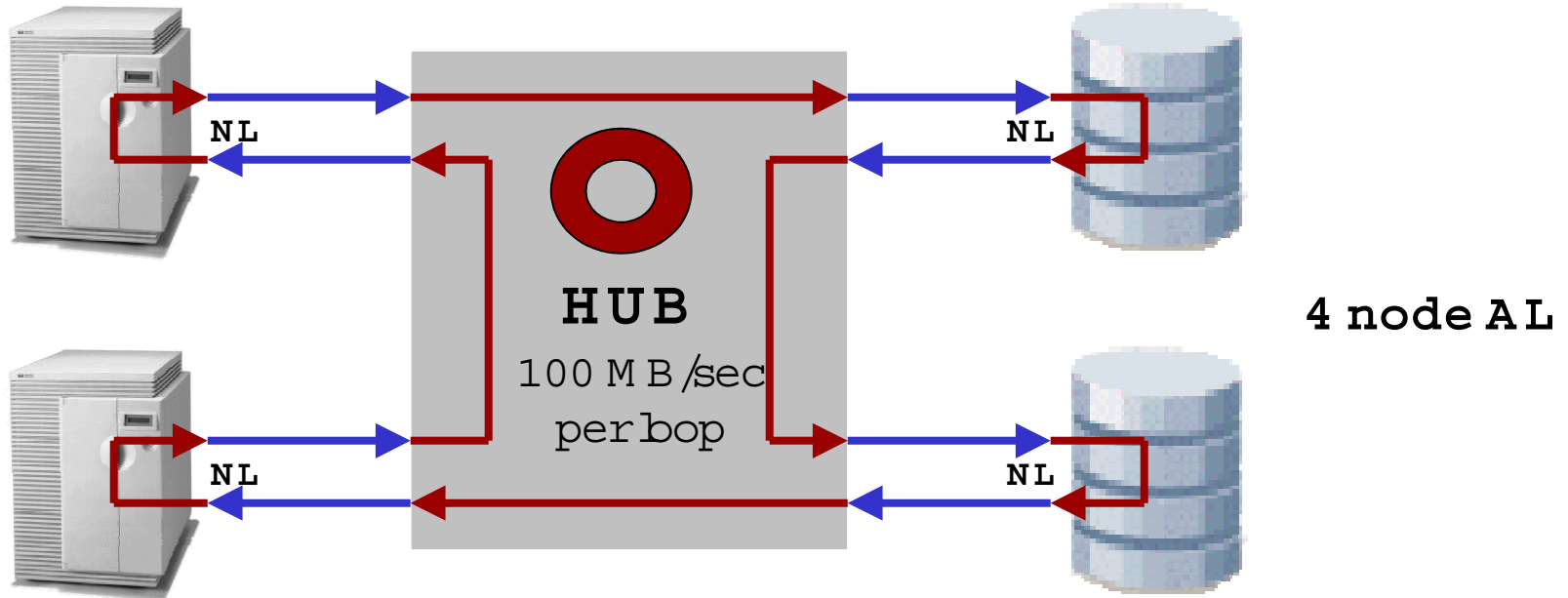
# communication



⇒ Shared media

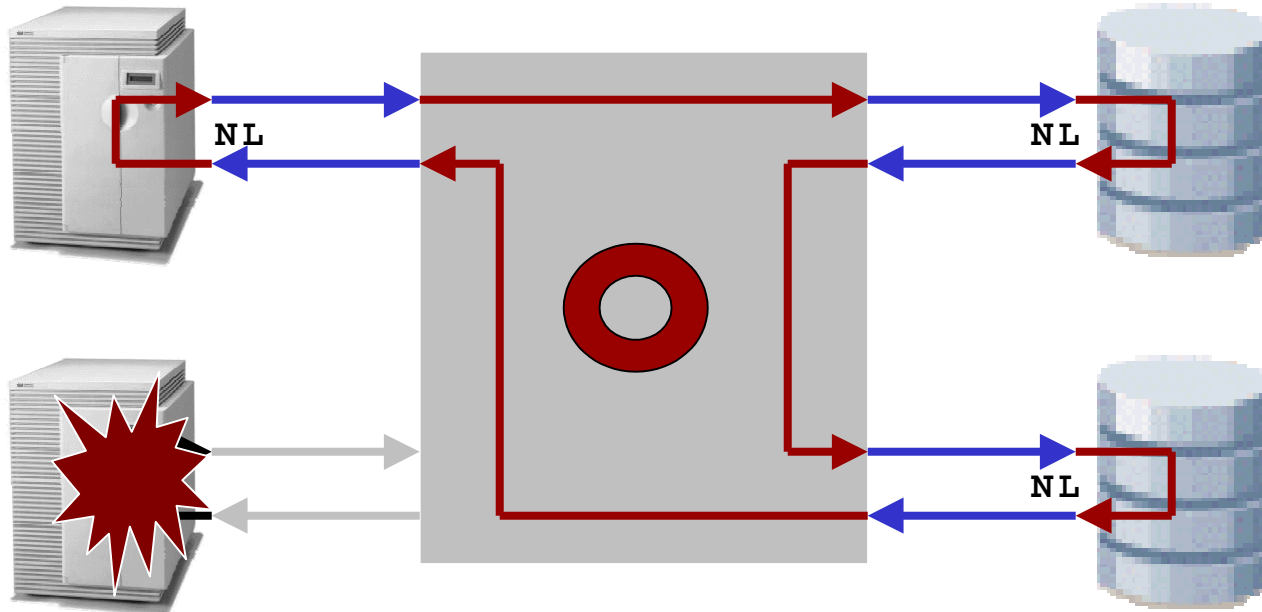
⇒ Only one virtual connection

# common implementation



⇒ HUB is transparent

# fault isolation



- ⇒ Increased availability
- ⇒ HUB isolates problems

⇒ Be aware of LIP

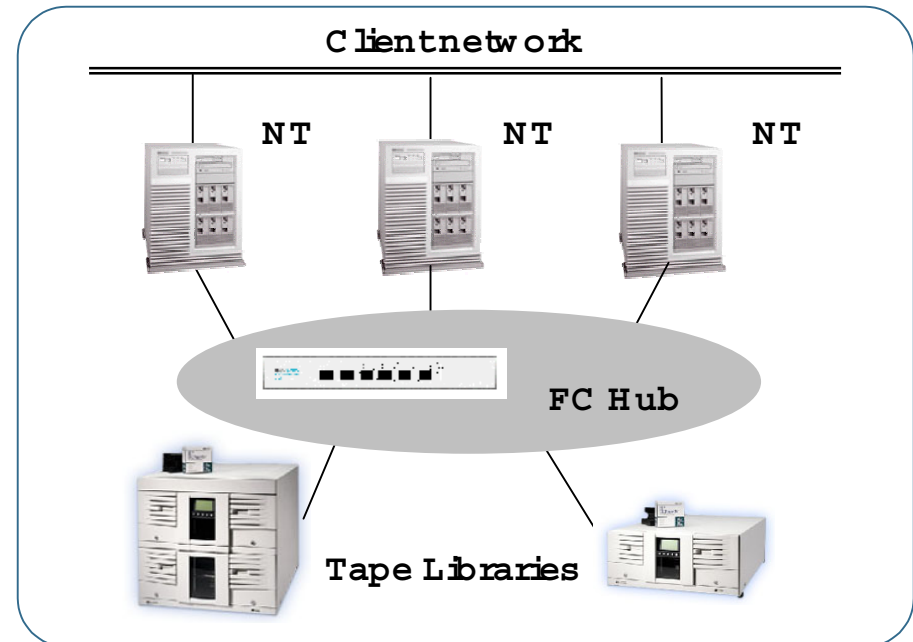
# arbitrated loop backup today (W indow s NT)

