



HP NSS VMS Storage update

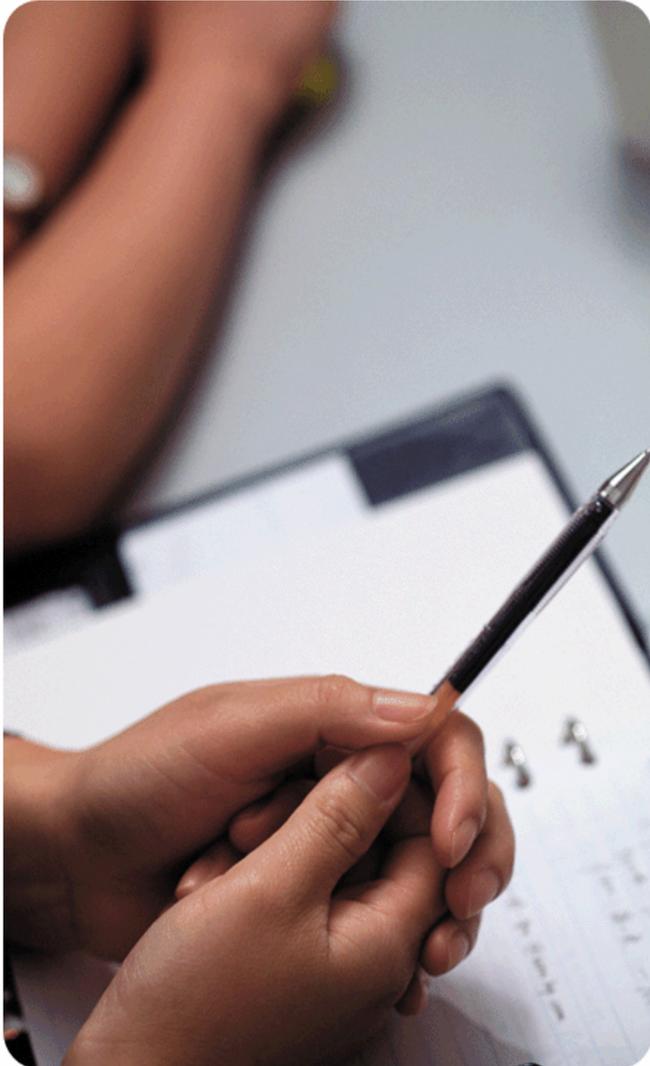
Technical Update Event 2004

Oktober 21st-22nd 2004

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EMEA NSS Storage Consultant, HP



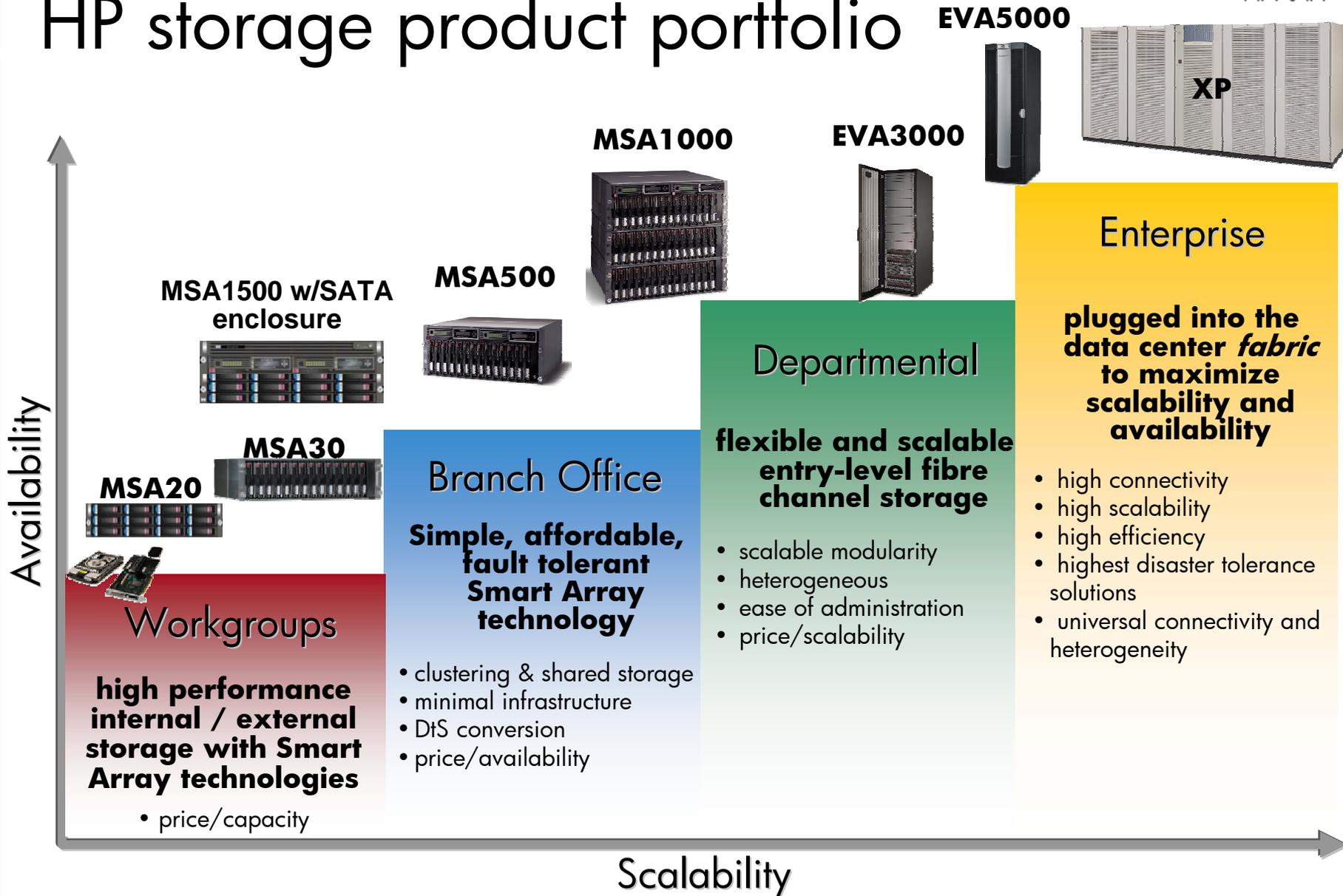
Agenda



- XP-EVA-HSG80-MSA support
- Itanium support
- Continuous Access Disaster Recovery
- Business Copy 2.3 snapshot-cloning
- OVSAM management
- Data Protector VMS SAN backup
- EBS LTO II support
- Longterm roadmap

