



## Decus Symposium Bonn 2003

### Brocade SilkWorm Fabric Application Platform

*Leading the Next Generation of Storage Area Networks*  
2003

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## AGENDA

- Brocade Technologie
- Brocade Roadmap & Fabric Application
- Fabric Management



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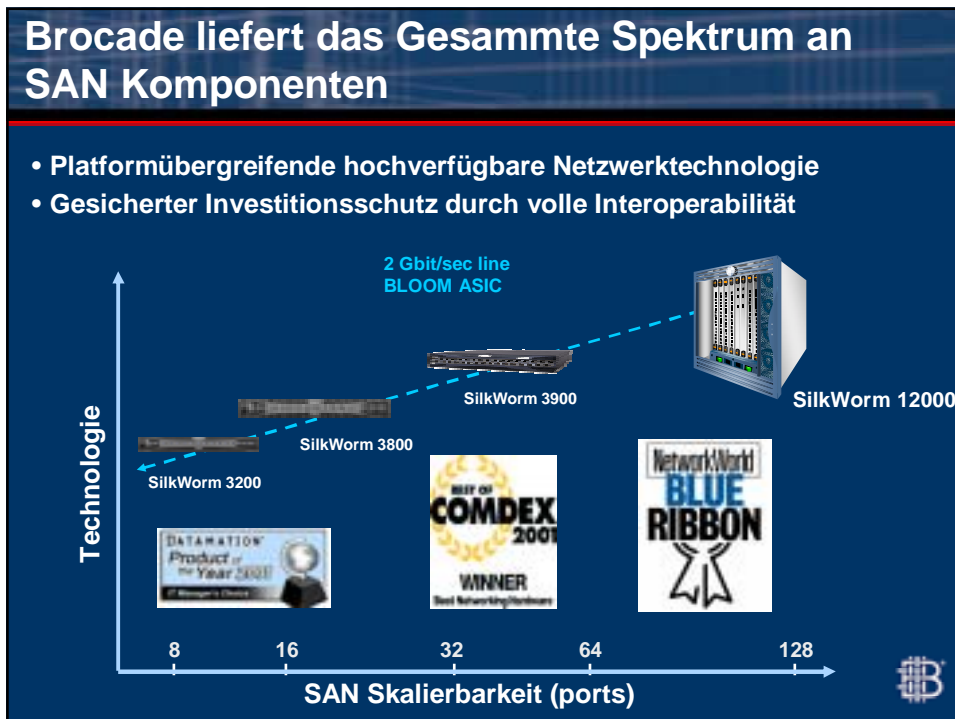
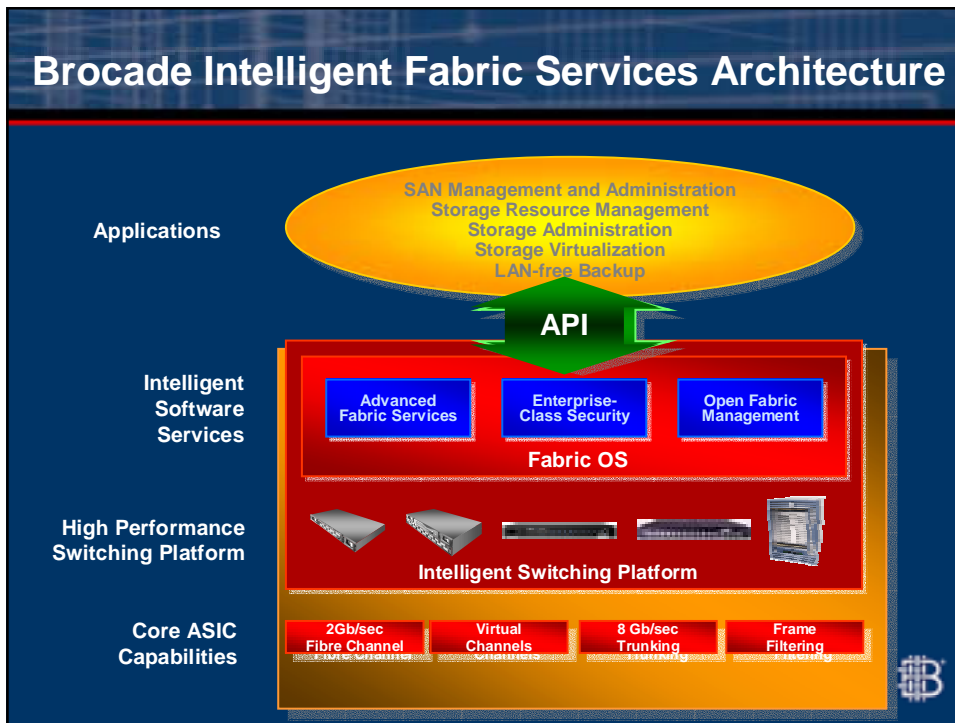