## Benefits

- Centralized M anagem ent
- Shared use of large Library
- FC point-to-point

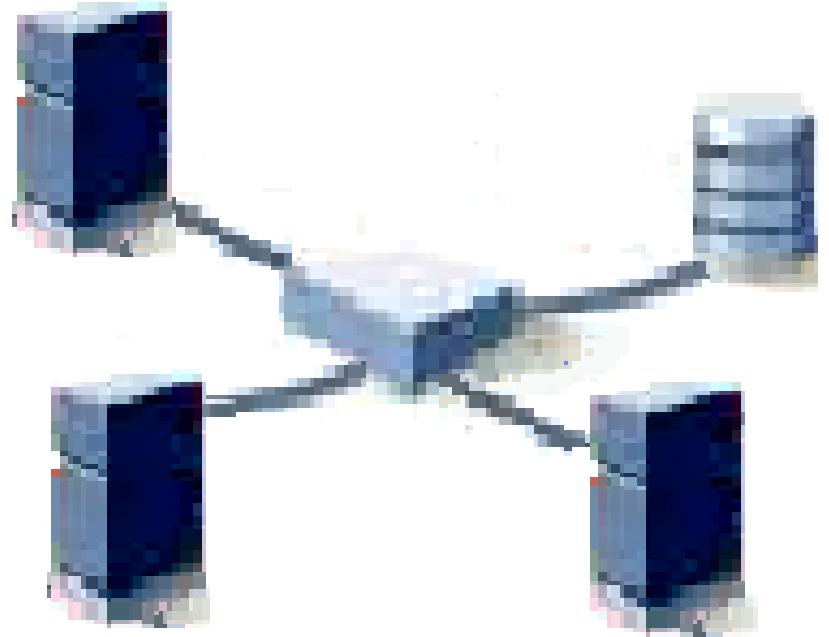
## Lim itations

- LIP problem
- Separate SAN infrastructure  
fortape and disk

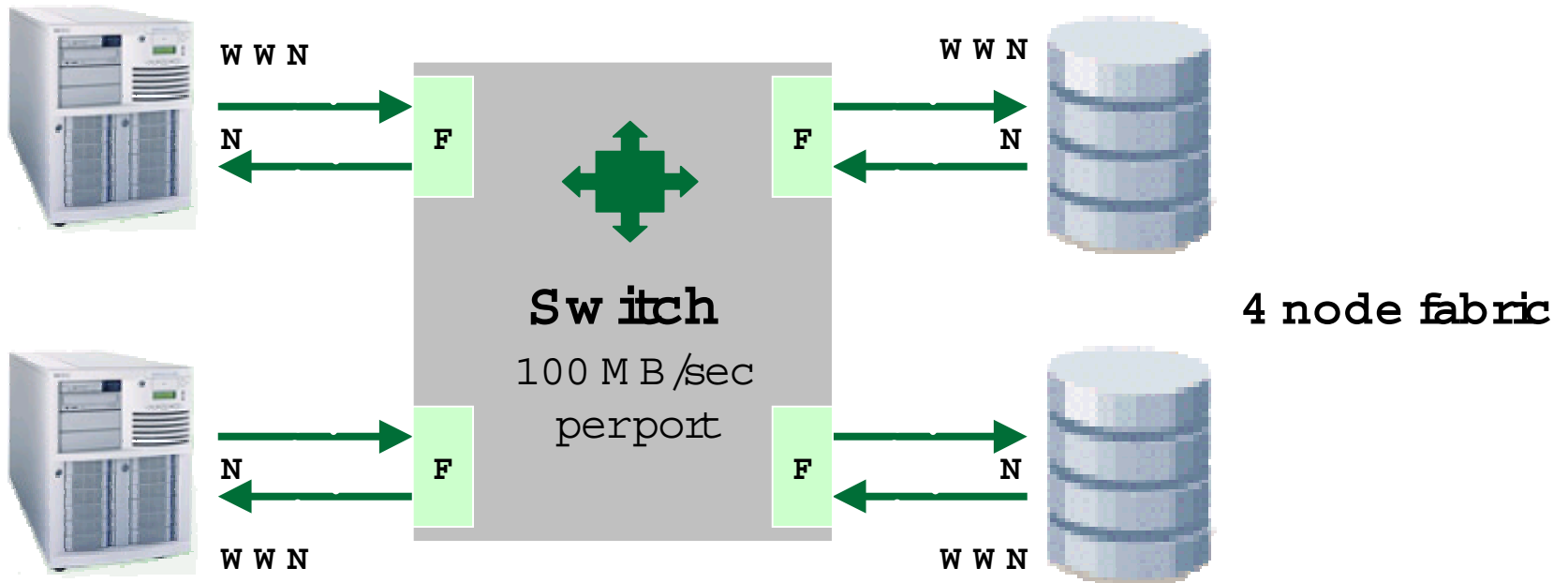




sw itched  
fab ric  
topo lology



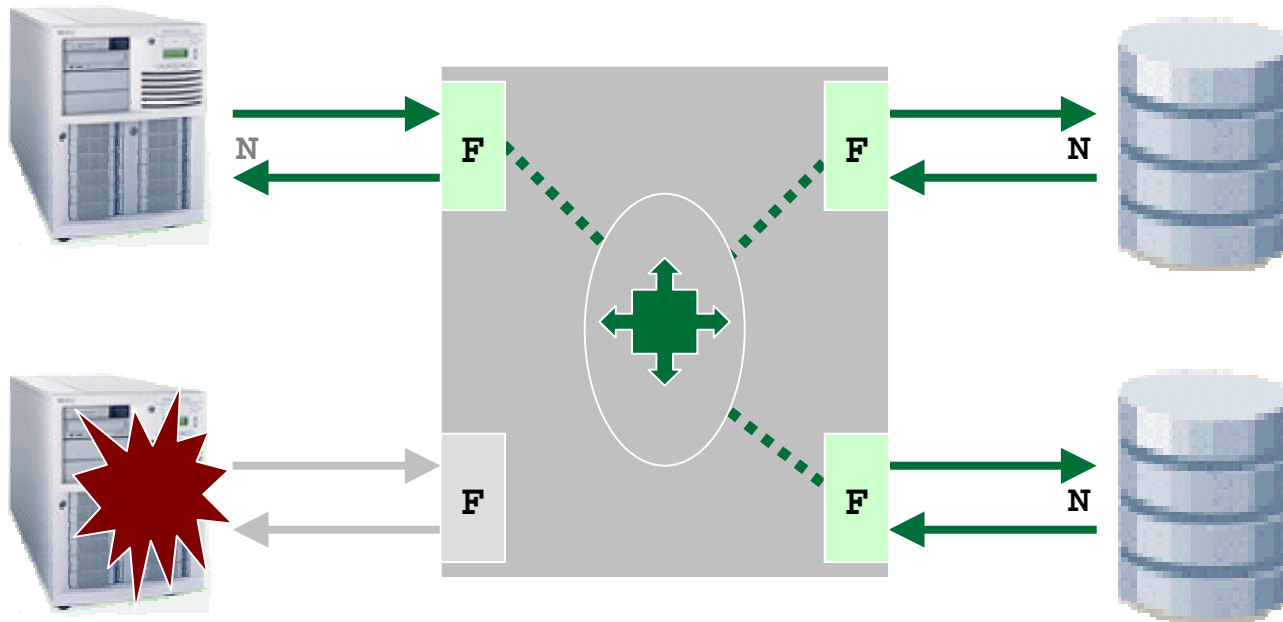
# sw itches m ake up the fabric



- ➡ M M concurrent connect
- ➡ > 15 M i b nodes

➡ M ore expensive

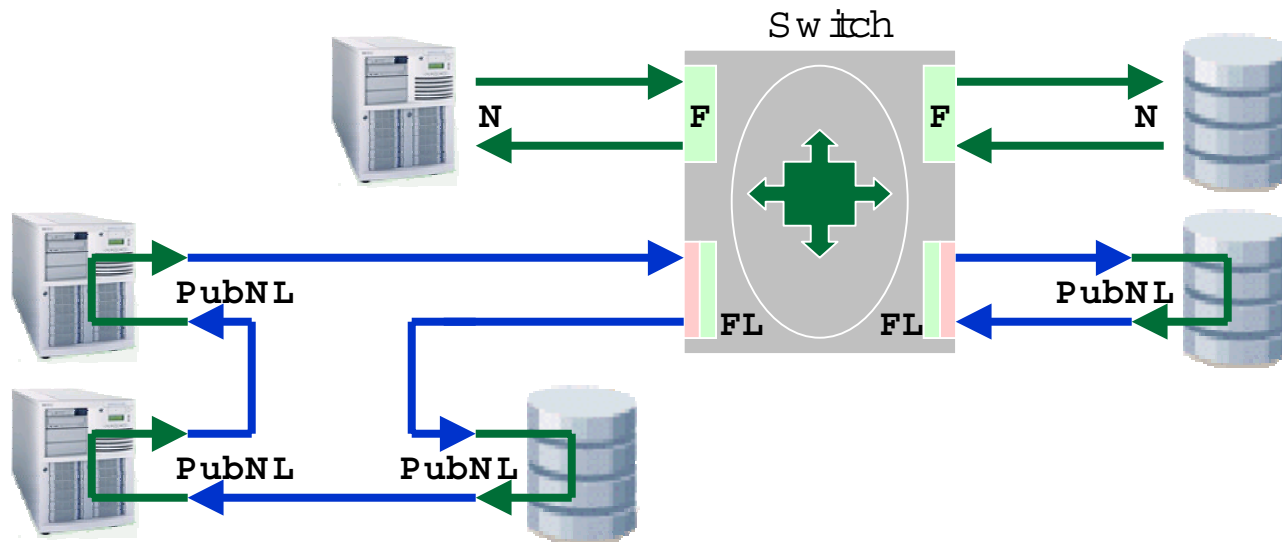
# fault isolation



⇒ Switch isolates problem

⇒ No LIP

# more complex fla

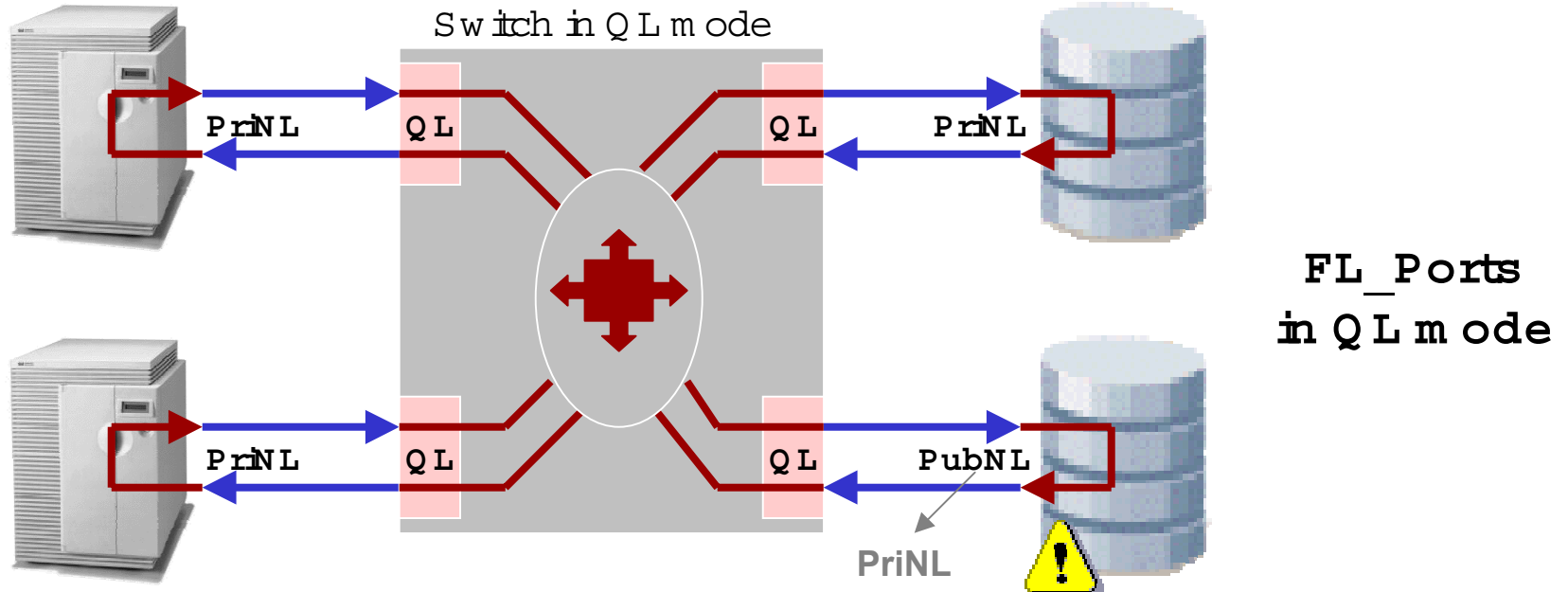


2 bops  
attached to  
a fabric

- ⇒ Connect bops to fabric
- ⇒ Flexibility

⇒ Max. 126 nodes/boplet

# quick loop mode



- ⇒ Loop with switch speed
