Emulex HBAs
Key Element to A Robust SAN

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Sr. Director, Product Marketing

HP Solution Symposium – Storage Track

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Emulex: Building on a Foundation of Strength

- 520 Employees
  - Costa Mesa, CA
  - Bothell, WA
  - Bolton, MA
  - Longmont, CO
- Worldwide manufacturing partners

- ■ **Strong track record of growth**
  - ↪ 5 Consecutive years of revenue growth
    - ↪ FY03 Revenue of $308M
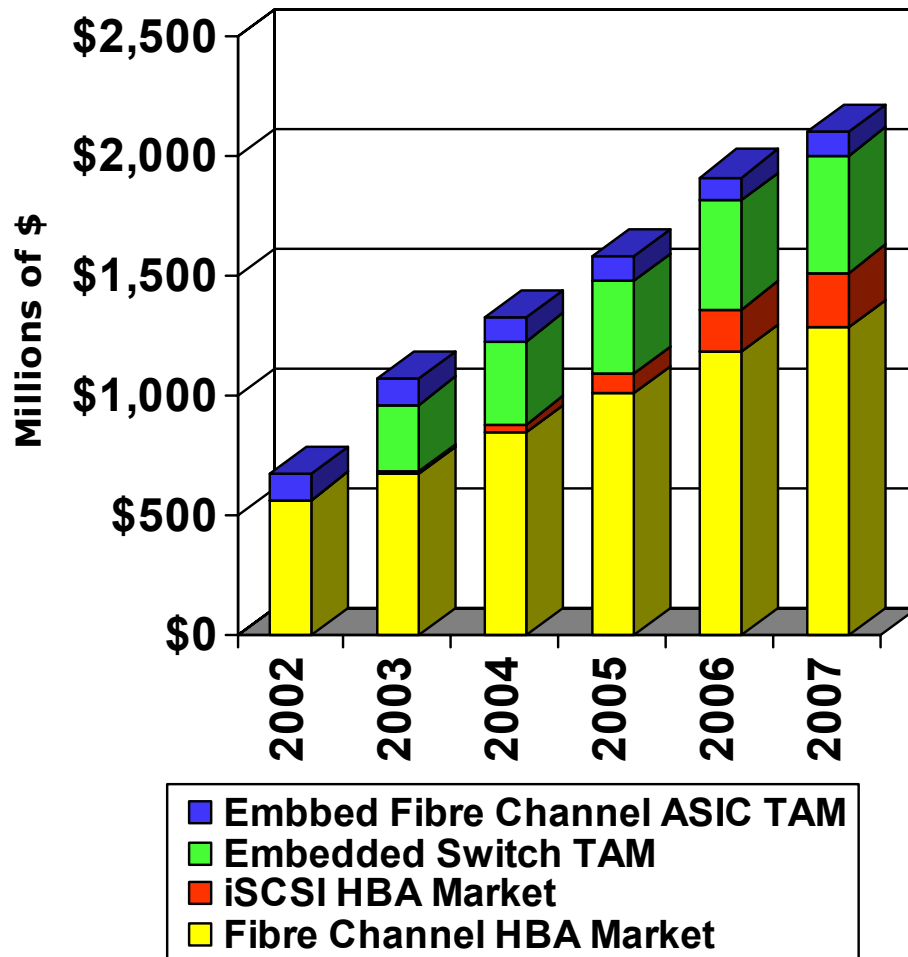 - ↪ #1 HBA Market Share
  - ↪ 1.4M units shipped

- ■ **Strategic investments fuel continued growth**
  - ↪ Vixel acquisition
  - ↪ Software technologies
  - ↪ Intel/Emulex joint development

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Expanding Market Opportunities

Chart: Millions of $ by year (2002–2007)

Legend:
- **Embbed Fibre Channel ASIC TAM** (blue)
- **Embedded Switch TAM** (green)
- **iSCSI HBA Market** (red)
- **Fibre Channel HBA Market** (yellow)

Y-axis: $0, $500, $1,000, $1,500, $2,000, $2,500

- **Vixel acquisition adds strength in embedded switching market**
  - ⇨ InSpeed technology ideally suited for non-fabric switching applications
    - ⇨ SBOD and Root Switches
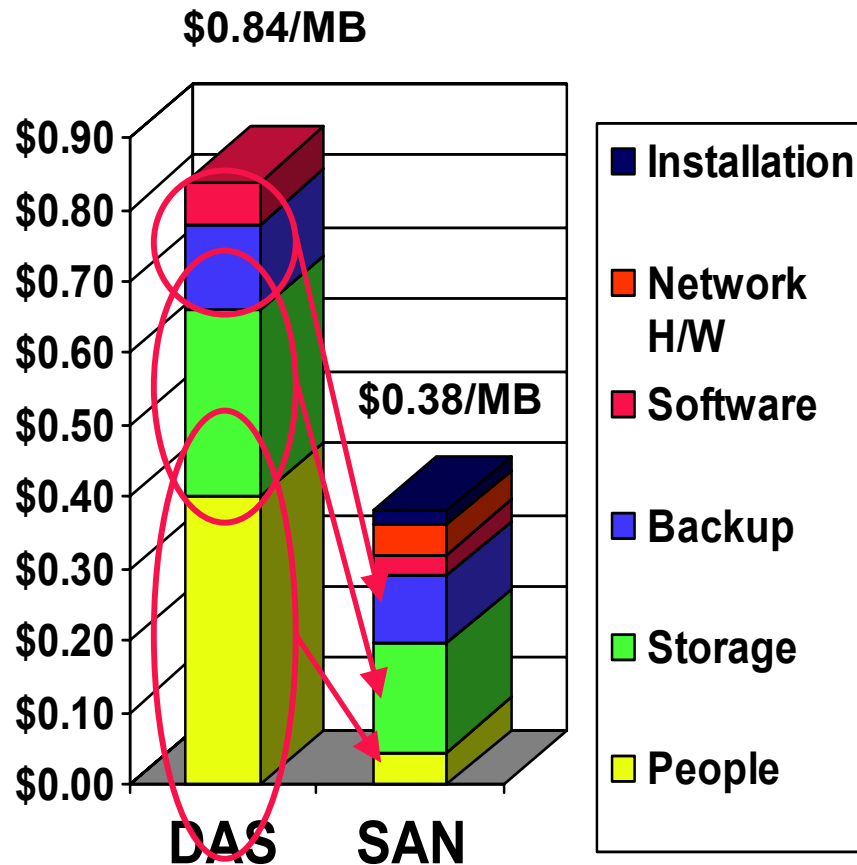   - ⇨ Server blades
    - ⇨ SMB SANs

- **Growing opportunity in embedded Fibre Channel**
  - ⇨ I/O Controllers and switch ASICs provide key synergies with OEM customers

- **Driving Fibre Channel into the SMB Market**
  - ⇨ Significant opportunity for easy-to-use SAN products

Source: IDC (July 2003), Gartner (July 2003), Vixel and Emulex

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Management Drives SAN TCO

$0.84/MB

$0.38/MB

Chart legend:
- ■ Installation
- ■ Network H/W
- ■ Software
- ■ Backup
- ■ Storage
- □ People

Chart axis values: $0.90, $0.80, $0.70, $0.60, $0.50, $0.40, $0.30, $0.20, $0.10, $0.00

Categories: DAS, SAN

Source: McKinsey, 2001

- ■ **SANs reduce people cost of management 66-92%** (McKinsey, Gartner, Enterprise Storage)

- ■ **SANs improve disk utilization up to 85%** (McKinsey)
  - ↪ **Easier to re-allocate or re-provision centralized storage**