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## Brocade SilkWorm Fabric Application Platform

Industry's first open, intelligent platform for fabric-based applications



### SilkWorm Fabric Application Platform

- Selected by HP, EMC and others
- Fully interoperable and manageable with existing SilkWorm family of products

### SilkWorm 12000 Core Fabric Switch 64/128-port configurations

- Enterprise
- Available from all major OEMs



### SilkWorm 3900 32-port Fabric Switch

- Mid-range/enterprise
- Available from all major OEMs



### SilkWorm 3800 16-port Fabric Switch

- Midrange/enterprise
- Available from all major OEMs



### SilkWorm 3200 8-port Fabric Switch

- Entry-level
- Available from all major OEMs



SAN Building Blocks



## SilkWorm 3200

- Die erste low-cost 8-port 2Gbit/sec Fabric Switch
- Auto-sensing 1G/2G universal ports mit steckbarem SFP media
- Basierend auf BLOOM ASIC Technologie (dritte Generation)
- Gleiche Software wie die SW3800
  - Fabric OS 3.0.2
- Uneingeschränkte Interoperabilität mit SW2400/2800
- Konzipiert fuer kleine Umgebungen
  - 2-node NT/2000 Server Cluster
  - Bis ca. 20 Windows NT/2000 Servern
  - Anschluß von Tape devices
  - NAS device(s) mit FC backend



## SilkWorm 3800



- Basierend auf BLOOM ASIC Technologie (dritte Generation)
- 16 Auto-sensing 1 & 2Gbps universal ports
- 1 Rack Unit Bauhöhe, Sehr hohe Portdichte
- Redundante, im Betrieb wechselbare Netzteile
- Redundante, im Betrieb wechselbare Lüfter
- Neue Small Form Factor, plug-able medien (SFP)
  - LC Stecker
- Uneingeschränkte Interoperabilität mit SW2400/2800



## SilkWorm 3900 32-port Fabric Switch

- Intelligent Fibre Channel Fabric Switch
  - 2 Gbit/sec, 32-port, 1.5 U
- Common, intelligent platform
  - Wire speed frame filtering
  - 8 Gbit/sec ISL Trunking
  - Advanced Fabric Services
    - Hardware Enforced WWN Zoning
    - End-to-end performance monitoring
  - WebTools, Fabric Watch, Fabric Manager
- Optimal customer choice and flexibility
  - Start Anywhere, Grow Anywhere



## SilkWorm 12000 Core Fabric Switch/Director

- Flexible, modulare Architektur
  - Skalierbares 2 x 64-port design
  - 2 Gbit/sec ports; autosensing
  - Hohe Port Dichte– 14U
- Basierend auf BLOOM ASIC Technologie
- 99.999% Verfügbarkeit
  - Alle Komponenten Redundant und “Hot Swapable”
  - Unterbrechungsfreie Software Upgrades
- Multiprotocol Architektur
  - FICON Support (software upgrade)
  - 10Gb Fibre Channel Support
  - IP / Infiniband
- Uneingeschränkte Interoperabilität mit SW2400/2800