- ⇒ PLDA & FLA devices

- ⇒ Max 126 modes/QL
- ⇒ LIP may occur in QL

# quick bop [str]

## F16/mixed configs

All current config rules  
continue to persist

- max 32 devices/QL
- max 2 switches/QL
- one switch can be part of only  
one QL at a time
- max 2 devices on a HUB if  
connected to F16

## SW 2800 only configs

All current config rules for F16  
apply, except

- max 64 AL\_PAs/QL
- no limit of devices/HBAs on a  
HUB if connected to a  
SiK Wom 2800
- QL zoning planned for 1Q00

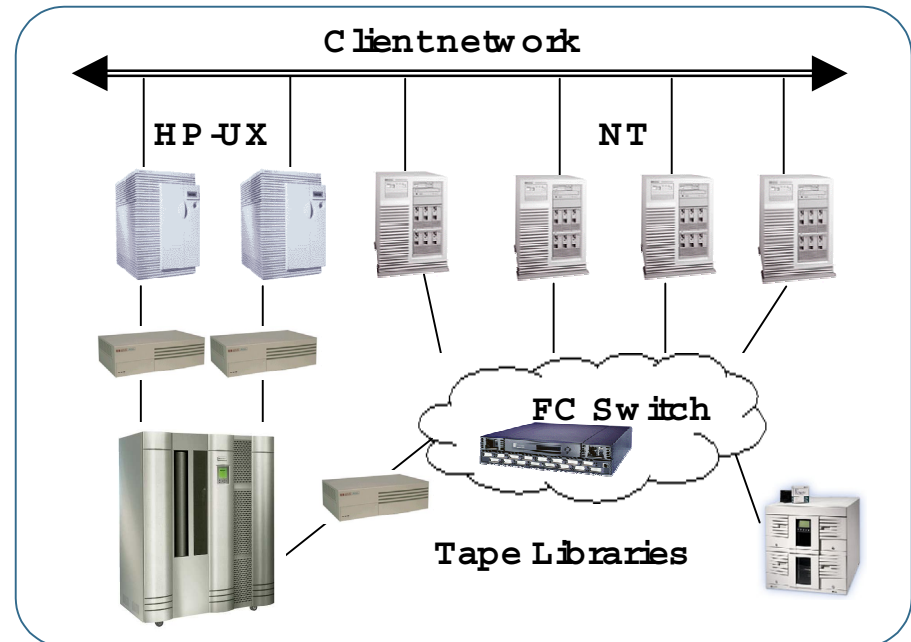
# sw itched fab ric back up today

## Benefits

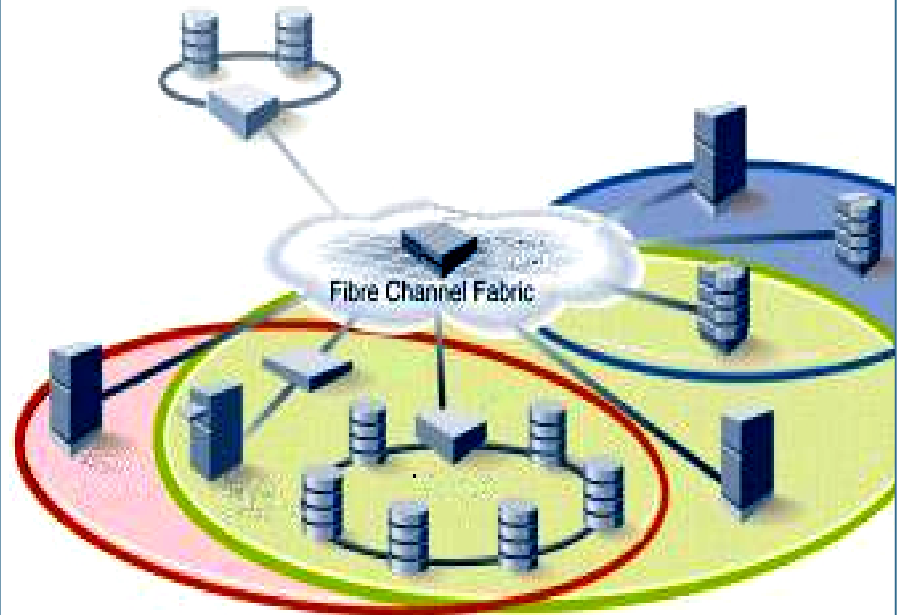
- Centralized Management
- Shared use of large Library
- Het. platform support (NT, HP-UX)
- FC point-to-point
- FC switched fabric (NT)