- ■ **SANs reduce backup costs**
  - ↪ **Number of tape drives reduced 50-75%** (McKinsey)

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Microsoft Systems Architecture (MSA)

Emulex is the exclusive MSA Fibre Channel HBA for Microsoft Systems Architecture – Internet Data Center

- **Rigorously tested and validated technology architecture**
  - Provids planning and implementation blueprints
  - Includes storage, networking, security, management, and application infrastructure

- **Designed to be used 2 ways**
  - Proactive strategy to standardize IT architecture
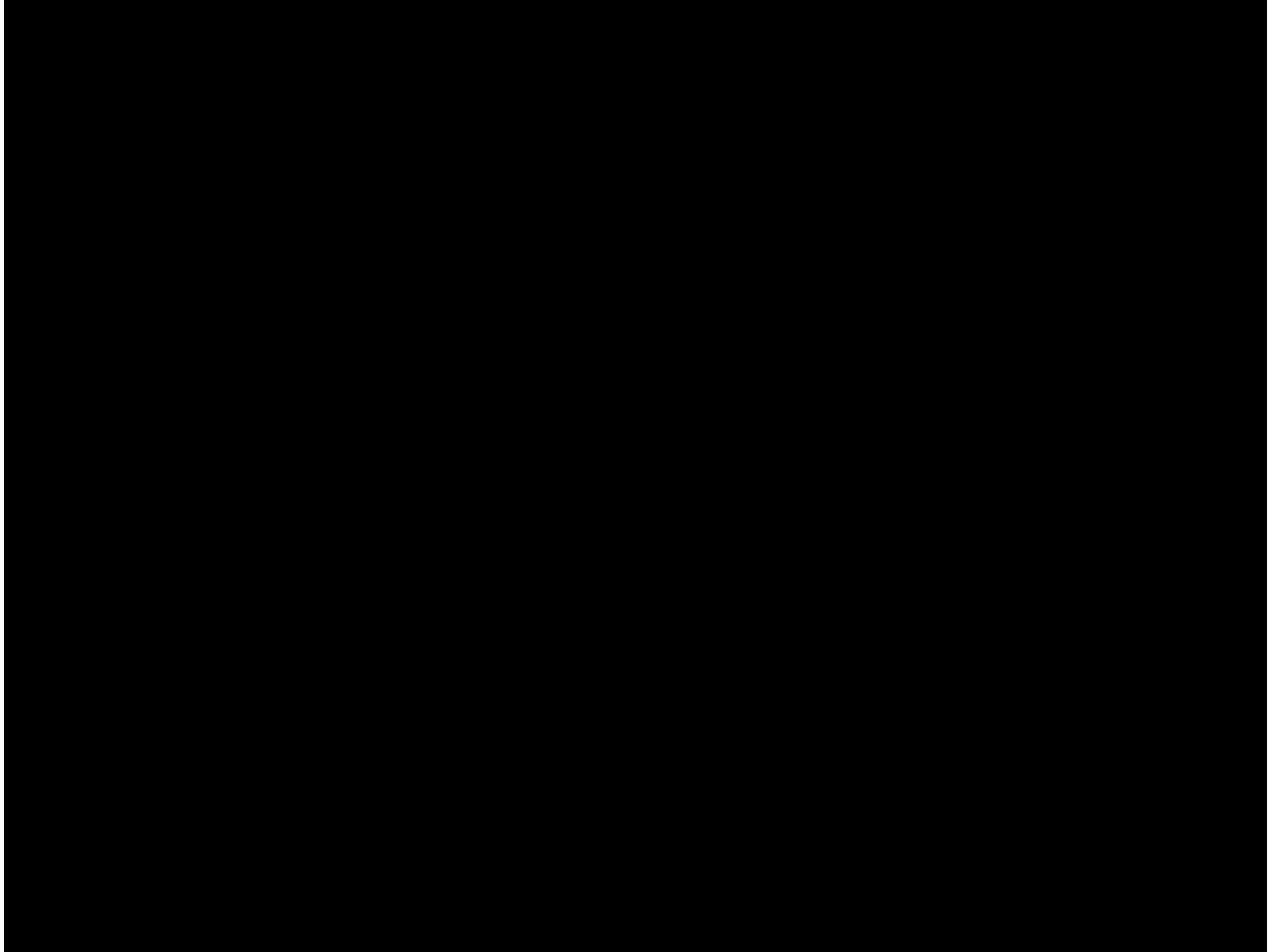 - Tactical approach to roll out specific projects

Windows 2000 partners

Windows Server 2003 partners

"Anatomy of an HBA"

Emulex Advantages

#1 HBA Supplier to HPQ

ProLiant Series

Alpha Series

HP 9000 Series

HP Integrity Series

»rx5670

»rx4640

»rx2600

Servers

StorageWorks RAID Array Series

HP SureStore NAS 8000

StorageWorks Modular Storage Array Series

StorageWorks Modular Array Series

Disk Storage

StorageWorks VA Storage Array Series

StorageWorks XP Storage Array Series

StorageWorks Enterprise Virtual Array Series

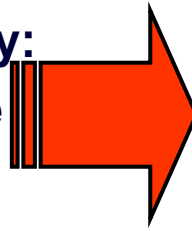**StorageWorks Enterprise Backup Solutions (EBS)**

Tape Storage

✓ **Over 350,000 HBAs shipped to HPQ**

✓ **Support for strategic OSs: HP-UX, Windows, Linux**

✓ **HBAs and drivers for HP-UX: HP logo certified and hazard tested**

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"Future-Proof Your Investment
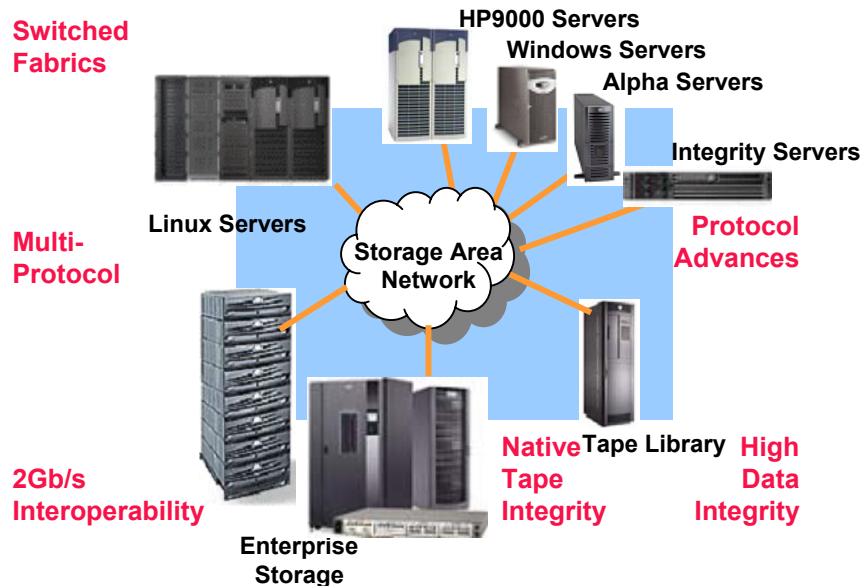
Unique Emulex Capability:

- **Independent Firmware upgrade**

- **Upgrade firmware via management utilities**

- **Enables installed base to utilize "today's" features**
  - ➥ **More than 1.4 M Emulex HBAs in service**