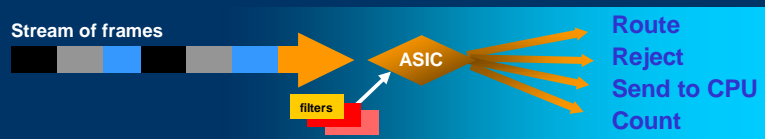


\* <http://www.nwfusion.com/reviews/2002/0506bgrev.html>



## Intelligence Starts in the ASIC

- Smart data routing through Frame Filtering



- Active Quality of Service through Virtual Channels

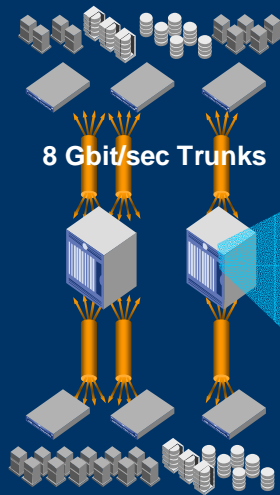


- Industry's first 8 Gbit/sec capability through ISL Trunking

**2 Gbit/sec**  **8 Gbit/sec**



## Advanced Fabric Services: Performance and Health



### ISL Trunking

- 8 Gbit/sec *Trunking* between switches for traffic aggregation – ASIC-enabled
- "Frame Striping" vs. Connection-level sharing
- Optimal performance under heavy load

### End-End Performance Monitoring

- Analyze performance by port, link, or server-storage path – uses Frame Filtering
- Foundation for capacity planning or network bill-back applications



### Fabric Health Monitoring

- Real-time threshold monitoring and notification of performance levels or error conditions via *Fabric Watch*
- Reduces risk of unplanned downtime

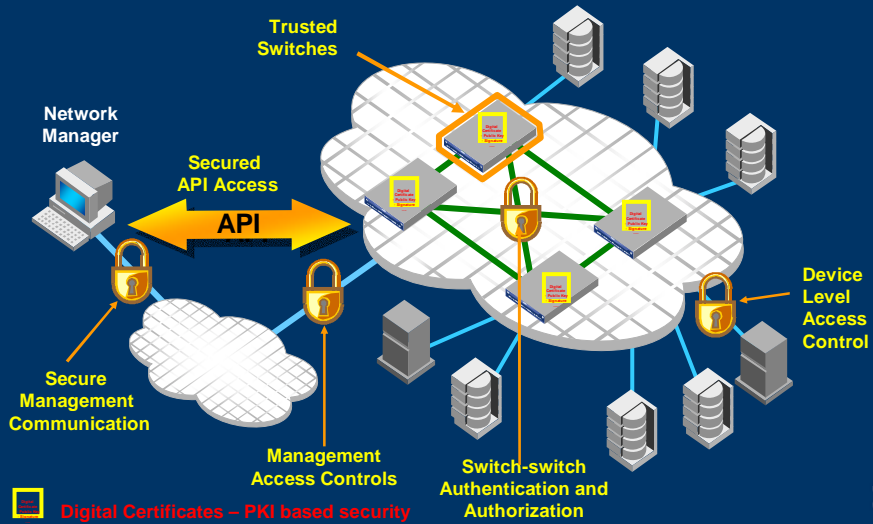


## Fabric OS 3.1/4.1 Feature Summary

- Enhanced High-Availability (4.1)
  - Non-disruptive firmware activation
  - Enhanced Background Health Monitor on standby CP (12000)
  - Call Home integration with Fabric Manager
- Enhanced Manageability
  - Port Naming (ability to set and query symbolic port names)
  - **FDMI Phase 1-Fabric Device Management Interface**
    - *HBA status via fabric (API and Fabric Manager)*
    - *Centralized HBA firmware download*
    - *Foundation for HBA-switch security, QoS*
- Secure Fabric OS
- FICON qualification support (4.1)
  - Delivered to OEMs for qualifications at the same time as 4.1
  - Expect longer qualification than 4.1

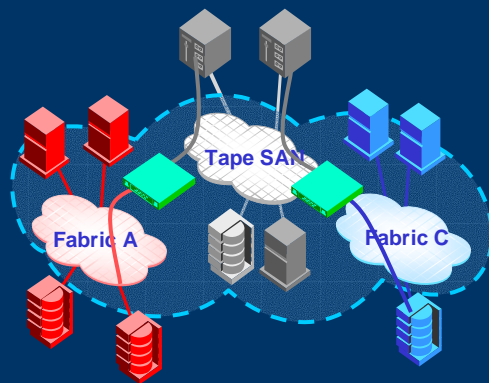


## Secure Fabric OS with FOS 3.1/4.1 Securing The SAN infrastructure



## SAN Subnets: SilkWorm Inter-Fabric Switch ("I-Switch")

*Accelerating Corporate SAN Growth*



- Create SAN Subnets
  - Connections between devices on separate fabrics
  - Simplifies change management
  - Better fault isolation
- Allows separate organizations to share equipment
  - Common fabric for backup, accessed by separate SAN Islands