## Limitations

- Separate SAN infrastructure for tape and disk

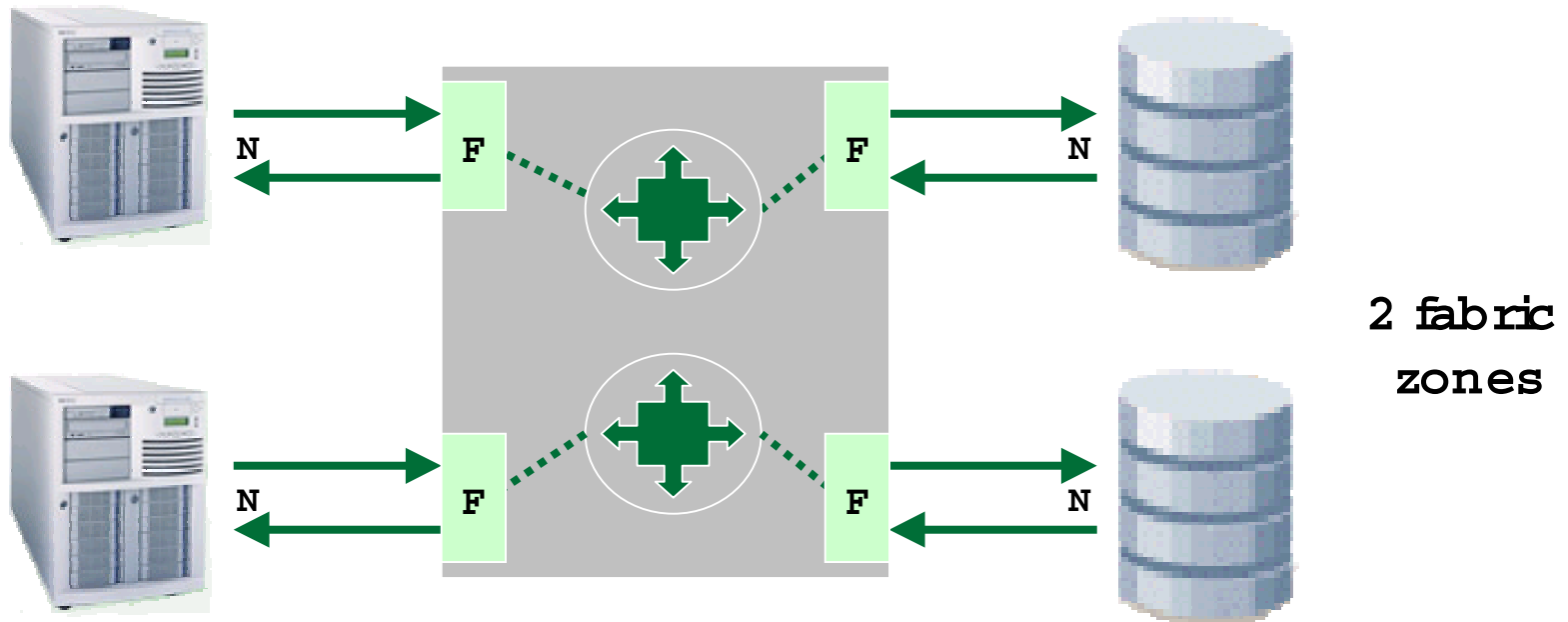


# zoning basics





# zoning



- ⇒ Divides fabric virtually
- ⇒ Zones may overlap

⇒ Not on LUN level

# backup using zoning

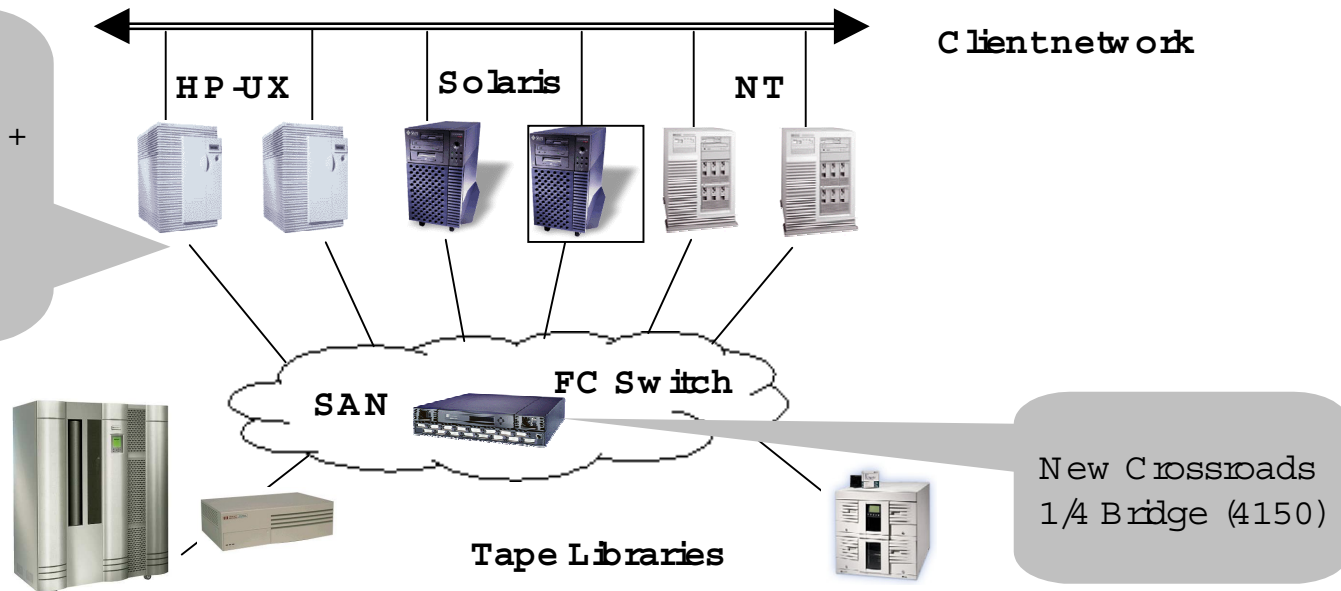
## Benefits

- Centralized Management
- Shared use of large library
- Heterogeneous platform support
- High speed backup
- Modular growth, seamless scalability

## Limitations

- Separate SAN infrastructure for tape and disk

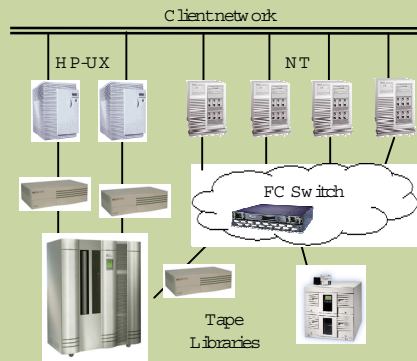
New FC HBA A56xxx  
(PCIBus) HP-UX 11.0 +  
Patch or HP-UX 11.11  
Only V-, N- and  
L-Class Systems



New Crossroads  
1/4 Bridge (4150)

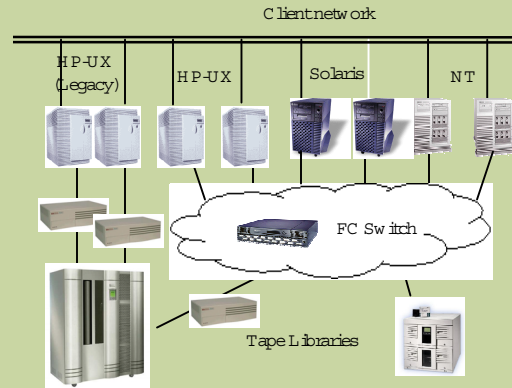
# san backup solution roadmap

## May 2000



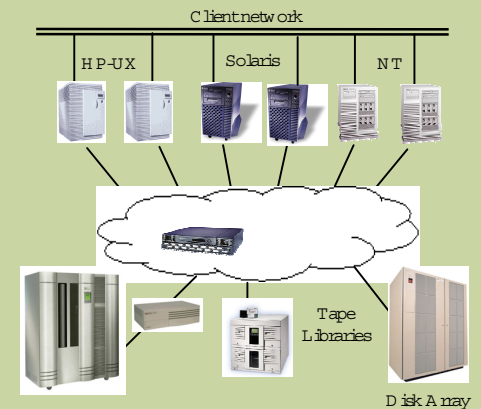
- Platforms
  - HP-UX (direct) 10.20 & 11.0
  - NT (fabric) HP, Compaq, Dell, IBM
- HBAs
  - HP 9000 PCI & HSC
  - Agilent
- Omniback II
- Brocade 2800 & 2400 switch
- FC Bridge 4/2 for STK Libraries
- Separate disk and tape SAN

## July 2000



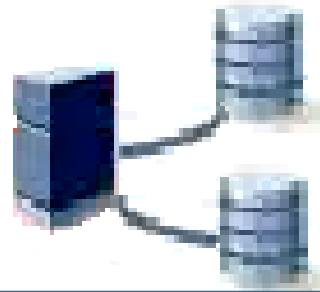
- Platforms
  - HP-UX (fabric) 11.0 (64-bit)
  - HP-UX (direct) 10.20, 11.0 (32-bit)
  - NT (fabric) HP, Compaq, Dell, IBM
  - Solaris (fabric)
- HBAs
  - HP 9000 PCI (fabric), HSC (direct)
  - Agilent
  - JNIPCI & SBUS
- Omniback II
- Brocade 2800 & 2400 switch
- FC Bridge 4/2 (HP-UX & NT), FC Bridge 4/1 HV
- Separate disk and tape SAN

## Late 2000

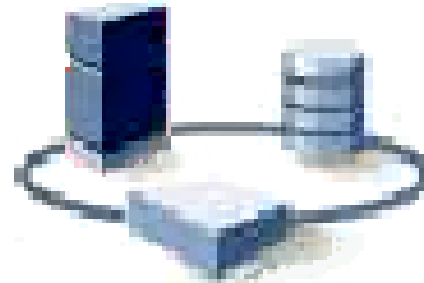


- Platforms
  - HP-UX (fabric) 11.0 (64-bit)
  - HP-UX (direct) 10.20, 11.0 (32-bit)
  - NT (fabric) HP, Compaq, Dell, IBM
  - Solaris (fabric), AIX (fabric), Netware (fabric)
- HBAs
  - HP 9000 PCI (fabric), HSC (fabric)
  - Agilent
  - JNIPCI & SBUS
- Omniback II
- Brocade 2800 & 2400 switch
- FC Bridge 4/2 (HP-UX & NT), FC Bridge 4/1 HV
- Common disk and tape SAN