OpenVMS Storage HW Solutions

HP storage product portfolio



Storage array systems support

- XP: OpenVMS 7.2-2, OpenVMS 7.3, OpenVMS 7.3-1, OpenVMS 7.3-2
- XP: Business Copy XP, Continuous Access XP, RAID Manager, Command View XP, Secure Manager XP, LUN Configuration Manager XP, Cache LUN XP, Performance Advisor XP (no host performance data)



XP12000

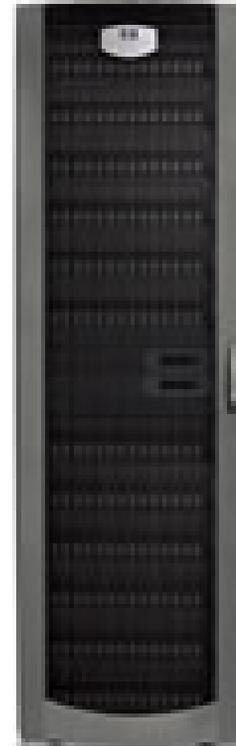
- Significantly improved performance
- Scalable to 1152 disk drives with 128 drives in the center cabinet
- External storage capability
- Enhanced online firmware upgrades
- **2nd** Storage and cache array partitioning
- **2nd** Enhanced Continuous Access with journaling
- **Future** Enhanced multi-site disaster tolerance
- **Future** Business Copy space efficient Snapshot
- **Future** Enhanced performance monitoring



OpenVMS support is expected in November.

Storage array systems support

- EVA: OpenVMS 7.2-2
OpenVMS 7.3 OpenVMS 7.3-1
OpenVMS 7.3-2
- EVA: Business Copy (v2.3) (OpenVMS 7.3-2 not supported), Command View EVA, Continuous Access EVA (v1.1a) (OpenVMS 7.2-2, 7.3-1, and 7.3-2 only), HP OpenView Storage Area Manager (OVSAM) Integration (v3.1) (OpenVMS 7.3 and 7.3-1 only), native multipathing



EVA FATA



- FATA - Fibre Attached Technology Adapted drives
 - Low-cost Fibre Channel storage for infrequently accessed data
 - Innovative technology from HP and our drive partners
 - Hybrid FC drive designed for the Enterprise:
 - More than SATA: dual-ported 2 Gb/s FC interface, SMART technology, optimized sequential addressing, etc
 - Lower performance and less expensive than enterprise FC drives
 - Ability to hot plug directly into current EVA enclosures
 - Competitively priced to today's PATA/SATA solutions
 - FCIA approved
 - Available in July 2004



Storage array systems support

- HSG: OpenVMS 7.2-2, OpenVMS 7.3, OpenVMS 7.3-1, OpenVMS 7.3-2
- HSG: Recommended Firmware: ACS 8.7-7
- HSG: Business Copy, HSG Element Manager, Command Console (SWCC) 2.5, CLI, native multipathing, DRM ACS 8.7P and 8.6P, SSP



Storage array systems support

- MSA: OpenVMS 7.2-2, OpenVMS 7.3, OpenVMS 7.3-1, OpenVMS 7.3-2
- MSA fw 3.36
- MSA: Compaq Analyze, CLI (OS unit ID), SSP, native multipathing, homogeneous config, no FC-AL
- OVMS Volume Shadowing
- FCA2384 Host Adapter PCI-X
- OpenVMS v7.3-1 remedial kit - VMS731_MSA1000-V0100



MSA1500

- MSA1500 is a 2 Gb Fibre Channel SAN attached 2U controller shelf that connects Serial ATA (SATA) enclosures and /or SCSI disk JBODS.
- Based on MSA1000
- MSA1500 w/4 SCSI Enclosures (MSA30) – 56 HDD's, up to 8.1TB scalable from 3 to 42 drives (6 TB total)
- MSA1500 w/8 SATA Enclosures (MSA20) – 96 HDD's, up to 24TB



**OpenVMS is
planned to be
supported on
the MSA1500**

Which drives to use?

PATA, SATA, FATA



Fixed content
Snapshots & Clones
Instant archive
Fast file recovery
Offsite recovery
Two stage backup
Data migration
Temporary files
E-mail archiving
Medical imaging
Web serving
File & print
Application testing

SCSI and FC



Databases
ERP
Bank transactions
Financial applications
CRM
On-line purchases
Other number crunching applications

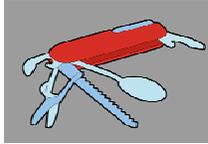


Access Frequency

OpenVMS Storage SW Solutions

HP Array Management Software

A Simple, affordable and powerful way to manage your information



Array Management

Storage Operations Manager

Management, discovery and topology mapping for the EVA storage arrays

Command View XP / EVA

Management of XP storage arrays

Management of EVA storage arrays

Storage Resource Management

Storage Area Manager

Integrated, enterprise wide management and monitoring of all storage resources and infrastructure