## Overview

### Brocade SilkWorm Fabric Application Platform

- Industry's first intelligent Fabric application (and switching) platform
  - Runs storage management applications in the fabric at line rate
  - XPath™ Technology - future-proof, multi-protocol, scalable
  - Complementary to existing Brocade Fibre Channel switches
- Open software APIs for broad application support
  - Robust set of storage services and APIs
  - Affords fast and easy migration of storage applications to the fabric
- Wide choice of solutions
  - OEM and ISV Storage Applications moving to platform
  - Virtualization, Replication, Migration, Virtual Tape, and other applications
  - Seamlessly extends and complements existing SANs
- Industry-leading, highly differentiated offering



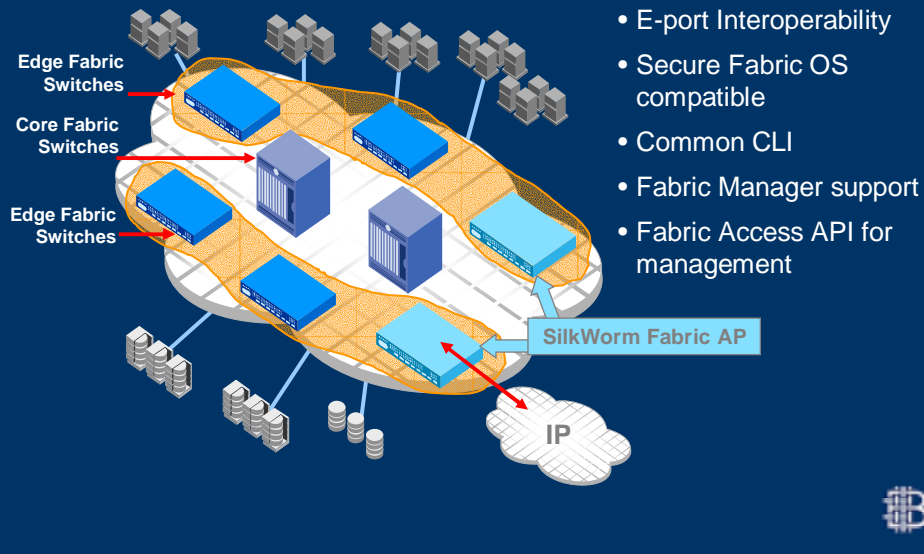
## Brocade Platform for Fabric Applications

- High performance fabric application platform/switch
  - Runs storage applications in the fabric at wire speed
  - XPath™ Technology - future-proof, ASIC-based, multi-protocol fabric
  - Tremendous performance, 50,000 Iops per Port, scalability, economic advantages
  - Xcopy
  - Multi-protocol
  - -VTAL (Virtual Tape Library)
  - More 400 API cycle per sec
- Open software architecture for easy solution migration
  - Robust set of storage services and APIs
  - Affords fast and easy delivery of storage applications in the network