san backup  
and  
restore  
solutions



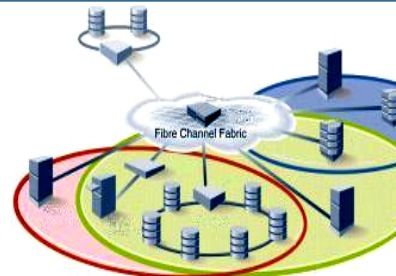
Point  
to  
Point



Arbitrated  
Loop

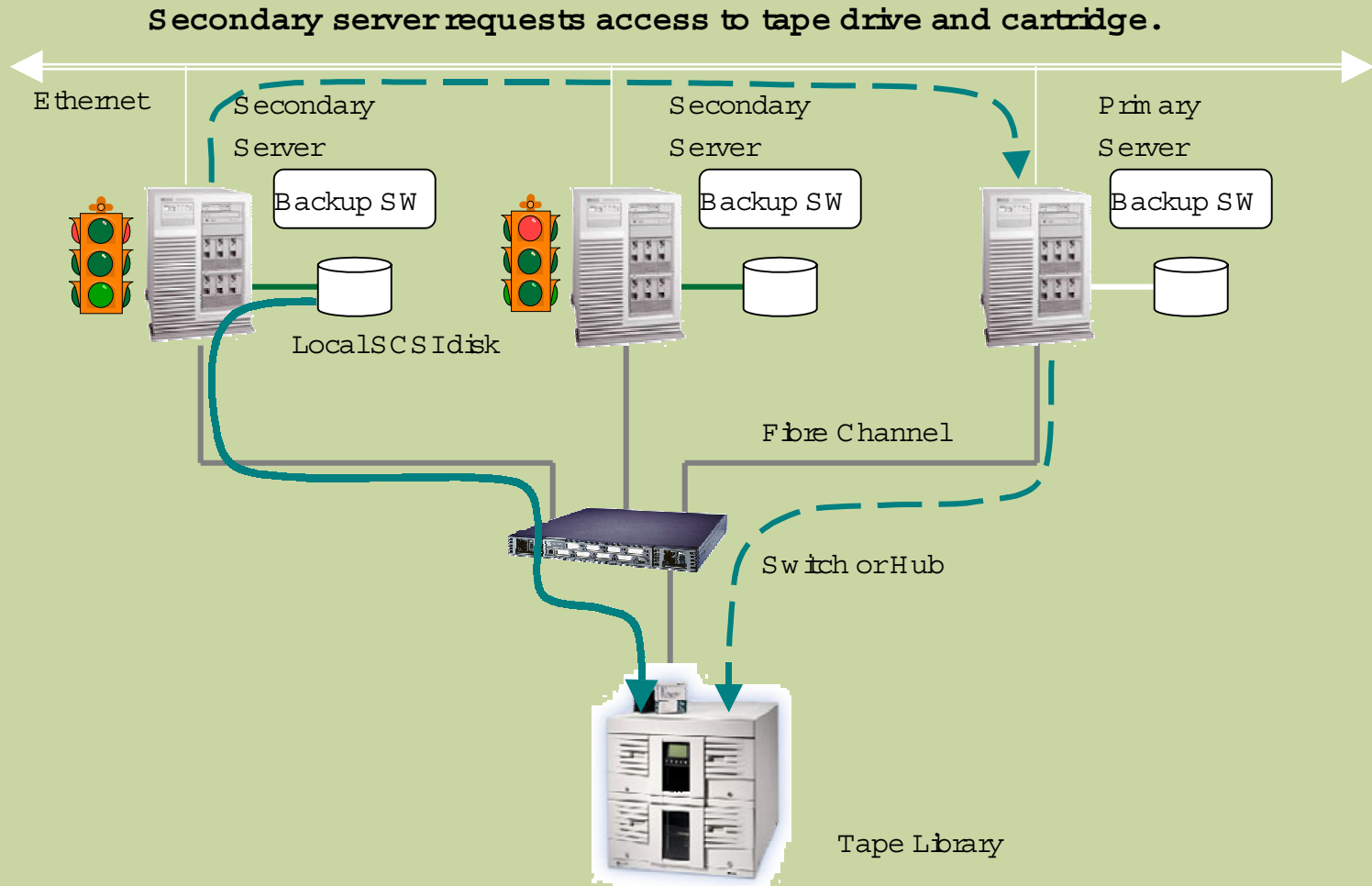


Switched  
Fabric

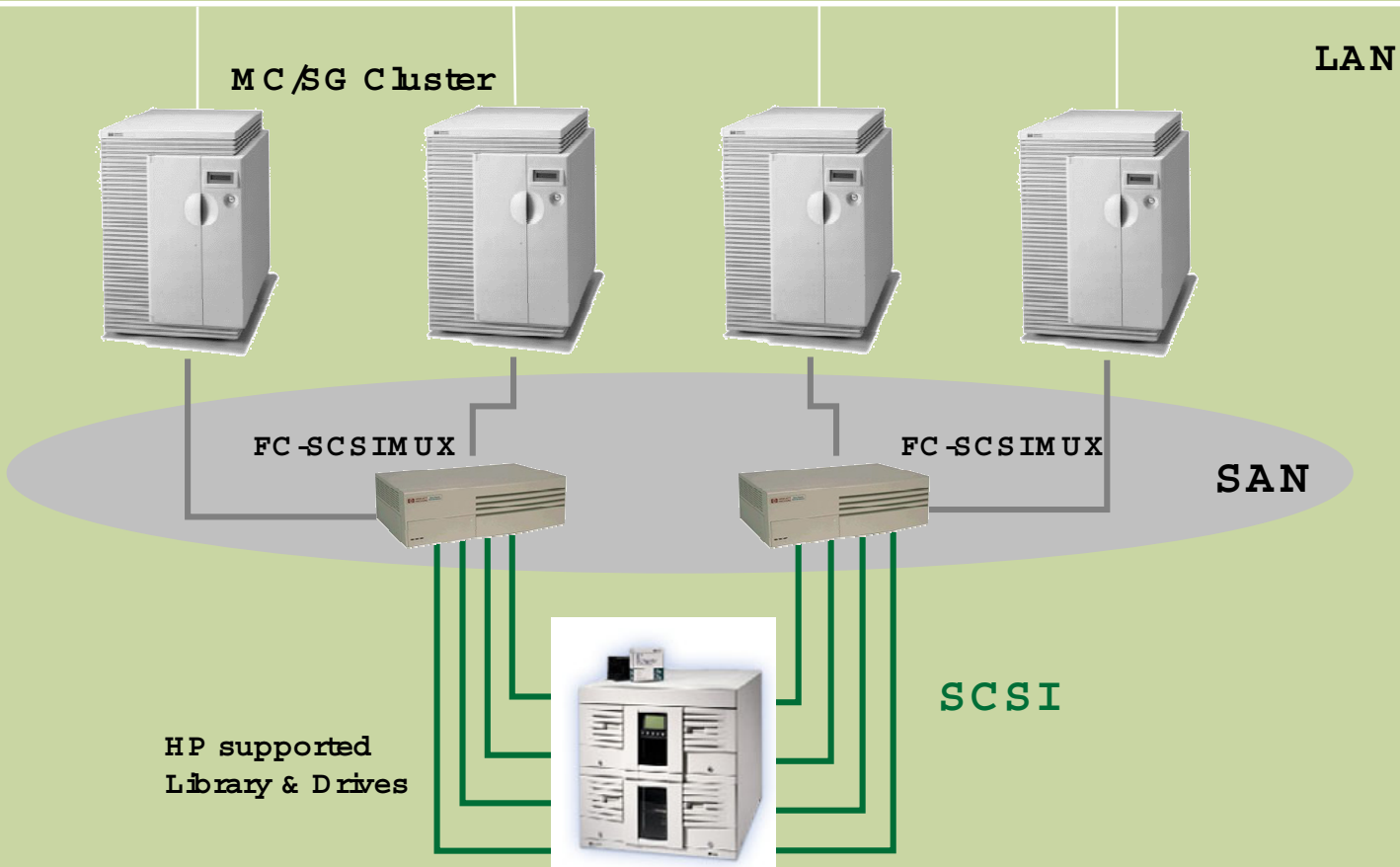


Zoning

# what is san backup?



# san solutions concept drive and library sharing

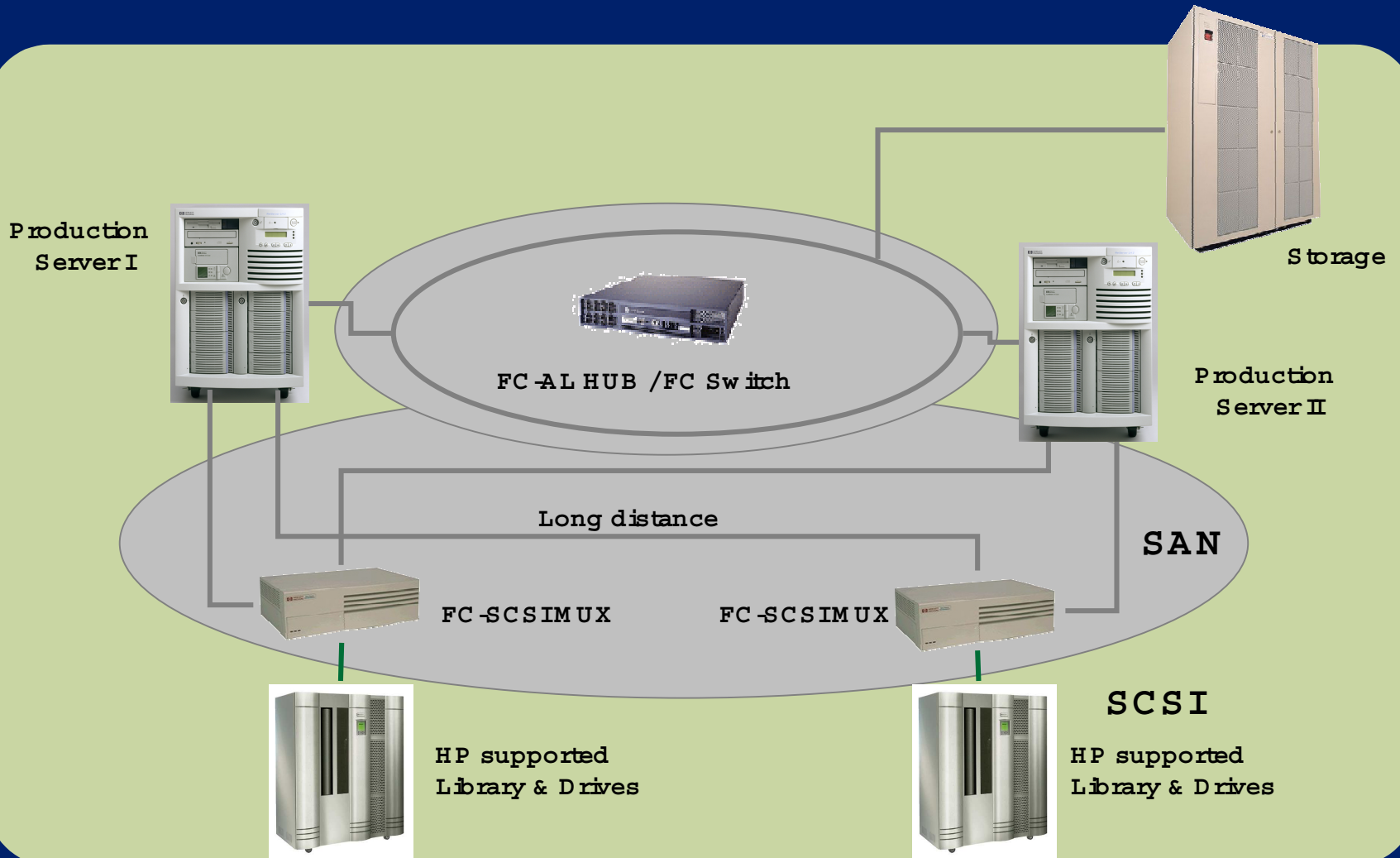


# drive and library sharing

## key advantages

- High performance backup
  - Perform local backups on all systems
  - Share the same drives between two hosts
  - Use the maximum number of drives on each machine in future with AL
- Remove the network bottleneck for backup
- Protect your investment in libraries
  - Share a common library between multiple hosts
- Increase the high availability of your environment
  - Remove SPOF of the library by sharing the robotic
  - Enable continuous backup to the same device after fail-over

# san solutions concept remote vaulting





# remote vaulting

## key procedure

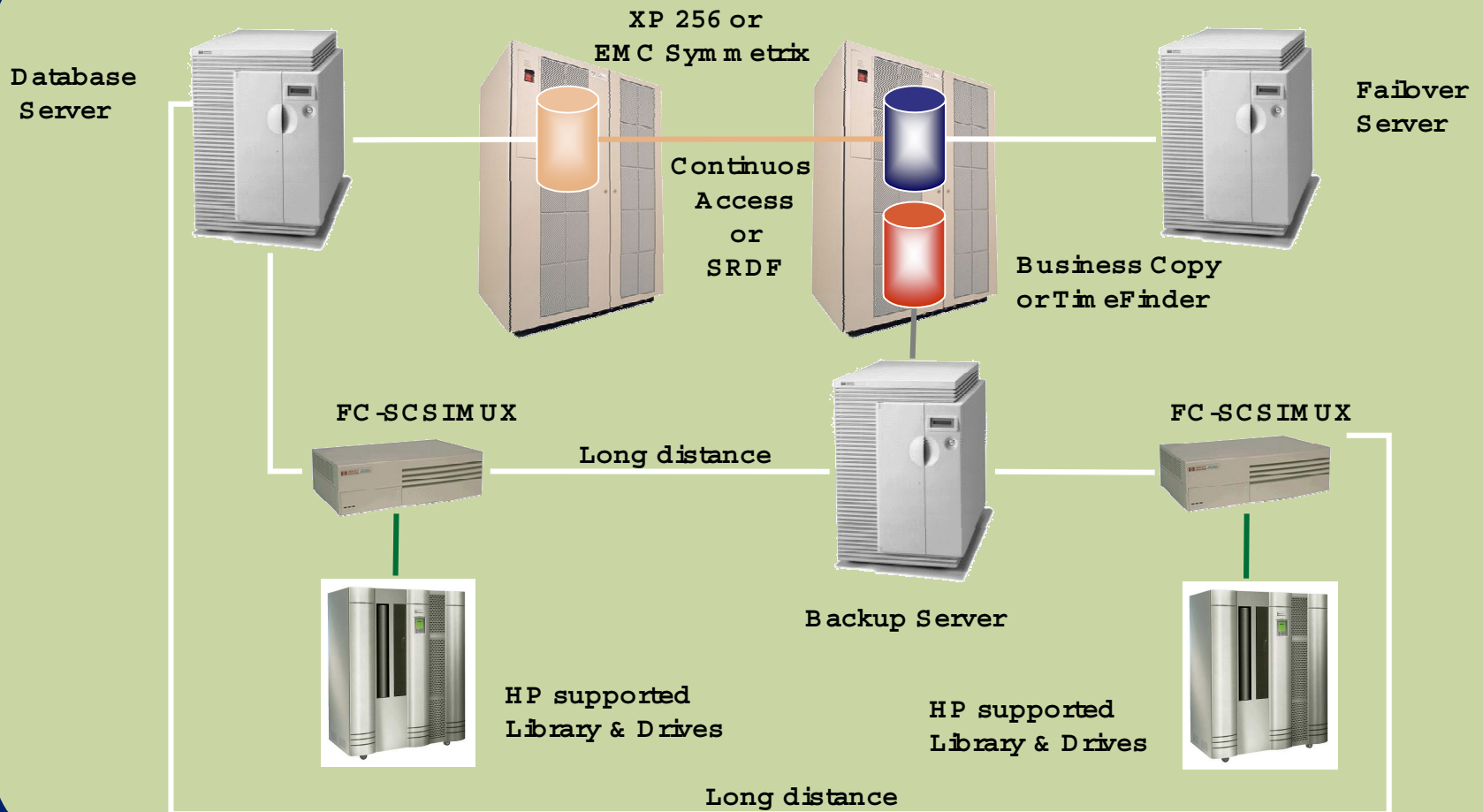
- Both sides are located in different buildings
  - using two different fire cells for protection
- Daily database backup for library I
  - fast local recovery (normal procedure)
- Daily offline redo log backup
  - 1. Copy to library I
  - 2. Copy to library II & automatic remove
- Weekly full database backup to library II

# remote vaulting

## key advantages

- Both sides are fully recoverable
  - Local recovery server using normal backup
  - On the remote side using weekly full and the archive bgs to roll forward
- Simple vaulting through normal backup process
  - Data automatically copied to remote side
  - OmnBack II library management used to control the vault
- Reduce total cost of ownership
  - No complex vault maintenance needed

# san solutions concept disaster recovery



# disaster recovery

## key procedure

- Same advantages as remote vaulting solution
- Make database highly available
  - Using HP MetroCluster for automatic remote recovery
  - Use OmniBack II/XP256 integration for zero impact backup
- Remote vaulting solution possible
- Direct restore from library possible
  - Using DBA tools