- **Upgrade without taking server offline**

- **Eliminates "fork-lift" upgrades**

Lower Downtime Simplified Management Protection

Switched Fabrics

HP9000 Servers
Windows Servers
Alpha Servers

Integrity Servers

Linux Servers

Multi-Protocol

Storage Area Network

Protocol Advances

2Gb/s Interoperability

Native Tape Integrity

Tape Library

High Data Integrity

Enterprise Storage

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Eliminate Driver Complexity
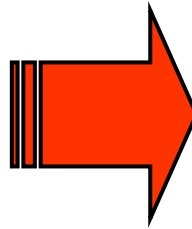
Unique Emulex Capabilities:

- **Hardware-Independent Driver Architecture**
  - ➪ **One O/S driver for all products**

1G & 2G:
- PCI
- compact PCI
- low profile PCI
- PCI-X
- PCI-Express
- Sbus
- dual channel

- **Simplifies configuration and maintenance**

- **Enables seamless migration to new technologies**
  - ➪ **Product Families**
    - ➪ **LP7000, LP8000, LP9002L, LP9800, LP10000**
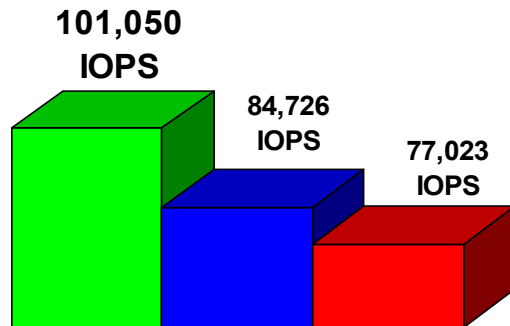 - ➪ **Technology Transition**
    - ➪ **2Gb/s, 4Gb/s, PCI-X, PCI Express, 10Gb/s, … etc.**

- **Simplifies and accelerates OEM and partner design cycles and TTM**

Simplifies Management
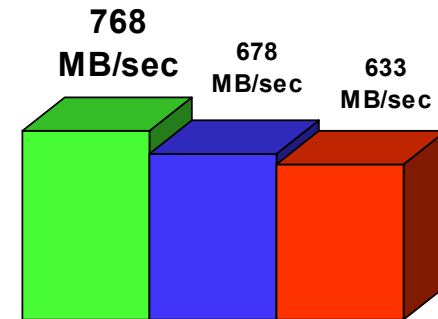*Reduces Downtime*
Lowers Qualification Costs

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#1 in Fibre Channel HBA Performance

PCI-X HBA *Transaction* Performance

101,050 IOPS
84,726 IOPS
77,023 IOPS

■ LP10000DC ■ LP9802DC ■ Competitor

- **31% faster than competition**
- **19% increase over previous generation HBA**

PCI-X HBA *Throughput* Performance


768 MB/sec
678 MB/sec
633 MB/sec

■ LP10000DC ■ LP9802DC ■ Competitor

- **21% faster than competition**
- **13% increase over previous generation HBA**

Note: Transaction performance based on 2K block sequential READ IOPS in a MS Windows 2000 environment; throughput performance is based on 64K block read/write MB/sec in a MS Windows 2000 environment; data represents the total for both channels on dual channel HBA

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#1 HBA in Mixed Workload Performance

PCI-X HBA *Transaction* Performance

7,400

5,400

IOPS

Emulex   Competitor
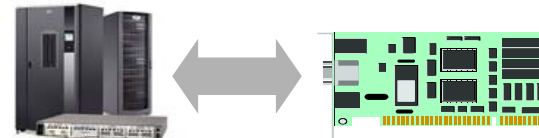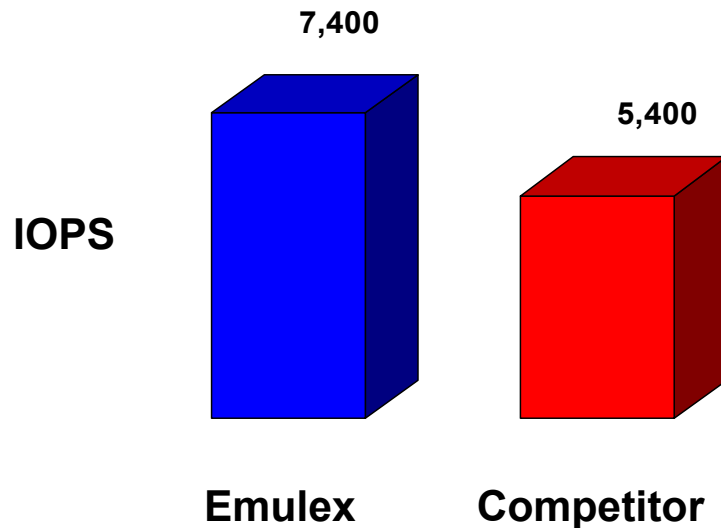
Tape and Disk Storage attached to one HBA

- **Concurrent transaction and backup workloads**

- **Transactions processed at frame rather than exchange level**

  ⇨ **37% faster transaction performance**

Note: Mixed workload performance based on a workload that is split between 2K block READ transaction and 64K block WRITE backup in a MS Windows 2000 environment
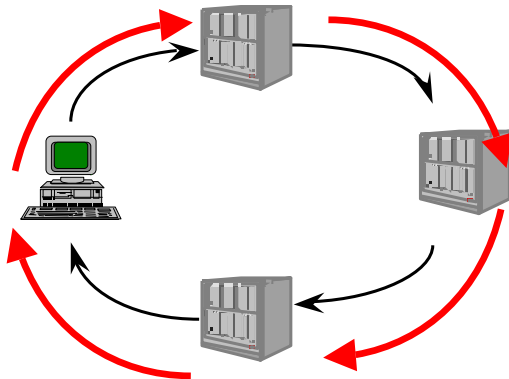
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Enabling Technology

Largest Buffer-To-Buffer Credits

Benefit:

- **Higher Performance in Distance Applications**
  - ⇨ **Allow Devices to Negotiate Maximum Amount of Data In-Flight**
  - ⇨ **Credits Represent Size of Buffer on HBA**
  - ⇨ **Emulex provides 64 buffer to buffer credits (2K ea) on LP8/9000, 16 credits on LP850/950. Most others provide 4**

Loop Buffer to Buffer Distance = Entire Distance Between two Devices
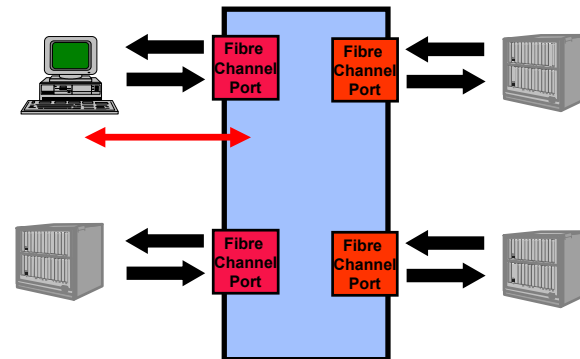
**Fabric Buffer to Buffer Distance = Distance Between Device & Switch Port**