Remote Replication

Continuous Access

Remote mirroring solution for EVA and XP storage arrays



XP



SAN



EVA

Local Replication

Business Copy

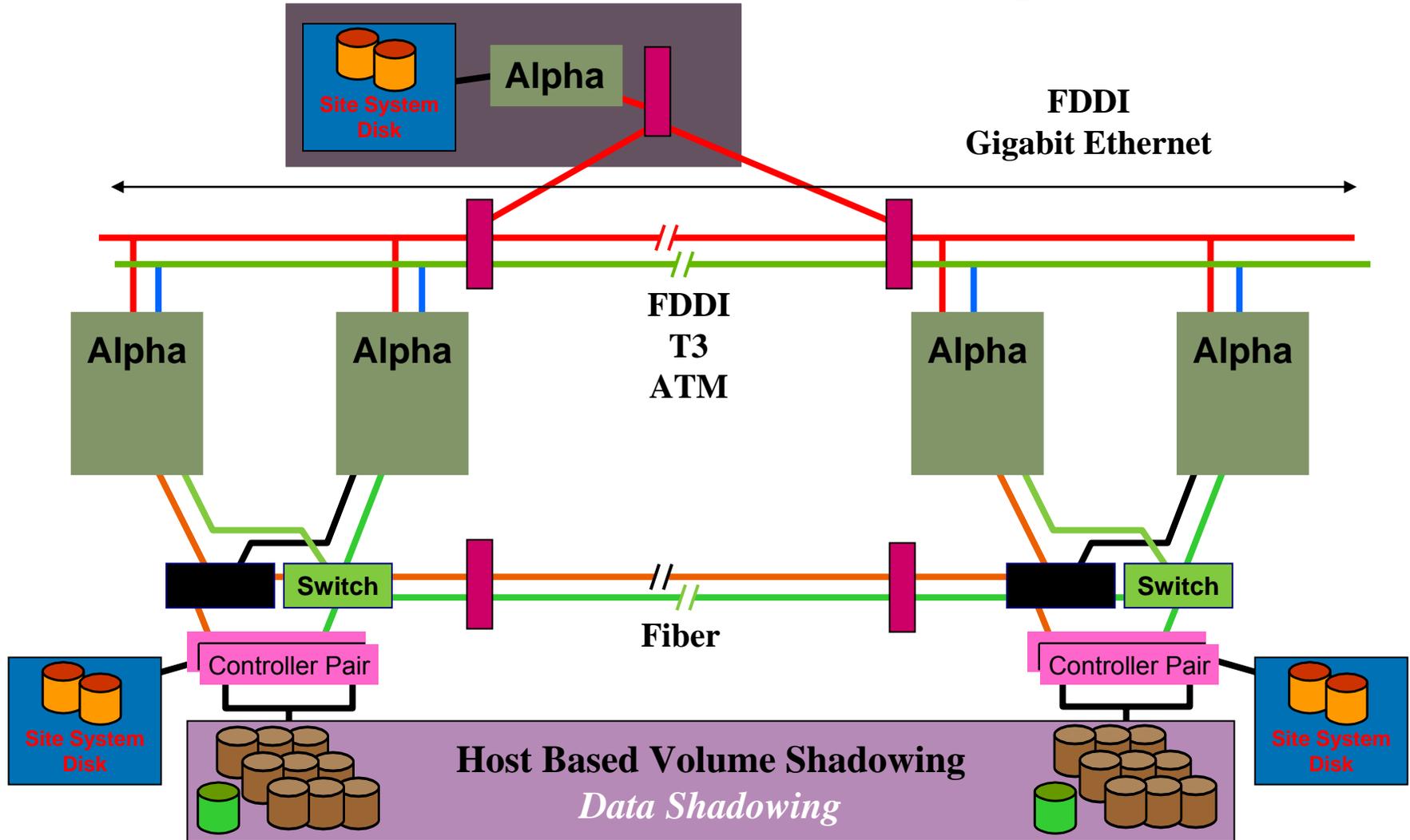
Instantaneous point-in-time copy solution for backup, recovery and parallel processing for the EVA and XP storage arrays



VMS clustering

- XP: OpenVMS Clusters
7.2-2, 7.3 , 7.3-1, 7.3-2
- EVA: OpenVMS Clusters
7.2-2, 7.3 , 7.3-1, 7.3-2
- HSG: OpenVMS Clusters
7.2-2, 7.3 , 7.3-1, 7.3-2
- MSA: OpenVMS Clusters
7.2-2, 7.3 , 7.3-1, 7.3-2,
OpenVMS 4 nodes