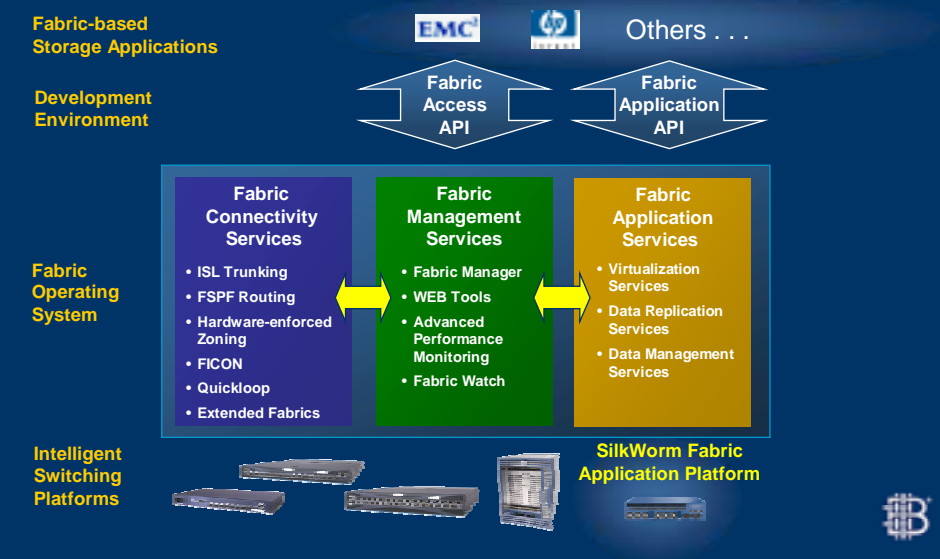




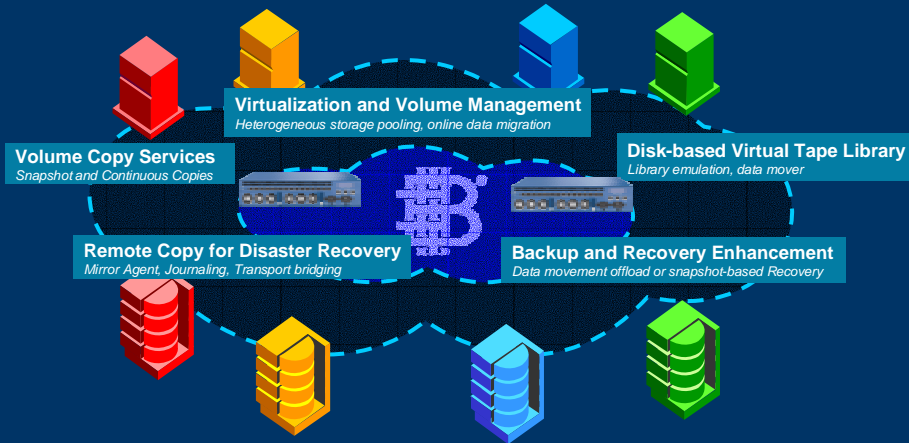
# Fabric Application Platform Integration with Brocade Switches



# Extending the Operating Environment with Fabric-based Storage Applications



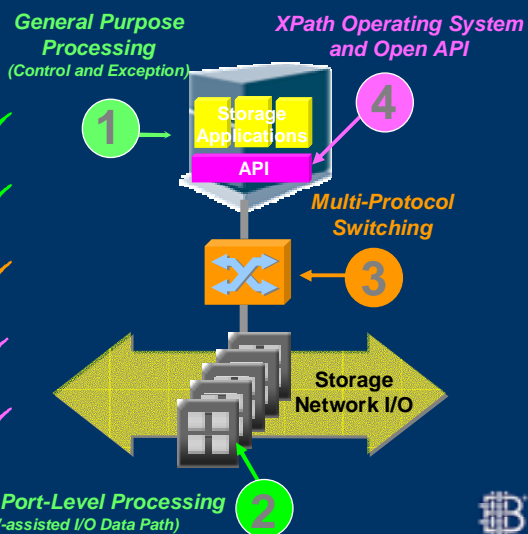
## Fabric-based Storage Applications Functionality Consolidated in the SAN Fabric



## Brocade XPath™ Technology Optimized to address Fabric Applications requirements

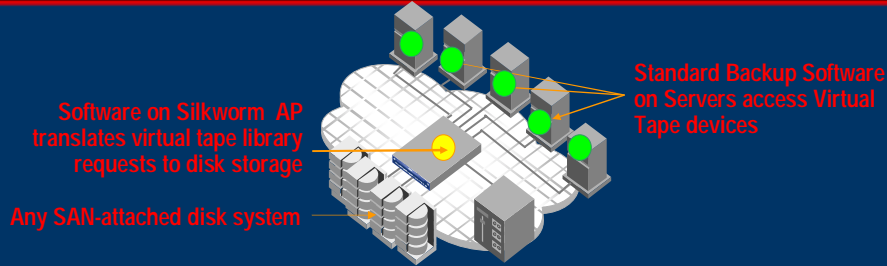
### Requirements

- Processing scales with SAN growth ✓
- Performance transparent ✓
- Protocol and transport neutral ✓
- Integration with existing SAN infrastructure ✓
- Broad choice of application solutions and vendors ✓