Hardware Context Cache

- **Improved Receive Performance in Switched Fabric Applications**
  - ➥ **Efficient hardware processing of interleaved exchanges**
  - ➥ **Offloads Host PCI Bus CPU (contexts are not spilled/filled across the PCI Bus)**
  - ➥ **Critical in Multi-Target Configurations**
- **Improved Scalability**
  - ➥ **Able to process up to 2048 concurrent active exchanges**
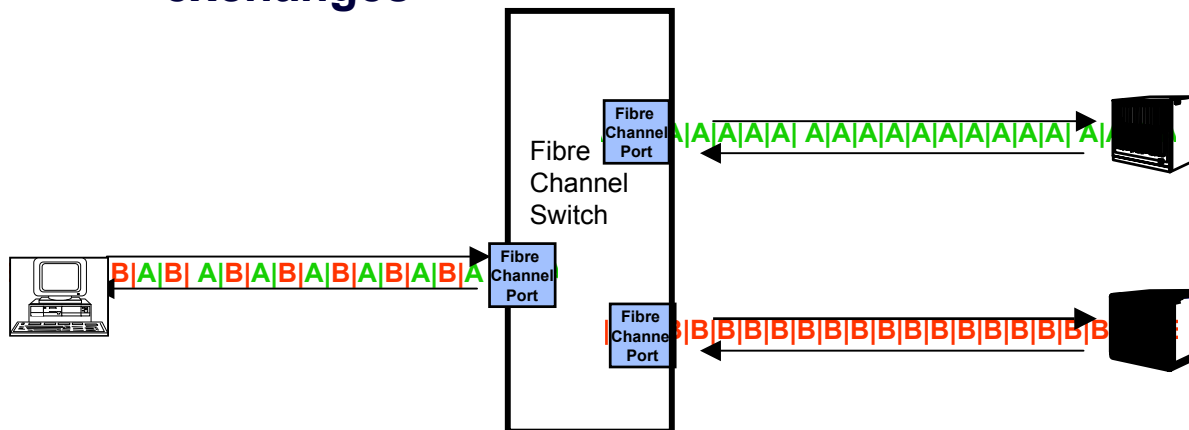
Superior Product Design

Common drivers simplify HBA integration and management

Independent drivers and upgradeable HBA firmware protects investment

HBA platform continues to scale offering increased performance, new features, flexibility
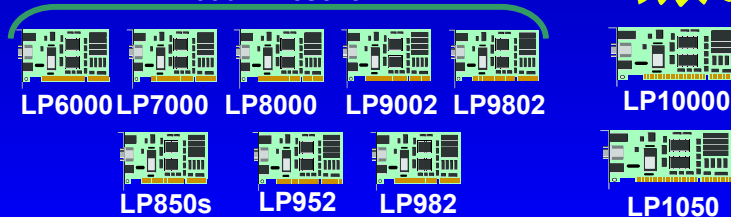
Management Applications

FC-MI Management API   **Emulex APIs**
(SNIA API)

Common Drivers
Across Platforms and Generations

Service Level Interface (SLI)

Fibre Channel HBAs   *New! PCI-X*

1996 - Present

LP6000 LP7000 LP8000 LP9002 LP9802   LP10000

LP850s   LP952   LP982   LP1050

1/ 2Gb/s: PCI, c PCI, PCIx, SBus, dual channel HBAs

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Product Overview

+ *Host Bus Adapters (HBAs)*
+ *Management Applications*
+ *Embedded Switching*

Servers & Storage Matrix

	HP HBA Model #	HBA Model#	O/S Environment
ProLiant ML Family, ProLiant DL Family, ProLiant BL p-Class	DS-KGPSA-CB/CY FCA2404DC FCA2408 FCA2355 FCA2404	LP8000 LP9802DC LP982 LP9002DC LP9802	Windows (32-bit) NT, 2000 & Server 2003
HP Integrity Series (rx5670, rx2600, rx4640, rx8620), **HP Alpha Servers**, **HP 9000 Superdome Server**	AB232A	LP9802	Windows Server 2003 (64-bit)
	A7298A	LP982	Linux 64-bit
		LP9002L LP9002DC	HP-UX 11i V1
StorageWorks Modular Storage Array Series, **StorageWorks RAID Array Series**, **StorageWorks XP Storage Array Series**, **StorageWorks Enterprise Virtual Array Series**, **StorageWorks VA Storage Array Series**, **StorageWorks Enterprise Backup Solutions (EBS)**	FCA2404 FCA2355 FCA2404DC FCA2408	LP9802 LP9802 LP9002DC LP9802DC	Windows (32-bit) NT, 2000 & Server 2003
	FCA2101	LP952L	Windows (32-bit) NT, 2000 & Server 2003 Linux 32-bit
	FCA2354	LP9002L	Tru64/OpenVMS
	AB232A	LP982	Windows Server 2003 (IA 64-bit)

HBAs Cross Referenced Matrix

Emulex Model	HP Model	Description	Targeted System & OS
LP8000	DS-KGPSA-CA/CX	1-Channel PCI	Tru64/OVMS
LP8000	DS-KGPSA-CB/CY	1-Channel PCI	Windows
LP952L	FCA2101	1-Channel PCI	NAS, Windows & Linux
LP9002L	FCA2354	1-Channel PCI	Tru64/OVMS
LP9002DC	FCA2355	2-channel PCI	Windows & Linux
LP982	A7298A	1-Channel PCI/PCI-X	Windows IPF/IA64 & Linux IA64 (Bulk pack)
LP982	FCA2408	1-Channel PCI/PCI-X	Windows
LP9802	AB232A	1-Channel PCI/PCI-X	Windows IA64
LP9802	336070-001	1-Channel PCI/PCI-X	NAS & IPF (Bulk Pack)
LP9802	FCA2384	1-Channel PCI/PCI-X	Tru64/OVMS, PCI-X for Alpha
LP9802	FCA2404	1-Channel PCI/PCI-X	Windows & Linux, PCI-X for IA32 servers
LP9802DC	FCA2404DC	2-Channel PCI/PCI-X	Windows
LP9002L		1-Channel PCI	HP-UX 11i "Certified for HP-UX"
LP9002DC		2-Channel PCI	HP-UX 11i "Certified for HP-UX"

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Fibre Channel HBA Product Line

IO Controller

•*Firmware Upgradeable*
•*Driver Compatible*

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Centaur

EMULEX
Pegasus

EMULEX
Thor

High End

LP9002L *Low Profile cPCI SBus Dual Channel*
•**64-bit/66Mhz PCI**
•**All drivers**

LP9802 *Low Profile Dual Channel*
•**133Mhz PCI-X**
•**All drivers**

LP10000 *Low Profile Single/Dual Channel*
•**Dual Channel ASIC**
•**133MHz PCI-X**
•**All drivers**

LP10000 *Std Height/Short Single/Dual Channel*
•**Dual Channel ASIC**
•**PCI Express bridge**
•**x4 PCI Express**
•**All drivers**

Mid Range

LP952L *Low Profile*
•**64-bit/66Mhz PCI**
•**Windows, Linux, NetWare**

LP982 *Low Profile Dual Channel*
•**133MHz PCI-X**
•**Windows, Linux, Novell**

LP1050 *Low Profile Single/Dual Channel*
•**Dual Channel ASIC**
•**133MHz PCI-X**
•**Windows, Linux, Novell**

Key Differentiators:
• High performance: CPU off-load, Bandwidth
• Highly scalable
• Hardware independent drivers
• Firmware upgradeable

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HP & Emulex HBA Selected Attributes