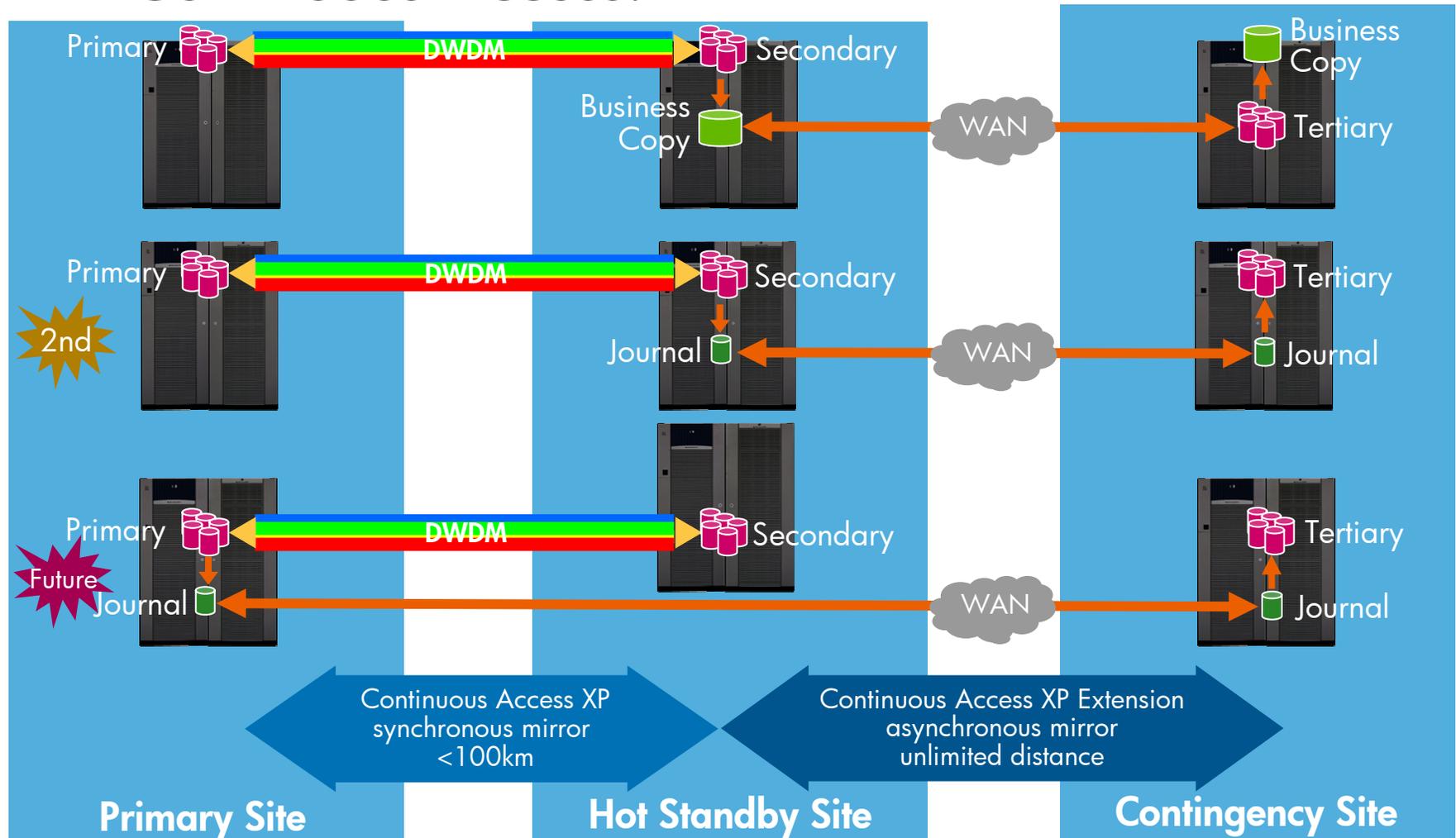
Host Based Volume Shadowing



Continuous Access Disaster Recovery

storage replication versus host based mirroring

- XP Continuous Access:



Continuous Access Disaster Recovery

storage replication versus host based mirroring

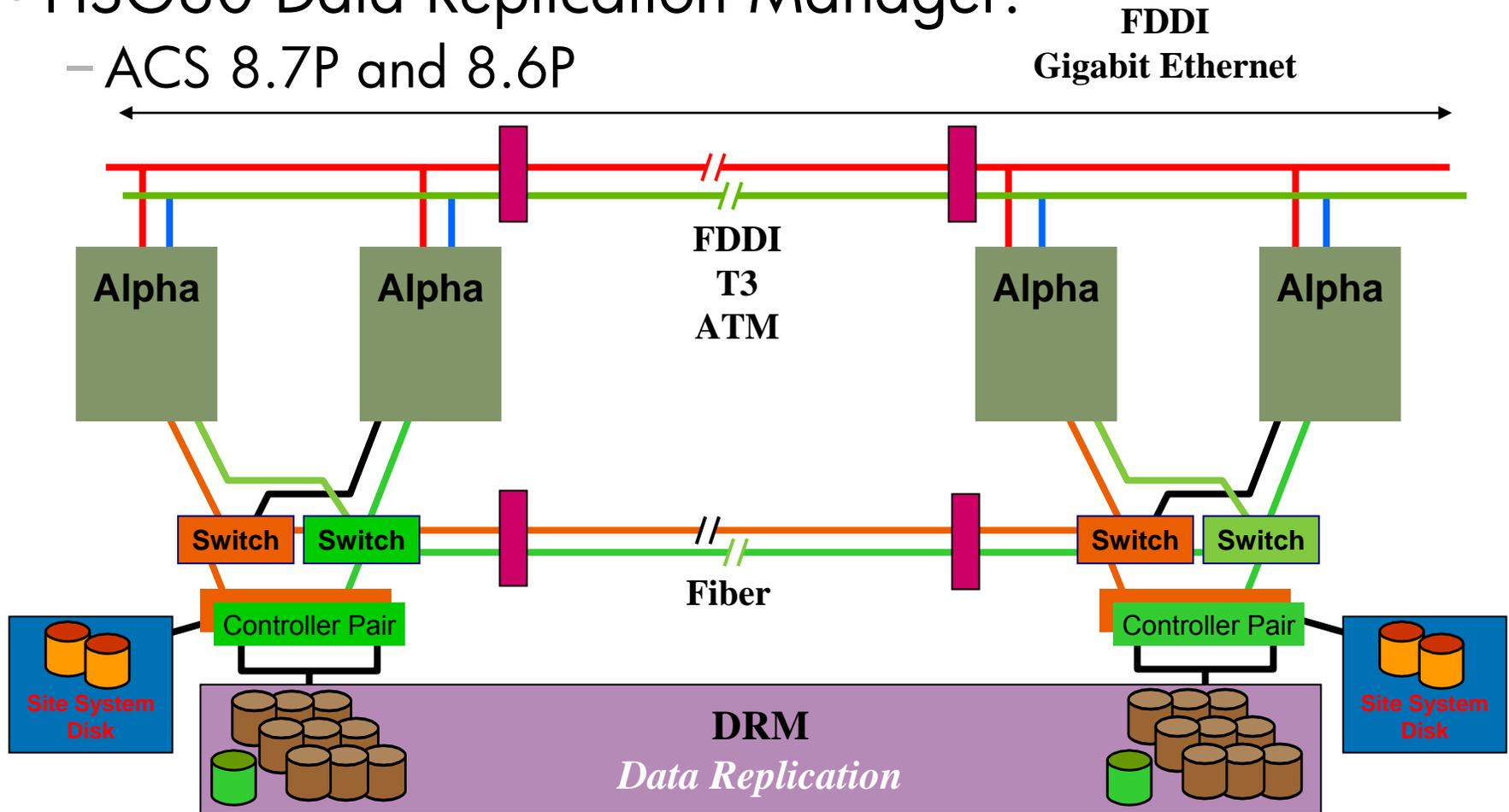


- EVA Continuous Access:
 - **Synchronous**
 - Up to 100 msec one way latency
 - Up to 128 copy sets per pair of EVAs
 - Up to 128 DR groups
 - Up to 8 copy sets per DR group.
 - **Asynchronous**
 - Up to 100 msec one way latency
 - 12 copy sets per pair of EVAs, less 1 copy set for each additional 20 msec for a maximum of 7 at 81–100 msec
 - Up to 7 – 12 DR groups, and depends on the intersite latency above.
 - Up to 7 or 8 copy sets per DR group, and depends on the intersite latency above.
 - Boot from CA Source, Boot from Replicated Boot Disk after Failover
 - HP OpenVMS 7.3-2, 7.3-1, 7.2-2

