StorageWorks SAN by Compaq

Addendum - Heterogeneous Open SAN Design Reference Guide for Enterprise Virtual Array

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This document describes the configuration rules for the Enterprise Virtual Array in a heterogeneous open SAN. It presents these rules in the context of Chapter 3 and Chapter 4 of the *Heterogeneous Open SAN Design Reference Guide*, 2nd edition (AA-RMPNC-TE).

Obtain the *Heterogeneous Open SAN Design Reference Guide* through this link:
http://www.compaq.com/products/storageworks/san/documentation.html

For the latest version of this Addendum and other heterogeneous open SAN documentation, visit the Compaq storage website at:

http://www.compaq.com/san

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Addendum Contents

This addendum covers the following topics:

- SAN Configuration Rules with Enterprise Virtual Arrays
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Intended Audience

This document is intended for customers who purchased the StorageWorks SAN by Compaq Enterprise Virtual Array and who wish to incorporate that storage into a heterogeneous open SAN.

Additional documentation, including white papers and best practices documents, are available via the Compaq website at:
http://www.compaq.com.

Controllers and Storage Systems Terminology

HSV110 controllers are used in Enterprise Storage Systems that comprise Enterprise Virtual Arrays.

The HSG60 and HSG80 controllers are used in these storage systems:

- MA6000
- RA/MA8000
- ESA/EMA12000
- EMA16000

In this document, Host Bus Adapter (HBA) is equivalent to Fibre Channel Adapter (FCA) or Fibre Channel Host Bus Adapter (FC HBA).

In HSG-based storage systems, Selective Storage Presentation (SSP) is used to control LUN access by host type. In HSV-based storage systems, LUN Presentation is used to control access by host type.

Related Documents

- Compaq StorageWorks Enterprise Virtual Array Initial Setup User Guide
- Compaq StorageWorks Enterprise Virtual Array HSV Controller User Guide
- Compaq SANworks VCS License Key Retrieval Instruction Sheet
- Compaq SANworks Tru64 UNIX Kit V1.0 for Enterprise Virtual Array Installation and Configuration Guide
- Compaq SANworks Windows NT and 2000 Kit V1.0 for Enterprise Virtual Array Installation and Configuration Guide
- Compaq SANworks OpenVMS Kit V1.0 for Enterprise Virtual Array Installation and Configuration Guide
- Compaq SANworks Sun Solaris Kit V1.0 for Enterprise Virtual Array Installation and Configuration Guide

SAN Configuration Rules with Enterprise Virtual Arrays

This section presents updates to Chapter 3 and Chapter 4 of the *Heterogeneous Open SAN Design Reference Guide*, 2nd Edition, (SAN Design Guide) that have changes specific to Enterprise Virtual Arrays. Please see the SAN Design Guide for a more complete discussion of SAN fabric rules.

General HSV110 Configuration Rules

1. The supported platforms and operating systems are listed in Table 1.

2. The HSV110 controller is supported in all Compaq supported SAN Fabric topology configurations noted in the SAN Design Guide or the platform application notes. The HSV110 is compatible in SANs using SAN Switch 8/16, 8/16-EL, and SAN Switch Integrated 32/64 model switches.

3. Any mix of servers (clustered and standalone) and storage systems is allowed that satisfies the maximums given in Table 2 and in the platform-specific release notes and documentation.

4. Refer to the SAN Fabric Zoning Rules with Enterprise section for information related to mixing platforms on a single shared storage system.

5. The HSV110 controller supports cross-cable and the straight-cable high availability cabling schemes. See Figure 4–1 and Figure 4–2 in the SAN Design Guide for cabling diagrams.

6. Supports Multiple-Bus Failover mode only. Multiple-Bus failover requires operating system or separate multi-path driver functionality.

7. SSP - LUN level masking:

   Use storage system LUN Presentation to enable/disable LUN access to specific hosts.

   NOTE: Shared access between different servers to the same storage unit (LUN) requires specific application software (i.e., MSCS) to ensure proper data preservation.

8. All host table entries must have the proper operating system type parameter set based on platform type accessing the assigned LUNs. Refer to Table 1.

SANworks Management Appliance Rules with Enterprise

The SANworks Management Appliance (SWMA) manages Enterprise Virtual Arrays with the HSV Element Manager.

1. A SAN Appliance is required to manage Enterprise Virtual Arrays. The HSV Element Manager may manage up to 16 HSV controller pairs per appliance.

2. One SAN Appliance is required for each fabric in multiple fabric SANs.

3. Multiple appliances per fabric are allowed as long as only one appliance is accessing a controller pair at a time. Zoning is required.

4. A license key is required for each Enterprise Virtual Array managed by the SWMA. Additional licenses are required to take advantage of value added software functionality.

5. The Element Managers for HSG and for HSV controllers can not coexist on the same appliance.

SAN Fabric Zoning Rules with Enterprise

Zoning must be used with Enterprise Virtual Arrays.

- Each SWMA with the Element Manager for HSV (HSV SWMA) and the HSV controllers it manages must be in a unique HSV management zone

- For SANs with both HSV and HSG based storage:

  — Each SWMA with the Element Manager for HSG (HSG SWMA) and the HSG controllers it manages must be in a unique HSG management zone

  An HSG management zone must not overlap with an HSV management zone

  — HSG and HSV controllers can coexist in zones with servers but not with each others SWMAs

- TRU64 UNIX and Windows NT/2000 servers must be in separate zones

- For SANs with more than 1024 HBAs, an HSV controller must be zoned so that it can see no more than 1024 HBAs. It may be necessary to add a zone to a SAN to satisfy the 1024 HBA limit.