Category	Attribute	DS-KGPSA-CA/CX	DS-KGPSA-CB/CY	FCA2101	FCA2354	FCA2355	A7298A	336070-001	FCA2384	FCA2404	FCA2404DC	FCA2408	LP9002L	LP9002DC	LP952L	LP9802	LP9802DC	LP982	LP10000	LP10000DC	LP1050	LP1050DC	LP10000EX	LP10000EXDC
Fibre Channel	1 Gb/s	X	X																					
	1-2 Gb/s			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PCI	33 MHz/64 Bit	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
	66 MHz/64 Bit			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
PCI-X	133 MHz/64 Bit				X	X	X	X	X	X		X			X	X	X	X	X	X				
PCI Express	x4																						X	X
PCI Form Factor	Short	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Low Profile			X	X		X	X	X	X	X	X			X	X		X	X	X	X	X		
Dual Ports	2 Channels/Adapter						X				X			X			X			X		X		X
Media Interface	SC	X	X																					
	SFF SW LC			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	SFF LW LC														X			X						
HP Certified Device Drivers	HP-UX												X	X										
	Linux/Windows			X		X	X	X		X	X													
	Tru64/OVMS	X			X				X															
	Windows		X									X												
Emulex Device Drivers	All drivers												X	X		X	X		X	X			X	X
	Linux/NetWare/Windows														X			X			X	X		

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LP9802DC Host Bus Adapter
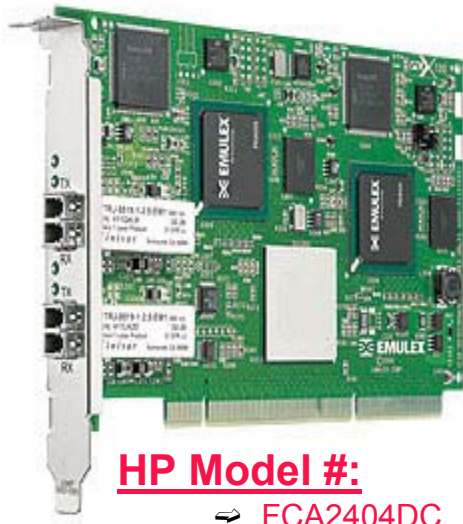
HP Model #:
- FCA2404DC

- **1 standard model**
  - LP9802DC-F2

- 64-bit 66/100/133 MHz PCI-X 1.0a compatible
  - 33/66 Mhz PCI 2.2 compatible
  - 3.3 and 5 volts required
  - Dual channel short form factor PCI card
- Software
  - Supports Windows NT/2000, Linux, NetWare, Solaris and HP-UX
  - Custom drivers through Emulex SLI
  - Supports cHBA API, HBAnyware, MultiPulse
- Architecture
  - Emulex Pegasus ASICs
  - 1024 concurrent on-board exchanges/channel
  - 16 buffer to buffer credits/channel
  - Full Speed PCI-X to PCI-X Bridge

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LP9802 Host Bus Adapter
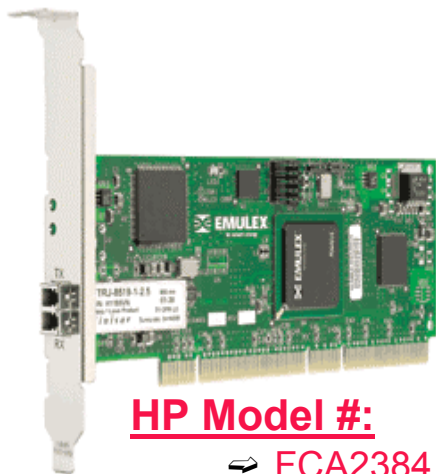
HP Model #:
- FCA2384
- FCA2404
- AB232A
- 336070-001

- **2 standard models**
  - LP9802-F2
  - LP9802-X2

- **64-bit 66/100/133 MHz PCI-X 1.0a compatible**
  - 33/66 MHz PCI 2.2 compatible
  - 3.3 VDC
  - Short form factor and low profile PCI card

- **Software**
  - Supports Windows NT/2000, Linux, NetWare, Solaris, and HP-UX
  - Custom drivers through Emulex SLI
  - Supports cHBA API, HBAnyware, MultiPulse

- **Architecture**
  - Emulex Pegasus ASIC
  - 2048 concurrent on-board exchanges
  - 64 buffer to buffer credits

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LP10000 Family
2Gb/s Fibre Channel PCI-X HBAs

New

- **Features 20% higher transaction performance and up to 25% lower power than previous generation adapters**

- **Advanced Emulex HBA architecture**
  - ⇨ **Driver compatibility across product line**
  - ⇨ **High availability**
  - ⇨ **Scalability features**
  - ⇨ **Simplified SAN Management**

- **Single- and dual-channel models**
  - ⇨ **Low profile PCI (MD2) card format**
  - ⇨ **Enterprise and mid-range versions**
  - ⇨ **3.3 volt PCI signaling, 5 volt tolerant**

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LP10000
Enterprise-Class HBAs

New

Emulex Exclusive

- **Enterprise HBA features**
  - ⇨ Features larger data buffering and on-board context caching for performance and scalability
  - ⇨ Driver Support for Windows NT/2000/Server 2003, NetWare and Linux
  - ⇨ Additional driver support for Solaris, HP-UX and custom drivers
  - ⇨ Robust fabric boot support in x86, IPF and SPARC systems
  - ⇨ M2 optics supports digital diagnostics interface enabling SAN management packages to monitor and manage critical link data
  - ⇨ Improved initialization sequence, supporting all Sun dynamic reconfiguration modes

- **Single- and dual-channel models**
  - ⇨ LP10000-M2: Single-channel, short-wave optical link
  - ⇨ LP10000DC-M2: Dual-channel, short-wave optical link

- **Low profile PCI (MD2) card format**
  - ⇨ Low profile mounting bracket available at no additional cost

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LP1050
Mid-Range HBAs

New

- **General Purpose HBA**
  - ⇨ **Low cost adapters supporting Windows NT/2000/Server 2003, NetWare and Linux**
  - ⇨ **Linux support now includes full-featured open source driver**
  - ⇨ **On-card fabric boot support for x86 and IPF systems**
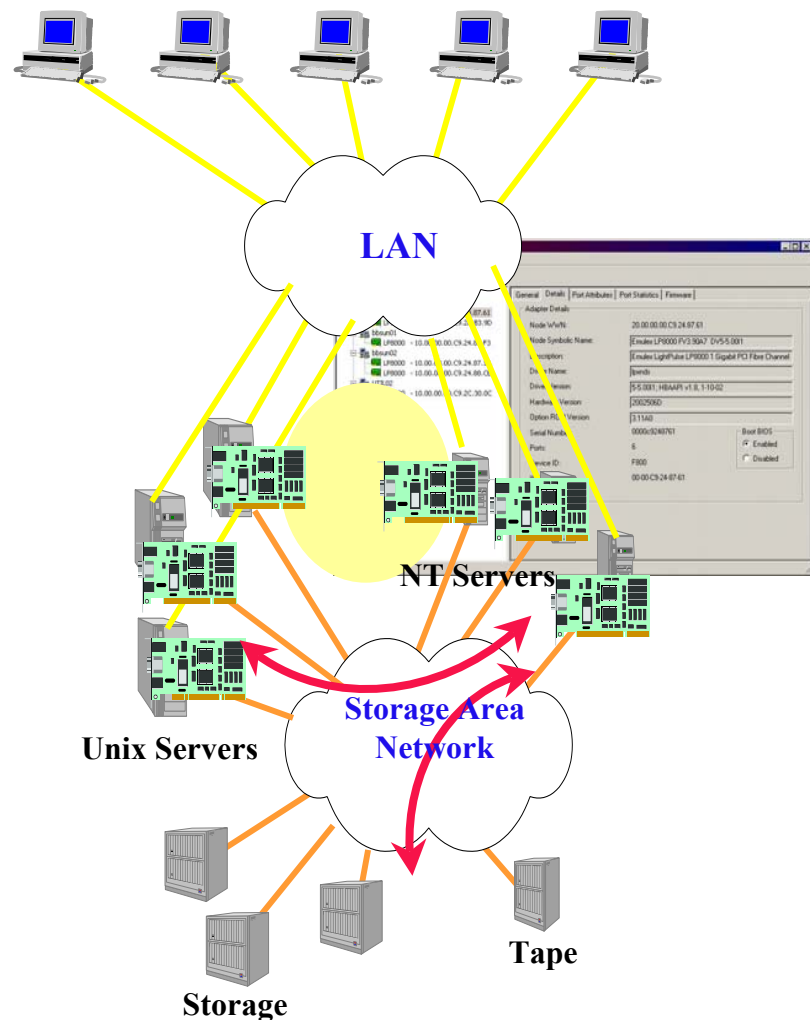
- **Single- and dual-channel models**
  - ⇨ **LP1050-F2: Single-channel, short-wave optical link**
  - ⇨ **LP1050DC-F2: Dual-channel, short-wave optical link**