Data Replication Manager Disaster Recovery

storage replication versus host based mirroring

- HSG80 Data Replication Manager:
 - ACS 8.7P and 8.6P



EVA/MA/EMA Business Copy 2.3

controller based snapshot and cloning

- Business Copy EVA/MA/EMA
- The BC v2.3 Host Agent supports OpenVMS v7.2-2 , OpenVMS v7.3-1 and v7.3-2, clustered and standalone, host agent for v7.3.x.
- ECO kits (or successors) VMS721_CPU2208, VMS721_UPDATE, and VMS721_PCSI.
- LP8000, LP9002, LP9802

Business Copy XP

- Business Copy creates local copies of logical units within the same XP disk array
- You can make up to 9 copies of the data in one XP disk array
- Names for BC volumes
 - P-Vols (Primary Volumes) contain original data
 - S-Vols (Secondary Volumes) contain duplicate data
- BC operations can be performed from
 - SVP (Service Processor) in the XP disk array
 - RAID Manager XP on the host with command line control
 - RMC (Remote Console PC)

OpenView Storage Area Manager

storage end-to-end management

- Storage Node Manager, Builder, Accountant support for VMS 7.3 and 7.3-1 and OVMS cluster 7.3-1 (no support for Optimizer and Allocator)
- Limitations:
 - No OVMS host platform support for the SureStore Disk Array XP 256
 - OVMS File System information: no support of OVMS UFS and AdvFS
 - Removed support of OVMS Logical Volume Manager: not existent
 - Multinet is not supported with OV-SAM's VMS host agent

Data Protector VMS SAN backup

current support

- Disk and Media agent:
 - Backup Agents (disk agents): Open VMS 7.3-1, 7.3-2
 - Backup Device Server (media agent), including robotic control: OpenVMS 7.3-1
- Cluster support:
 - OpenVMS Cluster: OpenVMS Cluster (Disk Agent & Media Agent support) - Raw Disk Backup is supported.
- Tape device support:
 - VMS: SDLT220, SSL2020, MSL5026DLX, MSL5026SL, MSL5052SL, ESL9198SL, ESL9198DLX, ESL9595SL, ESL9326DX, LTO

Data Protector VMS SAN backup

current support

- Backup & restore of:
 - Directory structure
 - Files and all file versions
 - Extended filesystem names
 - All file & directory attributes and ACLs (Access Control Lists)
- Full system disaster restore
 - OpenVMS system with Disk Agent required
 - OpenVMS WRITEBOOT utility can be used to make the system disk bootable
- Restore to other operating systems possible
 - Some file attributes might be lost, depending on the capabilities of the other OS
- OpenVMS 7.3-1 on Alpha
- Developed by the HP OpenVMS experts, not 3rd party

Data Protector VMS SAN backup

current support

- Disk Agent: full Data Protector Disk Agent Command Line Interface available on OpenVMS
 - Data Protector Disk Agent commands can automatically be launched as part of automation scripts
- Media Agent: backup drives can be directly attached to OpenVMS via SCSI, Robotic control & library sharing, Automatic device configuration, OpenVMS 7.3-1
- VMS NULL device for performance testing:
 - The VMS null device is "NLA0"
 - The speed of DLT is:
 - 5Mb/s DLT7000
 - 6MB/s DLT8000

Data Protector VMS SAN backup

EVA Zero-Downtime-Backup

- Oracle on-line backup for OpenVMS has been requested for the DP 5.5 release
- Regarding EVA & ZDB - scripting the solution with DP pre post exec would be an acceptable solution. One could configure a filesystem backup through a backup host and run as pre exec a script that:
 - puts DB in backup mode
 - uses SSSU to create the snapshot/snapclone
 - takes DB out of the backup mode
 - mounts the disks on the backup host
- After that is done we could perform a file level backup. The backup would be online backup. In the post exec he could delete the snapshot

HP VMS Enterprise Backup Solution

software solutions



- OpenVMS BACKUP utility:
 - full volume and incremental file backups
 - enhanced and supported with future versions of OpenVMS
- HP Storage Library System (SLS):
 - automatic, unattended backup for OpenVMS systems and OpenVMS clients
 - limited support into the future: support for new versions of OpenVMS and remedial fixes only
- HP Archival Backup System (ABS):
 - scheduling, catalogs, media manager
 - OpenVMS, Windows NT, and UNIX clients
 - actively supported well into the future, including minor new features, support for new tape devices as appropriate, and support for new versions of OpenVMS

HP VMS Enterprise Backup Solution

software solutions



- Legato NetWorker:
 - OpenVMS client and Storage Node
 - OpenVMS on AlphaServer and Intel® Itanium™ architecture systems
 - Legato NetWorker Modules for Oracle and Oracle Rdb
 - openvms@legato.com
 - Future Plans include “cold metal” restore support, and potential OpenVMS Server support
- TapeSYS VMS:
 - Backup and restore, automated vaulting, cleaning and cycling of all removable media
 - hierarchical storage management system (HSM) for OpenVMS

HP VMS Enterprise Backup Solution

LTO II tape library support



- VMS supports the Ultrium 2 (LTO460) drives, direct-attach SCSI and behind the FC Bridges (NSR, MDR)
- ESL/MSL libraries
- Only Ultrium-2 tapes are supported
- For 7.3-1 there is a patch kit vms_731_fibre_scsi-v0600 from May.