# Fabric-based Virtual Tape Library

*Integrated disk-to-disk and disk-to-tape backup*



## Description

- Silkworm AP translates disk storage into “virtual” tape library devices
- Tape-optimized file system represented on FC-attached storage systems
- All backups to and most restores from disk-based “virtual tape volumes”

## Key Benefits and Advantages

- Increased enterprise data protection: improved backup reliability, faster restores
- Transparent to existing backup software
- Cost avoidance of larger tape libraries, re-deployment of legacy storage
- Allows consolidation of “legacy”



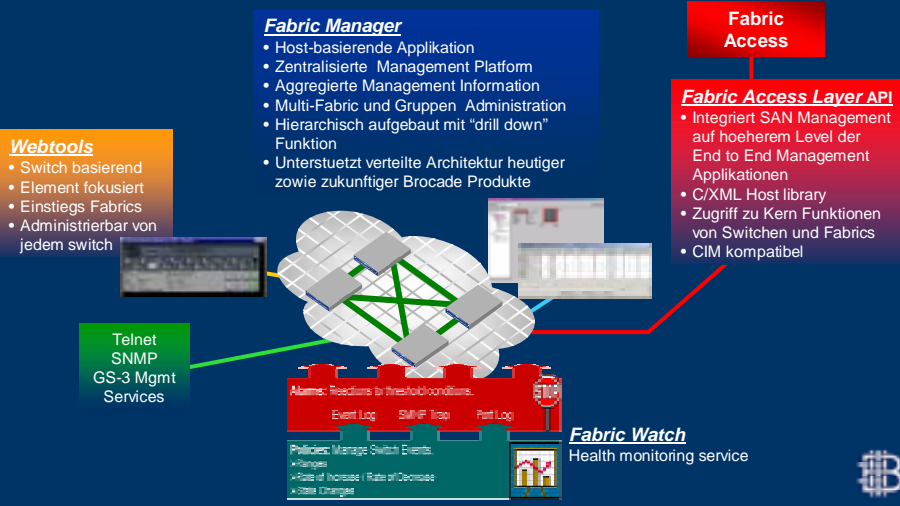
# AGENDA

- Brocade SAN Management



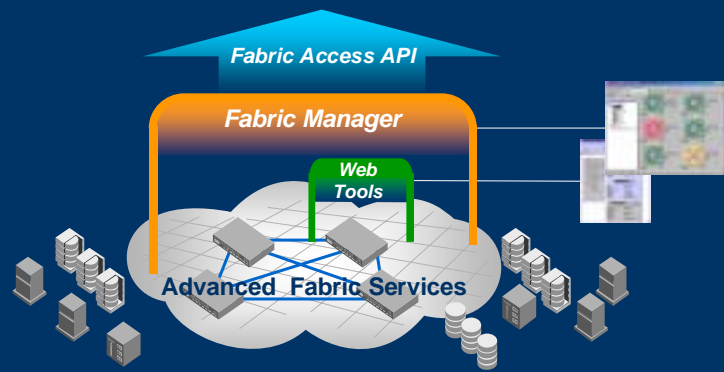
# Brocade Management Familie

Integrierte Administrations Applikationen  
(EMC, Tivoli, Veritas, BMC, SUN, HPQ ,and more...)



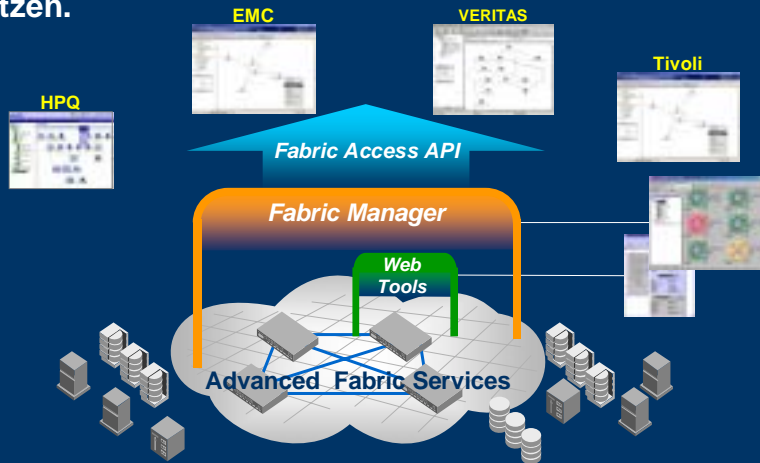
# Offenes Fabric Management

- Brocade Fabric Management Software
- Webtools
- Fabric Manager
- Fabric Watch



## API für offenes Fabric Management

- Viele Storage Management Applicationen verwenden die Brocade API um die Intelligenz der Brocade Switche zu Nutzen.