- **Low profile PCI (MD2) card format**
  - ⇨ **Low profile mounting bracket available at no additional cost for servers utilizing this type of slot**

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HBAnyware™

- **Centralized HBA management suite designed to simplify and improve SAN management, and lower total cost of ownership for SAN based storage**
  - ⇨ **Enables complete HBA management across heterogeneous SANs from a single console**
- **Product features**
  - ⇨ **Remote Management API support for SAN management applications integration**
  - ⇨ **Windows and Java GUIs and CLI provided**
  - ⇨ **Real-time discovery of in-depth HBA data**
  - ⇨ **Enables remote firmware upgrades**
  - ⇨ **Industry-standard CT based in-band management**
- **Fully compatible with installed base of over 1,400,000 Emulex HBAs for easy deployment**

LAN

NT Servers

Unix Servers

Storage Area Network

Storage

Tape

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HBAnyware Feature Sets

HBAnyware 1.0

- **Infrastructure**
  - In-band communication based on Authenticated CT protocol
  - Fabric-wide discovery of Emulex HBAs
  - API strategy for integration into OEM and third-party solutions
    - RMAPI
    - CT extensions
- **Management features**
  - Real-time capture of in-depth HBA attributes and statistics
  - Remote firmware upgrade
- **Standalone GUI utility and CLI**
  - Cross-platform, heterogeneous
- **Delivery**
  - Packaged with standard driver kits
    - 32-bit Windows
    - Solaris 32/64
  - Production deployments since Q1-CY03

HBAnyware 2.0

- **Infrastructure**
  - Security provisions for secure in-band management
  - Advanced discovery service
    - Improved performance and scalability
    - Real-time changes
  - Extended APIs
- **Management features**
  - Driver configuration
  - Persistent bindings management
- **Enhanced GUI utility and CLI**
 - Showcase of framework capabilities
  - Basis for a new utility strategy
- **Delivery**
  - Expanded platform support to include
    - 64-bit Windows
    - Linux
  - Production deployments begin Q4-CY03

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MultiPulse^{TM}
Intelligent High-Availability Technology

- **Unique driver-based technology**

- **Improves SAN reliability and performance**
  - ⇨ **Dynamic load-balancing and fail-over**
  - ⇨ **Improved data availability due to fast response time and intelligent re-routing**
  - ⇨ **Optimizes I/O traffic across multiple paths across the SAN**

- **Fully compatible with installed base**

- **Stand-alone solution or complimentary to OEM products**

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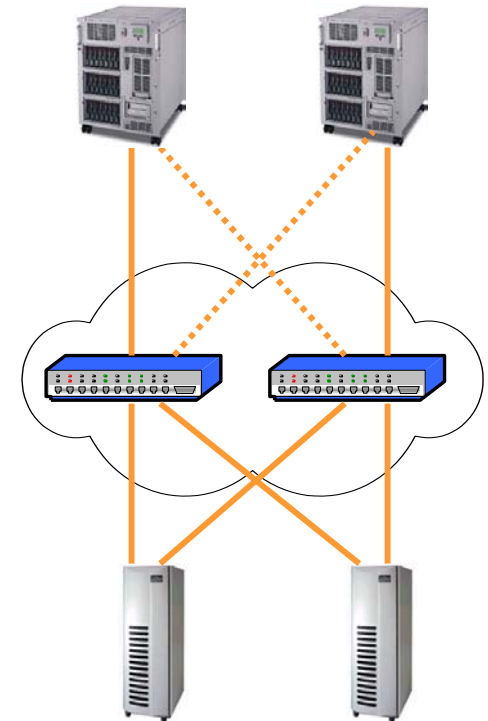
InSpeed Technology Defined

Fibre Channel Switch-on-a Chip (SOC)
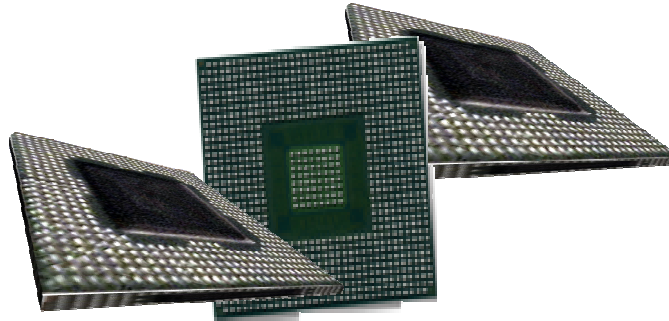
- Unique switching architecture designed from ground-up as an effortlessly managed interconnect solution
- Optimized for the needs and price requirements of storage and server supplies - breaking new cost/performance barriers
  - ⇨ Increases systems uptime by 20%
  - ⇨ Increases overall performance by up to 5 times
  - ⇨ Reduces cost-per-megabyte of storage by 20%
  - ⇨ Reduces cost of service by up to 15%
- No other technology offers integration at this level