OpenVMS Storage Roadmap

OpenVMS Storage HW Roadmap

2004

2005

2006

2007

XP Storage Family

- Ongoing support of larger cluster configs
- Support of broader XP Software tools 2004
- Support of updates to XP Array offerings 2004

EVA Storage Family

- Support new Continuous Access version
- Support new EVA product array early 2005

HSG80 Support

- Support for ACS 8.8x final firmware updates

MSA Storage Family

- MSA1000 Switched Support during H2 2003
- MSA1000 lower cost connectivity late 2004
- Support of new MSA solutions during 2005

Storage Adapter Support

- U320 Backplane RAID (SmartArray) H2 2004
- LP10000 Dual Channel FC – H2 2004

OpenVMS Integrity Storage Support (2004 and beyond)

- FC support to connect into existing SANs at V8.2
 - EVA, MSA, EMA and XP Solutions
- SmartArray support identical to Alpha in H1 CY2005
- Direct-Attached SCSI support ONLY for internal and non-shared external storage
- Utilize adapters that will be supported by multiple OS environments

HSG80 Array Controller Software 8.8

new functionality for disk handling

- Set <Unit> [NO]HOST_REDUNDANT:
 - any non-partitioned container (JBOD, RAID, mirror, stripe)
 - OpenVMS with HBVS provides redundant paths for the storage volumes, at times the host may employ rigorous retry attempts to maintain a viable path to a unit, and may not dis-engage a storage unit that is under error recovery but which will NOT likely resume error free operations
 - With redundancy deployed through use of host base mirroring capabilities using non-redundant storage containers across multiple controllers, the controller has NO view that there is redundancy provided for the unit

OpenVMS Integrity Option Rollout Plan

Q4 2004

Version 8.2

- ❖ Storage
 - U160 & U320 SCSI (non-shared)
 - Fibre Channel
 - SmartArray Backplane RAID (mid-2005)
- ❖ Storage Solutions
 - HSG, EVA, MSA1000, XP
- ❖ LAN
 - 5701(10/100/1000)
 - 8255x (10/100/1000)
- ❖ Graphics
 - ATI Radeon 7000 equiv.
 - ATI Radeon 7500/2D & 3D

12-18 months
after V8.2

Version 8.3

- ❖ Storage
 - U160 & U320 SCSI (non-shared)
 - Fibre Channel
 - SmartArray Backplane RAID
- ❖ Storage Solutions
 - HSG, EVA, MSA1000, XP
- ❖ LAN
 - 5701(10/100/1000)
 - 8255x (10/100/1000)
- ❖ Graphics
 - TBD

Itanium support

- platforms supported will be RX1600, RX2600, RX4640 for 8.2 shipment, other platforms supported during '05
- SCSI storage will be direct-attached 160/320 via shelves like MSA30
- no multi-host/shared SCSI

OpenVMS Enterprise Backup Solutions Roadmap



HP OpenView Data Protector Enhancements

- Post V5.5 Enhancements –
 - Oracle, Oracle Rdb Support, port to I64 (H1 2005)
 - Standalone restore, server support (TBD)

Legato NetWorker Enhancements

- ODS5, Oracle, Oracle Rdb (Q2 2004)
- I64 port (H2 2004)
- Standalone Support OpenVMS Server Support (TBD)

Archive/Backup System V4.2 (Q1 2004)

- Support for OVMS V7.3-2
- New device support
- Bug fixes

Minor Features, New Tape Support, New O/S Support, I64 port (Q1 2005)

Storage Library System V2.9H (Q1 2004)

- Support for OVMS V7.3-2

Maintenance only - New O/S Support, I64 port (2005+)

OpenVMS Enterprise Backup Solutions Roadmap



2003	2004	2005	2006/7	2008
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Heterogeneous Shops