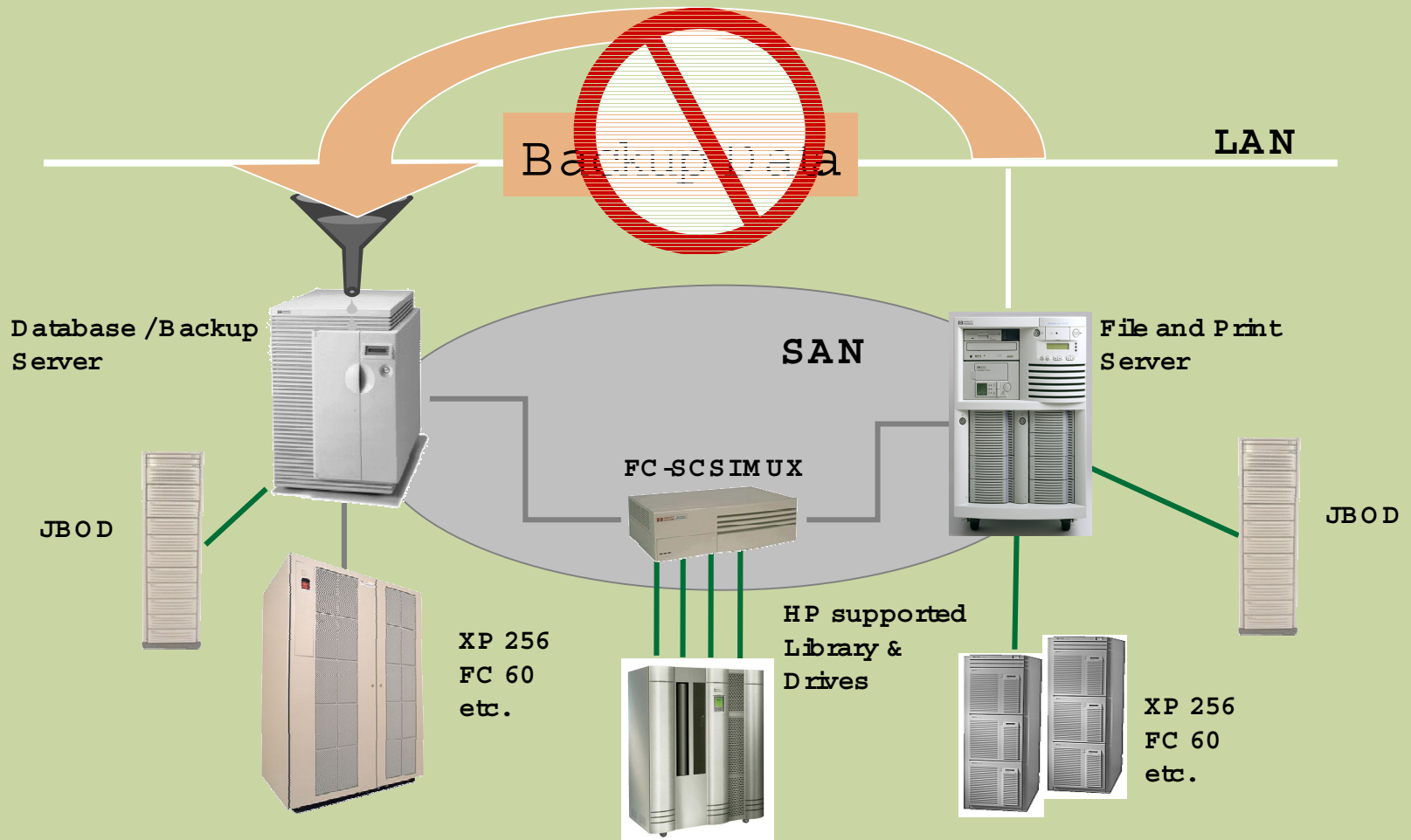
**disaster  
recovery**

**key  
advantages**

- Same advantages as remote vaulting solution
- High available data
  - No impact of backup for data availability
  - Automatic recover with MetroCluster
- Scalable solution
  - The backup window for the application is independent of database size
- High performance backup and restore
  - No backup data transferred via LAN

# san solutions concept

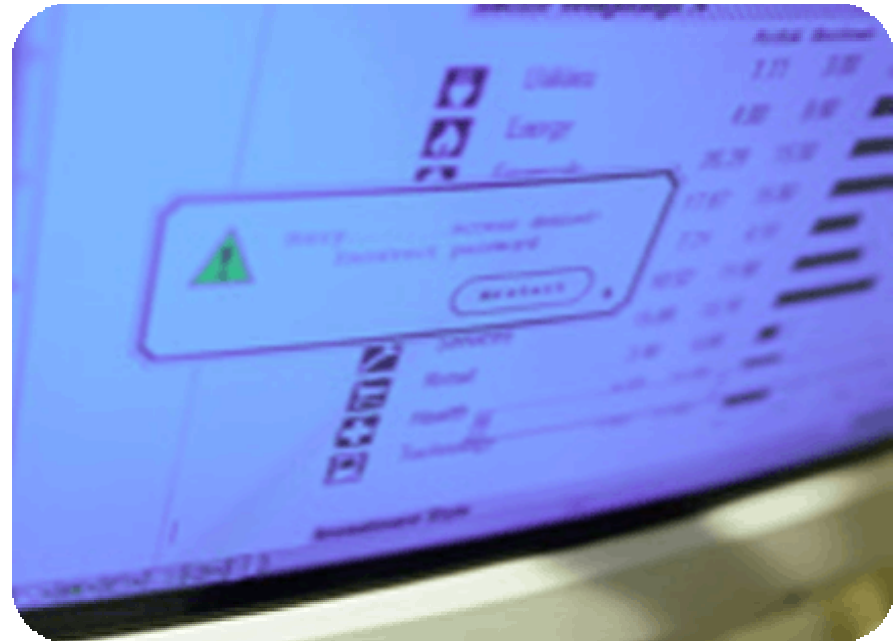
## lan-less backup



# lan-less backup

## key advantages

- Same advantages as drive and robotic sharing solution
- Remove the network as bottleneck for backup
  - perform local backups instead of network backup
- Reduce downtime of application
  - Faster backup possible through local backup



# san solutions concept heterogeneous environments



**OmniBack II  
Management Server**

**LAN**



**HP Unix  
Device Server**



**Windows-NT  
Device Server**



**FC-SCSI MUX**

**FC-SCSI MUX**



**HP supported  
Library & Drives**



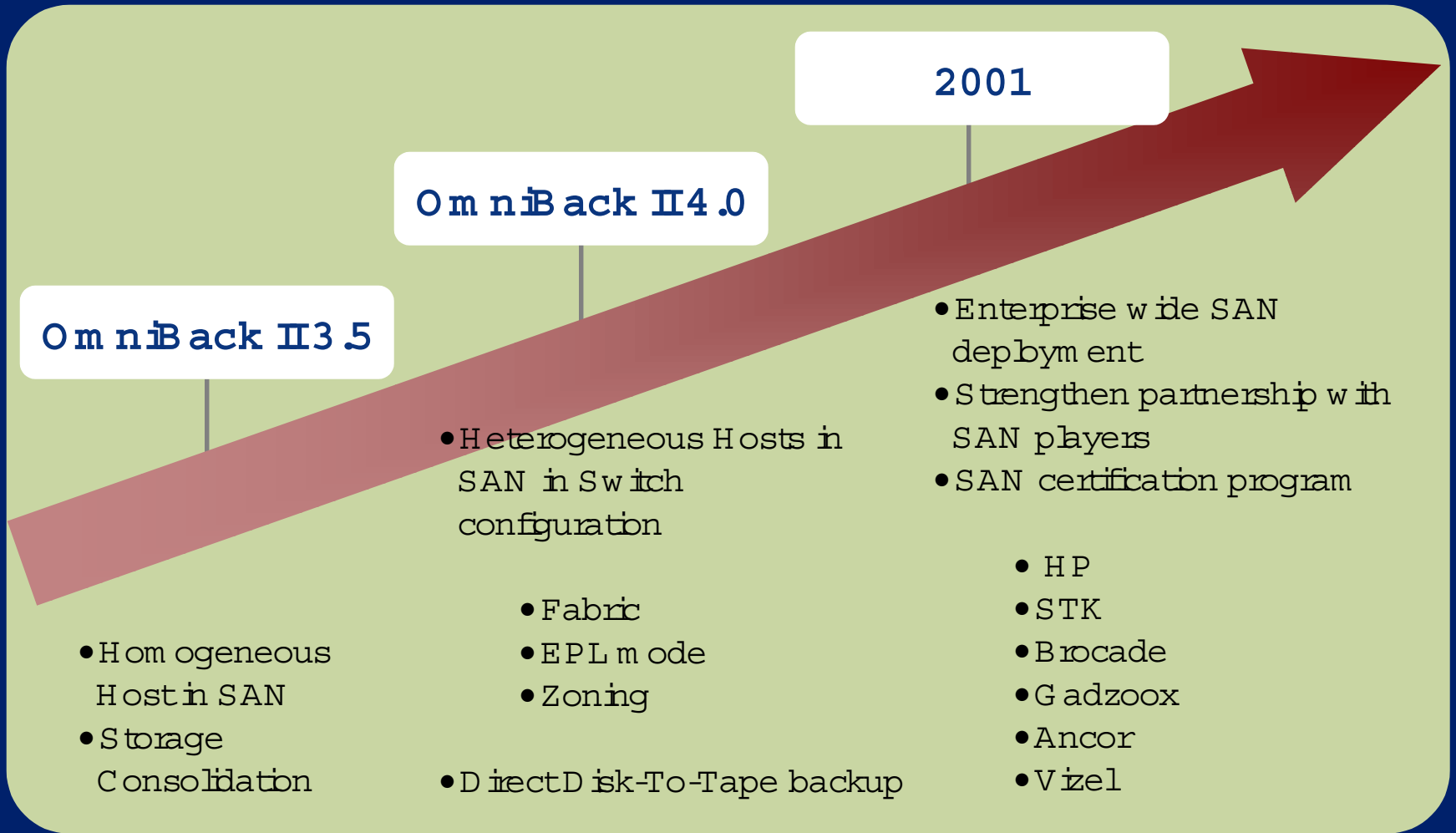


# heterogeneous environments

## key advantages

- Mix your SAN
  - Share libraries between different operating systems, HP-UX and NT
- Have all advantages of drive sharing solution
- Central control/configuration of devices in a SAN
  - Client-platform independent control
  - Free selection of management platform
  - Free selection of robotic control