COMPUTER TECHNOLOGY REVIEW
EDITORS CHOICE
2002

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Modular RAID Today

Modular Storage Architecture is Shared

Shared Infrastructure

Hosts
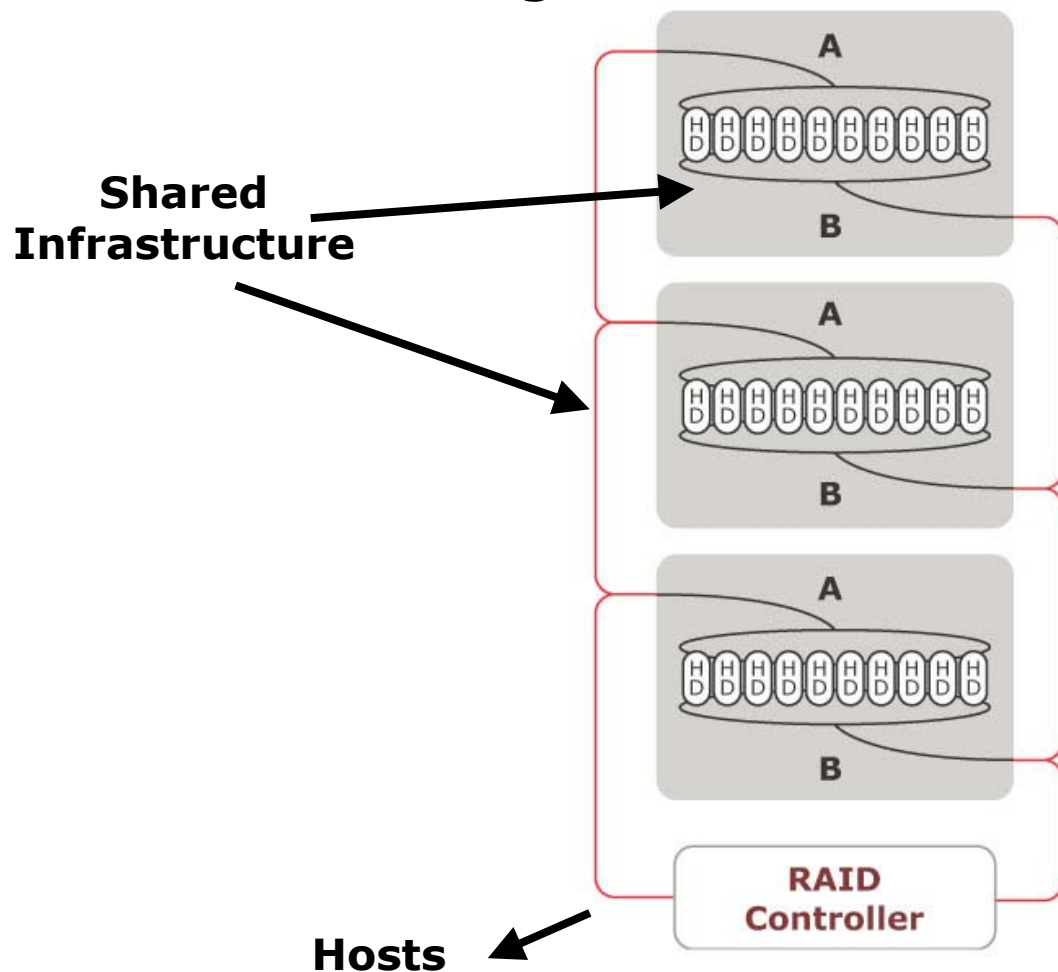
Challenges:

- Shared architecture
- Probability of double loop failures
- Serviceability
- Drive Isolation & Diagnostics
- Latency increases with # HDDs

Switched architectures are improving today's modular designs

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InSpeed Embedded Switch Solutions

Storage Array
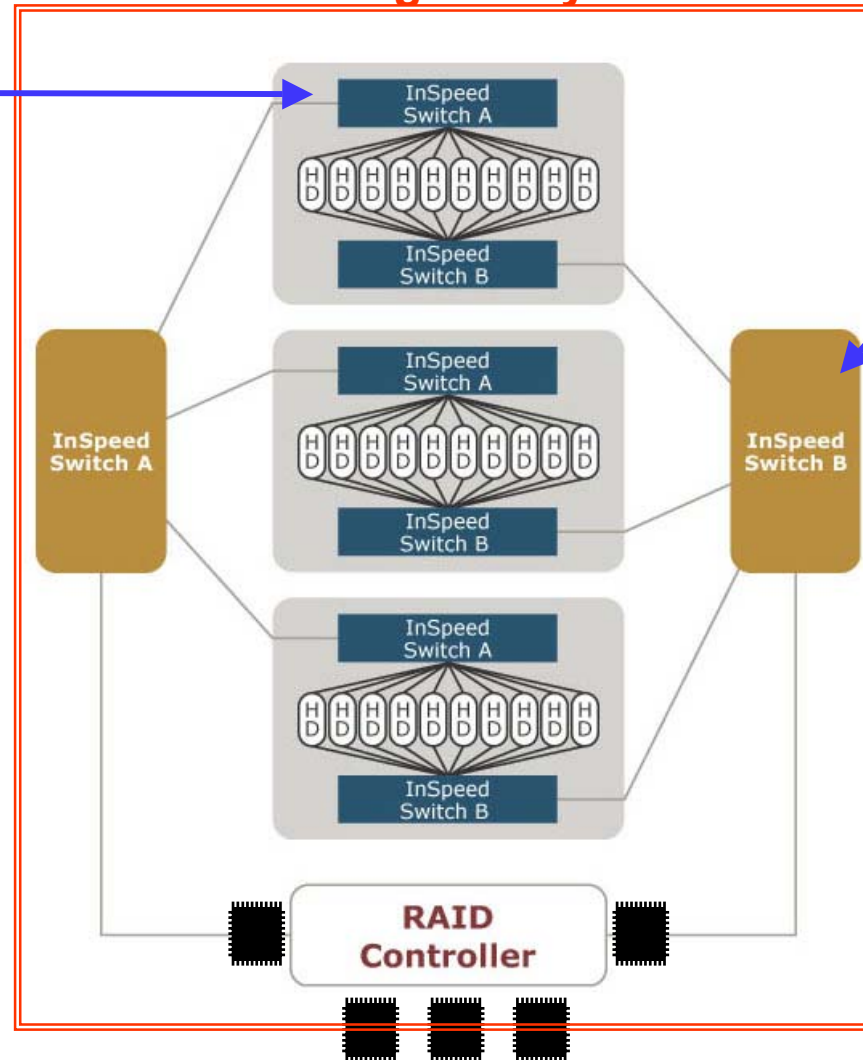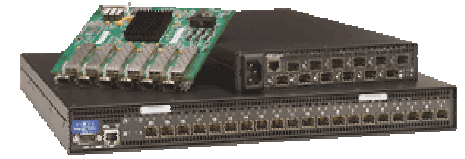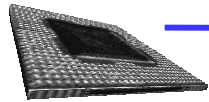
SBOD SOC:

"Switch the Disks"

- **Convert JBODs t SBODs**
- **Drive monitoring**
- **Drive isolation**
- **Performance**
- **Customers include Network Appliance, Fujitsu, Xyratex**

Root Switch:

"Switch the Drawers"

- **Direct data path**
- **Scalability**
- **Serviceability**
- **Performance**
- **Customers include Hewlett-Packard, BlueArc, Quantum**

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HP's EVA Deployment

InSpeed Back-end Root Switch Implementation

InSpeed Embedded Storage Switches Model 310
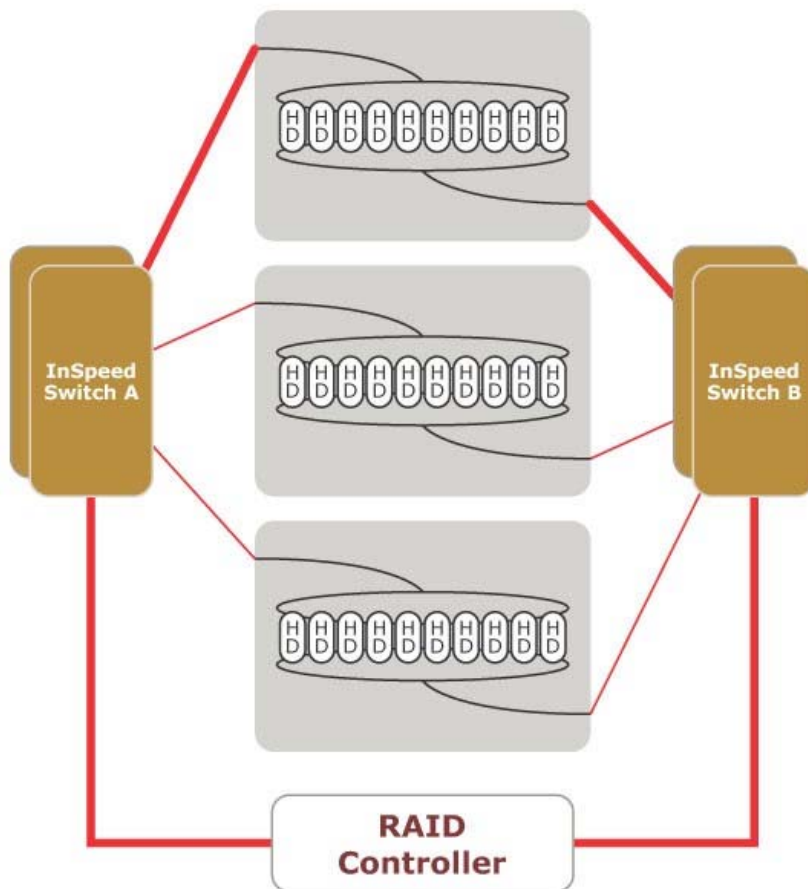
Advantages:

- **Performance**
  - ⇨ **Outperform competition by 50% in SPC benchmark**
  - ⇨ **Turbo charged solution with up to 5x performance improvement**
- **Reliability**
  - ⇨ **Increased RAS by isolating JBOD shelves**
  - ⇨ **Decrease MTTR by field service**
- **Drop in solution – no code rewrite**

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Product Qualification Matrix

HP Servers

Hewlett Packard Product	Operating System	HP HBA Model No.	HP Part Number	HP Certified Emulex HBA
ProLiant Server (ML/DL) Family[1]	Windows 2000 Windows NT	See HP Storage section	See HP Storage section	HP provides custom versions of Emulex HBAs
ProLiant BL40p	Windows 2000 & NT Windows 2000 & 2003 Server	FCA2101 FCA2404	245299-B21 305573-B21	
Alpha Server	TRU64 UNIX OpenVMS	See HP Storage section	See HP Storage section	
HP Integrity rx2600 & rx5670	Windows Server 2003 (64-bit) Linux (64-bit)	AB232A A7298A	3R-A4133-AA or 305573-B21 N/A	
HP Integrity rx4640	Linux (64-bit)	A7298A	N/A	
HP 9000 rp2400 Series Servers	HP-UX 11i v1	N/A	N/A	LP9002L - Certified for HP-UX[2]
HP 9000 rp5400 Series Servers	HP-UX 11i v1	N/A	N/A	LP9002L - Certified for HP-UX[2]
HP 9000 rp7400 Server	HP-UX 11i v1	N/A	N/A	LP9002L - Certified for HP-UX[2]
HP 9000 rp7410 Server	HP-UX 11i v1	N/A	N/A	LP9002L, LP9002DC - Certified for HP-UX[2]
HP 9000 rp8400 Server	HP-UX 11i v1	N/A	N/A	LP9002L, LP9002DC - Certified for HP-UX[2]
HP 9000 Superdome Server	Windows Server 2003 (64-bit) HP-UX 11i v1	AB232A N/A	3R-A4133-AA or 305573-B21 N/A	HP provides custom versions of Emulex HBAs LP9002L, LP9002DC - Certified for HP-UX[2]

1. Check HP for specific server model   2. Visit http://h21007.www2.hp.com/dspp/tech/tech_TechSoftwareDetailPage_IDX/1,,991,00.html for details on "CERTIFIED FOR HP-UX"

HP NAS

Hewlett Packard Product	Operating System	HP HBA Model No.	HP Part Number	HP Certified Emulex HBA
HP SureStore NAS 8000	Linux	FCA2101	245299-B21	HP provides custom versions of Emulex HBAs

HP Storage

Hewlett Packard Product	Operating System	HP HBA Model No.	HP Part Number	HP Certified Emulex HBA
StorageWorks XP Storage Array	Windows Server 2003 (32-bit) Windows Server 2003 (64-bit) Windows 2000 Windows NT Linux (64-bit)	FCA2404, FCA2408, FCA2101 AB232A FCA2355, FCA2408, FCA2101 FCA2355 A7298A	305573-B21, 343073-B21, 245299-B21 3R-A4133-AA or 305573-B21 308540-B23, 343073-B21, 245299-B21 308540-B23 N/A	HP provides custom versions of Emulex HBAs
StorageWorks VA Storage Array	Windows Server 2003 (64-bit) Linux (64-bit)	AB232A A7298A	3R-A4133-AA or 305573-B21 N/A	
StorageWorks Enterprise Virtual Array (EVA3000 & EVA5000)	Windows Server 2003 (32-bit) Windows Server 2003 (64-bit) Windows 2000 Windows NT Tru64 UNIX & Open VMS	FCA2404, FCA2404DC, FCA2408 AB232A FCA2101, FCA2404DC, FCA2408, FCA2355 FCA2101 FCA2354, FCA2384	305573-B21, 323264-B21, 343073-B21 N/A 245299-B21, 323264-B21, 343073-B21, 308540-B21 245299-B21 261329-B21, 302784-B21	
StorageWorks RAID Array 6000	Tru64 UNIX & Open VMS	FCA2354, FCA2384	261329-B21, 302784-B21	
StorageWorks RAID Array 8000	Windows 2000/NT Tru64 UNIX & Open VMS	FCA2101, FCA2355 FCA2354, FCA2384	245299-B21, 308540-B23 261329-B21, 302784-B21	HP provides custom versions of Emulex HBAs
StorageWorks Enterprise Storage Array 12000	Windows 2000/NT Tru64 UNIX & Open VMS	FCA2355, FCA2101 FCA2354, FCA2384	308540-B23, 245299-B21 261329-B21, 302784-B21	
StorageWorks Modular Storage Array 1000	Windows Server 2003 (64-bit) Windows 2000/NT Linux (64-bit)	AB232A FCA2101 A7298A	3R-A4133-AA or 305573-B21 245299-B21 N/A	
StorageWorks Modular Array 6000	Windows 2000/NT Tru64 UNIX & Open VMS	FCA2355 FCA2354, FCA2384	308540-B23 261329-B21, 302784-B21	
StorageWorks Modular Array 8000	Windows 2000/NT Tru64 UNIX & Open VMS	FCA2101, FCA2355 FCA2354, FCA2384	245299-B21, 308540-B23 261329-B21, 302784-B21	
StorageWorks Enterprise Modular Array 12000	Windows 2000/NT Tru64 UNIX & Open VMS	FCA2101, FCA2355 FCA2354, FCA2384	24299-B21, 308540-B23 261329-B21, 302784-B21	
StorageWorks Enterprise Modular Array 16000	Windows 2000/NT	FCA2101, FCA2355	245299-B21, 308540-B23	
HSG80	Windows Server 2003 (32-bit) & Windows 2000	FCA2404DC, FCA2408, FCA2355, FCA2101	323264-B21, 343073-B21, 308540-B22, 245299-B21	

Backup Solutions

Hewlett Packard Product	Operating System	HP HBA Model No.	HP Part Number	Emulex Certified HBA
Enterprise Backup Solutions (EBS)	Windows 2000/NT	FCA2101, FC2354	245299-B21, 261329-B21	HP provides custom versions of Emulex HBAs

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Additional Product Resources

- **Emulex Webpage:**
  - ➩ **Main Page**
    - ➩ http://www.emulex.com
  - ➩ **Products Page**
    - ➩ http://www.emulex.com/products/fcswitch/index.html
  - ➩ **Technical Whitepapers**
    - ➩ http://www.emulex.com/products/white/index.html
  - ➩ **Partners Page**
    - ➩ http://www.emulex.com/partners/index.html
  - ➩ **Online Training Page**
    - ➩ http://www.emulex.com/training/index.html
- **HP Webpage**
  - ➩ **Storage Products Page**
    - ➩ http://welcome.hp.com/country/us/en/prodserv/storage.html
  - ➩ **HP-UX Page**
    - ➩ http://h21007.www2.hp.com/dspp/tech/tech_TechSoftwareDetailPage_IDX/1,,991,00.html

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