HP OpenView Data Protector

DataProtector Disk and Media Agents, Enhancements

LEGATO

Legato NetWorker Client and Storage Node, Enhancements

Veritas, et al

OpenVMS Client

Homogeneous OpenVMS Shops

BACKUP Utility: Continuous improvements

SLS

Maintenance Support Only

ABS

Selected Tapes and Enhancements

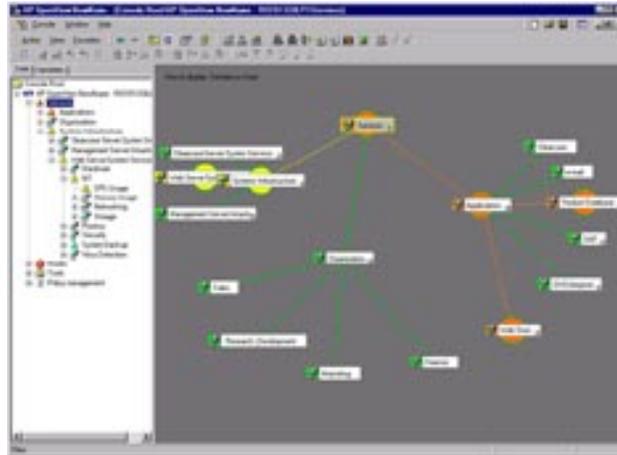
I-S-E & Software Partners

Ongoing Enhancement of BACKUP-based solutions

Hp OpenView Portfolio VMS Roadmap



service management

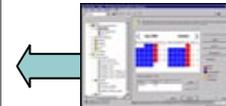


management information portal

Q205 SPI for Oracle
Q405 SPI for Rdb

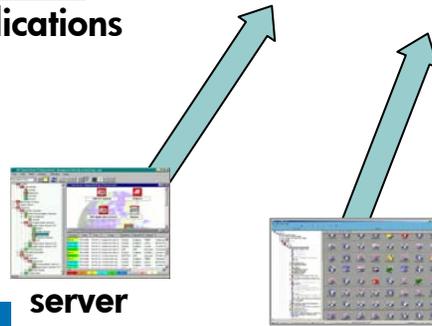


applications



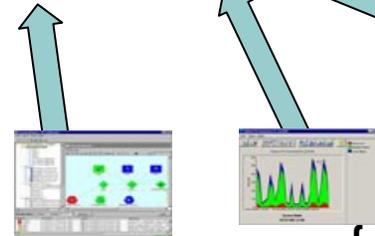
backup & restore

OpenView Data Protector



server

network



storage

performance



Software Distribution

Radia Software Manager
Radia Patch Manager

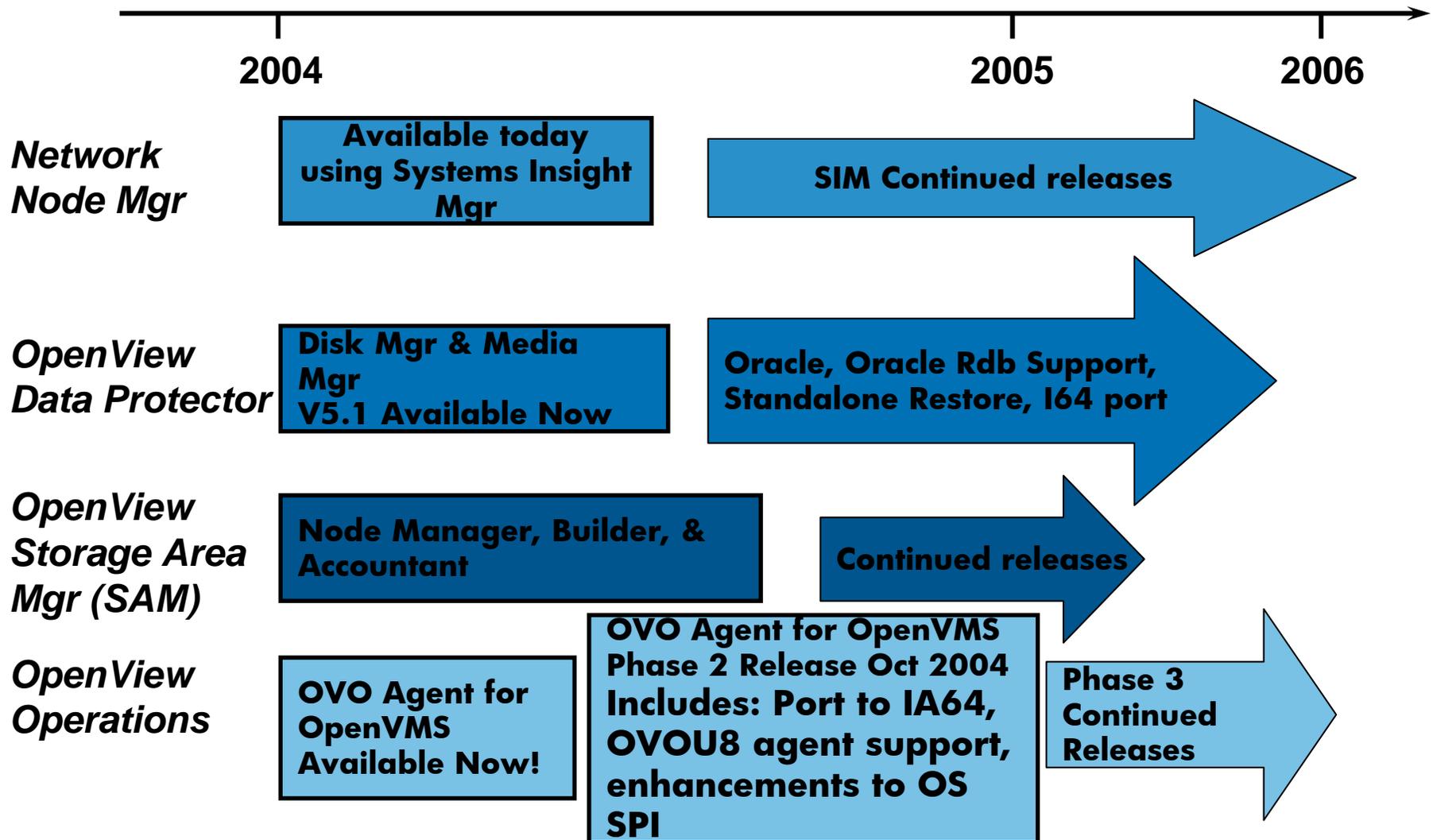
OpenView Operations for UNIX
OpenView Operations for Windows
OpenView VMS v7 SPI
H206 OpenView VMS v8 SPI

OpenView NNM (Network Node Manager)
OpenView TEMIP

OpenView SAM (Storage Area Manager)
OpenView Storage Provisioner
OpenView Storage Allocator

GlancePlus
OpenView Performance Agents Q405
Availability Manager Events (GlancePlus) Q305