# OmniBack II SAN roadmap



thank  
you

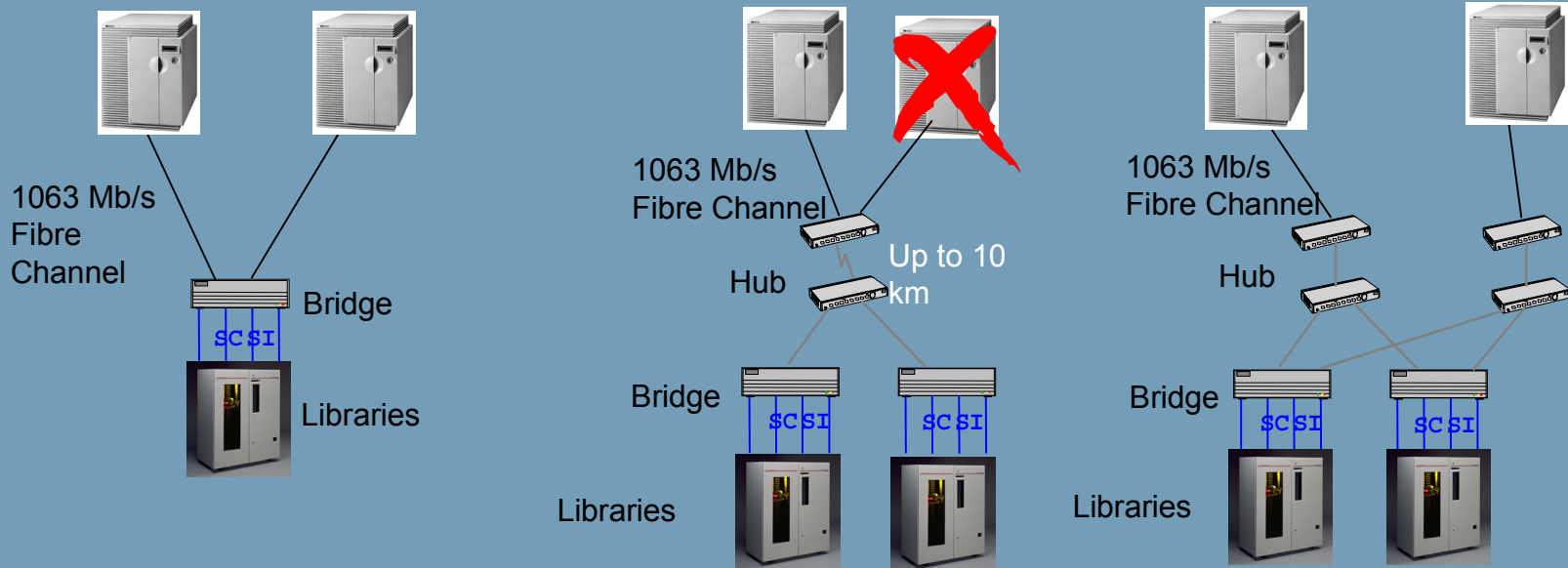
For further information:  
<http://www.openview.hp.com/>



backup  
slides



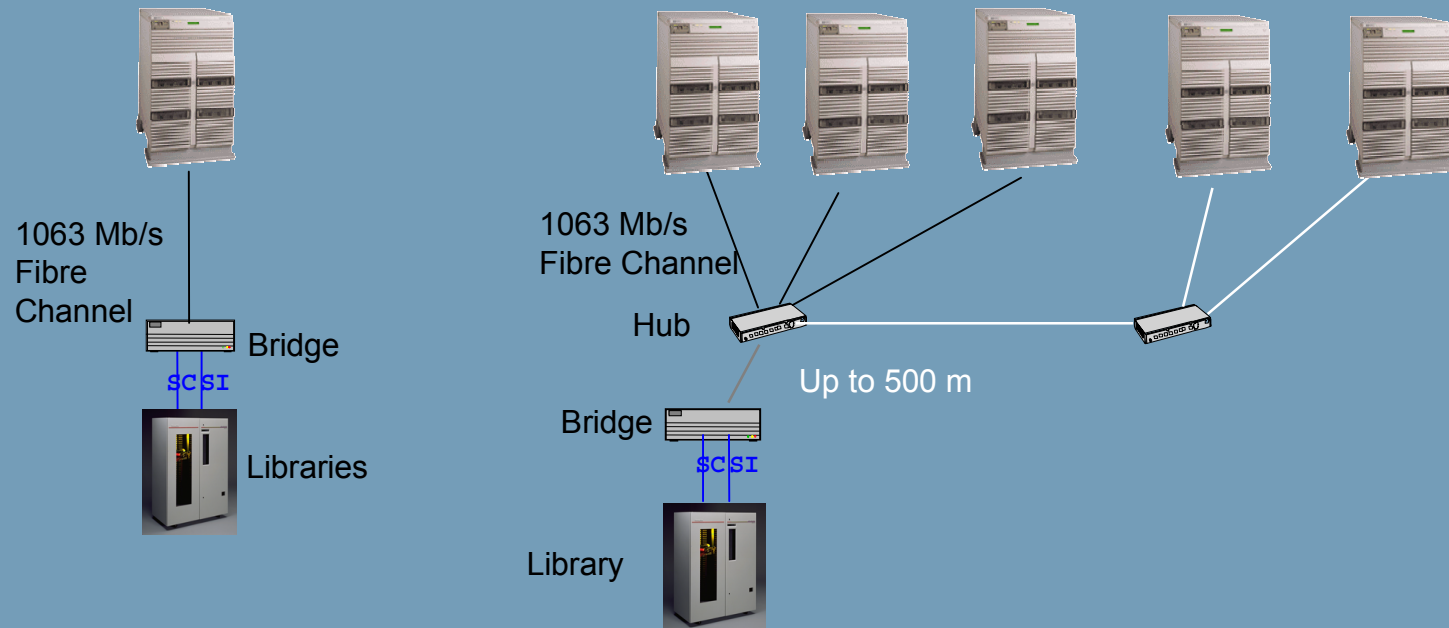
# hp-ux supported configurations for tape devices



## Notes

- If multiple servers are connected to a Hub, no libraries (through a bridge) are supported (Loop-Initialization-Problem)
- Cascading of Hubs is possible for long distance access (up to 10 km)
- For a detailed list of supported configurations see Backup Slides

# nt supported configurations for tape devices



## Notes

- NT Bridge has only one FC and 2 SCSI connections
- Hubs can be cascaded (up to 2 Hubs) for multiple server connections
- For a detailed list of supported configurations see Backup Slides

# supported point-to-point configurations

Vendors	OS	FC HBA	FC Bridge	Tape device	Status
HP	Windows NT	HP HBA-5100 Ver 2.2 ▪ D6977A HP HBA-5100 Ver 2.3 ▪ D8602A	HP 2100ER: C6340F	<ul style="list-style-type: none"> <li>HP SureStore 15-slots tape libraries Firmware 3.04 - HP Galactica family</li> </ul>	Supported
HP	HP9000 HP-UX 10.20 HP-UX 11.0	A3740A A3636A A3404A A3591A	FC Bridge 2/4 - A3308A - A3511A - A3511AZ	HP SureStore E tape libraries	Supported
STK	Windows NT	Emulex ▪ LP8000 Qlogic ▪ QLA2200	STK Bridge ▪ 3100 ▪ 3200	STK Tape libraries	Supported
STK	Sun Solaris 2.6, 7	Jaycor ▪ JNI Sbus	STK Bridge ▪ 3100 ▪ 3200	STK Tape libraries	Supported

# supported hub-sw itch configurations

Vendors	OS	FC HBA	FC Bridge	HUB / SWITCH	MODE	Status
HP	Windows NT	HP HBA-5100 Ver 2.3 ▪ D8602A	HP 2100ER: C6340F	Hub - D6976A	Private Loop	Supported
HP	HP9000 HP-UX 10.20 HP-UX 11.0	A3740A A3636A A3404A A3591A	FC Bridge 2/4 - A3308A - A3511A - A3511AZ	Short wave Hub - A3724A/AZ Long wave Hub - A4839A/AZ	Note: Only single server per Hub is supported	Supported
STK	Windows NT	Emulex - LP8000 Qlogic - QLA2200	STK Bridge ▪ 3100 ▪ 3200	STK Access Hub	Private Loop Note: Single Host per loop	Supported
	Sun Solaris 2.6, 7	Jaycor ▪ JNI Sbus	STK Bridge ▪ 3100 ▪ 3200	STK Access Hub	Private Loop Note: Single host per loop	Supported
STK	Windows NT	Emulex - LP8000 Qlogic - QLA2200	STK Bridge - 3100 - 3200	Brocade Switch 2800	- Quick Loop - Fabric Loop	Planned
	Sun Solaris 2.6, 7	Jaycor ▪ JNI Sbus	STK Bridge ▪ 3100 ▪ 3200	Brocade Switch 2800	- Quick Loop - Fabric Loop	Planned