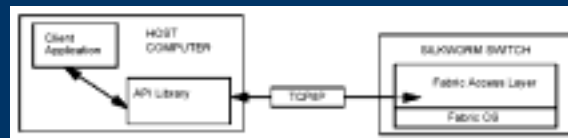


## Liste ausgewählter Fabric Access API Partner

<a href="#">Agile Storage, Inc.</a>	<a href="#">IBM</a>	<a href="#">PolyServe</a>
<a href="#">AppIQ</a>	<a href="#">Incipient, Inc.</a>	<a href="#">Prisa Networks</a>
<a href="#">Astrum Software</a>	<a href="#">Integrix, Inc.</a>	<a href="#">SAN Valley Systems, Inc.</a>
<a href="#">Axeda</a>	<a href="#">InterSAN, Inc.</a>	<a href="#">Storability</a>
<a href="#">BMC Software, Inc.</a>	<a href="#">Invio Software</a>	<a href="#">StoreAge Networking Technologies, Ltd.</a>
<a href="#">CommVault Systems</a>	<a href="#">JNI</a>	<a href="#">Sun Microsystems, Inc.</a>
<a href="#">Computer Associates</a>	<a href="#">Kanatek Technologies, Inc.</a>	<a href="#">SyncSort, Inc.</a>
<a href="#">Convergent Data Services</a>	<a href="#">Karthika Technologies, Inc.</a>	<a href="#">Tek-Tools</a>
<a href="#">CreekPath Systems, Inc.</a>	<a href="#">Netaphor Software, Inc.</a>	<a href="#">TrelliSoft, Inc.</a>
<a href="#">EMC Corporation, Inc.</a>	<a href="#">NetIQ</a>	<a href="#">Tributary Systems, Inc.</a>
<a href="#">ETRI</a>	<a href="#">Netreon, Inc.</a>	<a href="#">TrueSAN Networks</a>
<a href="#">Fujitsu, Ltd.</a>	<a href="#">Novus Consulting Group</a>	<a href="#">Veritas Software</a>
<a href="#">Fujitsu Software Technology Corporation</a>	<a href="#">NuView, Inc.</a>	
<a href="#">Giantloop</a>	<a href="#">Onaro</a>	
<a href="#">Hewlett Packard Company</a>		
<a href="#">Hitachi Ltd.</a>		

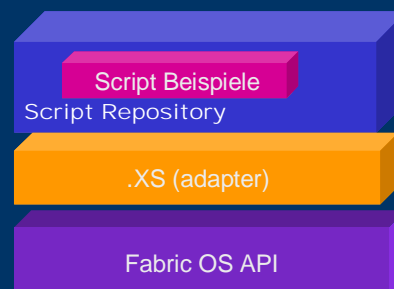
## Was ist die Fabric Access API ?

- Host basierende Library
- Ermöglicht die Kommunikation mit allen Brocade Switches im SAN
- Out-Band über TCP Connection
- In-Band über einen „TCP capable HBA“
- Aktuelle Version 2.0.2\*



## Was ist das Scripting Modul?

- Perl Modul welches auf dem XML Layer der API aufsetzt
- Ermöglicht den Zugriff auf alle API Funktionen via Perl
- Vorhandene Beispiele (Basic u. Advanced) zeigen die Anwendungsmöglichkeiten
- Die Anbindung an die API erfolgt über einen sog. .xs Adapter in Perl.