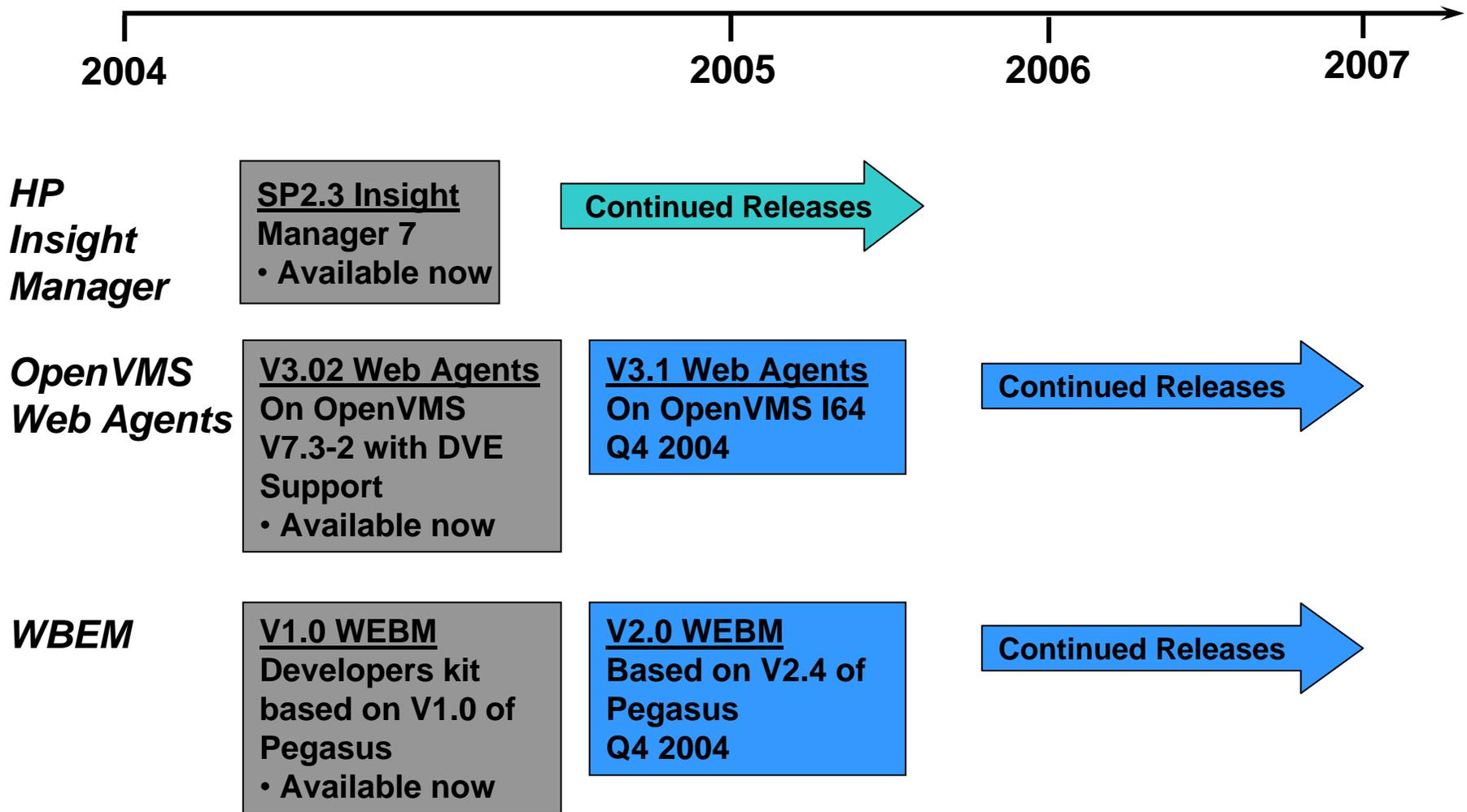
HP OpenView & OpenVMS Integration Planning



Data Protector VMS SAN backup planning matrix

- Backup Device Server (Media agent) incl. Robotic control OpenVMS 7.3-2: August '04
- Oracle 9i/10g/Recovery Manager (OpenVMS 7.3-1/7.3-2): December '04
- Oracle Rdb (OpenVMS 7.3-1/7.3-2): January '05
- HP SuperDLT600, Quantum SuperDLT600, HP StorageWorks 1/8 series Tape Autoloader with SuperDLT320, HP StorageWorks ESL E-Series ESL712e: Planned
- Itanium VMS 8.x Backup Device Server (Media agent) incl. Robotic control planned DP 5.5: June 2005

System Management Roadmap Web Management Agents



References

- Backup: <http://h71000.www7.hp.com/openvms/Storage.html>
- Roadmap: <http://galaxy.zko.dec.com/osg/>
- Data Protector: http://www.openview.hp.com/products/datapro/spec_0001.html
- SPOCK: <http://spock.corp.hp.com/index.aspx>



i n v e n t

OpenVMS Backup Slides

OpenVMS BACKUP Utility Plans

- Continuing to release new versions
 - OpenVMS V7.3-1 and V7.3-2
 - Support for new FC components and tape devices
- Continue to support native OpenVMS products
 - The foundation for ABS, SLS and HSM enhancements
- Several enhancements planned during 2004/2005
 - Investigate more modern backup techniques
 - EVM, snaps, clones, etc.
 - Support new File System as it evolves
- **Integrity Server plans are in place**
 - No major changes as we port to Integrity Server to maintain stability

Archive Backup System (ABS)

- ABS V4.1 Shipped in Q1 2003
 - Included Minor features, device and O/S support
- ABS V4.2 Shipping in Q1 2004
 - New O/S, Device support
 - Minor new features
- Overall Plans into the future
 - New Releases to support O/S changes (file system, backup)
 - Limited number of new features will be included (service impact scrutiny will be a driving factor)
 - Support appropriate new tape devices into the future – not necessarily picking up new capabilities that they may offer
- Integrity Server plans are in place
 - No major changes as we port to Integrity Server to maintain stability
 - Support planned for synchronization with 2004 OpenVMS 164 release

Storage Library System (SLS)



- SLS V2.9G was released in OpenVMS V7.3-1 timeframe
 - Bug fixes
 - Support for new FC and tape devices
 - MDR and NSR Support
- SLS V2.9H shipped in Q1 2004
- Support Plans into the Future
 - Place SLS into Mature Product Status during 2004
 - Customers can run ABS with SLS license at no cost
 - Working with services to offer migration assistance for customers who want to move to ABS
 - Support new versions of the O/S (allow existing SLS apps to work)
 - No new features will be added
 - No new tape drives will be qualified
- **SLS WILL be ported to Integrity Server in '05+ timeframe**

Who are the other players and what are their solutions?



- Heterogeneous SAN Data Protection providers include
 - Veritas – OpenVMS Client only
 - Tivoli/IBM – OpenVMS Client only (through 3rd party)
 - Computer Associates – OpenVMS Client only
 - CommVault – No support
 - HyperTape (BridgeHead Software) – OpenVMS Client only today
- Homogeneous OpenVMS Solutions
 - ISE – BACKUP Utility basis for solution – similar to ABS/SLS
 - Excellent option for customers looking for more active evolution of an OpenVMS BACKUP utility-based solution
 - Software Partners TAPESys – BACKUP Utility basis for solution
 - Technology that SLS was based upon many years ago!