Specific Operating System Rules with Enterprise

Table 1 summarizes the rules for configuring each supported hardware platform or operating system with an Enterprise Storage System. Table 1 lists the platforms, HBAs, SANworks Secure Path version, and the preferred method of storage attachment for each platform type. The sections following the table describe additional rules not listed in the table.

Table 1: HSV110 V1.01 Platform/Storage System SAN Attachment Summary

Platform or Operating System	Platform HBA	HBA F/W	HBA Driver	Secure Path	HSV110 Storage Controller SAN Attachment
Compaq Open VMS 7.2-1H1 w/ Tima v300 7.3	KGPSA-BC	3.20x7	N/A	Native	Operating System Parameter: OPENVMS Unit Identifier Required
	KGPSA-CA	3.81a4			
Tru64 UNIX V5.1 Patch Kit 3	KGPSA-BC	3.20x7	1.29	Native	Operating System Parameter: TRU64
	KGPSA-CA	3.81a4			
V5.1a	KGPSA-BC	3.20x7	1.32a		
	KGPSA-CA	3.81a4			
Microsoft Windows NT 4.0 SP6a	KGPSA-BC	3.20x7	4-4.53a7	3.1a	Operating System Parameter: WINDOWS
	KGPSA-CA	3.82a1			
Windows 2000 SP2	KGPSA-BC	3.20x7	5-4.53a7		
	KGPSA-CA	3.82a1			
Sun Solaris 4U 2.7, 2.8	380576-001	U4-3.0.3	2.5.9	2.1d	Operating System Parameter: SOLARIS
	123503-001	13.3.7			

Compaq OpenVMS

VCS V1.01 (7.2-1H1 with TIMA Kit / 7.3)

For HSV110 controller-based storage systems:

- A Unit Identifier is required for each Virtual Disk
- Supports Multiple-Bus Failover mode only. Multi-path driver is embedded in the operating system
- Supports multi-path high availability configuration implemented in a single fabric or separate fabrics

Tru64 UNIX

VCS V1.01 (V5.1, V5.1a)

For HSV110 controller-based storage systems:

- Supports Multiple-Bus Failover mode only. Multi-path code is embedded in the operating system
- Supports multi-path high availability configuration implemented in a single fabric or separate fabrics
- Tru64 UNIX versions V5.1 and V5.1a support TruCluster Server Version 5.1/5.1a

Microsoft Windows

VCS V1.01 (NT 4.0 w/SP6a, Windows 2000 w/SP2)

For HSV110 controller-based storage systems:

- Supports Multiple-Bus Failover mode only. All configurations require Secure Path for Windows
- Supports multi-path high availability configuration implemented in separate fabrics or in a single fabric (with zoning)

Sun Solaris

VCS V1.01 (2.7, 2.8)

For HSV110 controller-based storage systems:

- Supports Multiple-Bus Failover mode only. All Configurations require Secure Path for Sun Solaris
- Supports multi-path high availability configuration implemented in separate fabrics or in a single fabric (with zoning)
- Supports VERITAS Clusters 1.3
- A cluster must be in its own zone
- Secure Path version 2.1d supports two path only to an HSV110 controller. This requires the use of zoning

Heterogeneous Platform HSV110-based
Storage System Maximums

Table 2 lists the maximum connections supported by HSV110 controllers. In addition, Table 2 lists the maximum supported storage limits for each hardware platform or operating system. The maximums shown here are for access to an Enterprise Storage System with dual redundant HSV110 controllers. If the connection requirements for the number of servers in a particular SAN exceed the maximums, then deploy multiple storage systems within the SAN.

- Maximum of 1024 Host Bus Adapters (HBA)

- Maximum of 256 LUNs

- Maximum of 256 Hosts: A host is defined as one or more HBAs

- The # of LUNs times the # of Hosts must not exceed 8192

  — **Example**: 64 LUNs on an Enterprise Storage System gives a maximum of 128 hosts that may access that storage system

Table 2: Platform Storage Maximums - Enterprise Virtual Arrays

Platform or Operating System	Host Bus Adapters per Server	Active Controller Ports (Targets) per HBA	LUNs per HBA Target
See **Reference Notes**	1	2	3
Compaq OpenVMS 7.2-1H1, 7.3	4	128	128
Tru64 UNIX 5.1, 5.1A	64	128	255
Microsoft Windows NT 4.0 SP6a Windows 2000 (SP1 & SP2)	4	2/4	8/64
Sun Solaris 2.7, 2.8	16	2/4	128

Reference Notes

1. The maximum number of HBAs supported per server is dependent on the specific server model.

2. For Tru64 and OpenVMS this column typically represents the total number of active controller ports per HBA when accessing all ports of a storage system or ports on multiple storage systems. For all other platforms, this column typically represents 2 ports per storage system, or a total of 4 ports across 2 storage systems. Use of zoning may be required to limit the number of active targets presented to each HBA to the maximums stated for each platform in this column.

3. For Microsoft Windows, supports 8 LUNs per HBA target with the Large LUN feature disabled and 64 LUNs per HBA target with the Large LUN feature enabled.