## Welche Funktionen bietet die API ?

- Single Access Point\*
- Multi Access\*
- Secure Access\*
- Objekt basierendes Modell\*
- Conformität zu Industrie und De Facto Standarts (CIM)\*



## Welche Funktionen bieten diese Features?

### Basis Funktionen\*:

AliCreate	FabricShow	SwitchName
AliDelete	Fastboot	SwitchShow
AliRemove	FirmwareDownload	SetTime
AliShow	IpAddrSet	ZoneAdd
CfgAdd	LicenseAdd	ZoneCreate
CfgCreate	LicenseRemove	ZoneDelete
CfgDelete	LicenseShow	ZoneRemove
CfgDisable	NsAllShow	ZoneShow
CfgEnable	NsShow	
CfgRemove	PortDisable	
CfgSave	PortEnable	
CfgShow	Reboot	
CfgTransAbort	SwitchDisable	
ConfigDownload	SwitchEnable	
ConfigUpload		



# Fabric Manager 4.0

- Ease of Use Enhancements
  - Information At a Glance Views
- Topology
  - Switch types, Links, Ports & Devices (clouds)
  - Multiple network layouts , including Core-Edge
  - Real-time fabric: Network, Status, Detail (expand/collapse mode)
  - Physical and Logical topology views
  - Link intelligence (1Gb, 2Gb, 4Gb, 8Gb, ISL-Trunks)
- Fabric Snapshot/Compare (Track configuration/state of fabric)
- Call Home Facility
- HBA Management (HBA Attribute display and firmware management)
- Multi-user support (user login/user preferences saved centrally)
- E-Licensing (online software license ordering)
- Port Level Visibility/Port Grouping/Port Naming
  - FDMI ANSI T11: Fabric Device Management Interface
    - HBA status via fabric (API and Fabric Manager)
    - Centralized HBA firmware download
    - Foundation for HBA-switch security, QoS



## FM v4.0 Screenshots

### Fabric topology focused on BRCD fabric...

- Best-in-class technology partner (ILOG)
- Displays: Switch types, Links, Ports & Devices (clouds)
- Multiple network layouts (Hierarchical, Circular, Core-Edge, ++)
- Real-time fabric: Network, Status, Detail (expand/collapse mode)
- SAN Fabric specific concepts: Maintains non-competitive nature

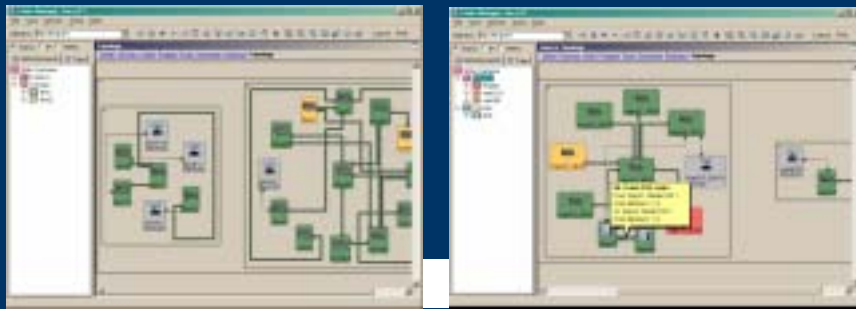




## FM v4.0 Screenshots

### *Fabric topology is highly informative...*

- Link intelligence (1Gb, 2Gb, 4Gb, 8Gb, ISL-Trunks)
- Common Link bundling to reduce network clutter (ISL-Trunking, ISLs, Fiber, Copper)
- Edge device visibility (Ports, Edge clouds, Quick NS tables)
- Quickly switch-able (on/off fabric objects via legends)
- Pan and Zoom overview
- Groups ready topology (logical fabrics shown as own topologies)
- Displays: Switch types, Links, Ports & Devices (clouds)
- Multiple network layouts (Hierarchical, Circular, Core-Edge, ++)
- Real-time fabric: Network, Status, Detail (expand/collapse mode)



## Other Manageability Initiatives

- **API CIM**
  - CIM is the emerging standard device API interface for management applications
  - Brocade will deliver CIM developer release in 1H03
- **Change management**
  - Looking at several tools, Fabric Mgr enhancements, and partner products to deliver solutions for Change Management
- **Performance management**
  - API in 4.1/3.1 enables external performance mgmt
  - Working with several API partners/tools
- **Troubleshooting**
  - Looking at making internal tools externally usable



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