

Shared Storage for Windows NT Using UltraSCSI Hubs

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Application Note

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and

<http://www.service.digital.com/>

Windows NT Shared Storage Configuration Components

NOTE

Please review the *Shared Storage Solutions Using UltraSCSI Hubs Application Note* before referencing this document.

The shared storage configuration consists of:

- Up to four Compaq AlphaServer systems or Intel-based systems running:
 - Microsoft Windows NT 4.0, Service Pack 3
 - HSZ70 Solution Software Kit for Windows NT (HSZDISK.SYS V4.0 or newer)
- STORAGEWORKS RAID Array (RA) 7000 or STORAGEWORKS Enterprise Storage Array (ESA) 10000 with a single or dual-redundant HSZ70 controllers using HSOF V7.0 or newer firmware, up to two pairs of controllers.

OR

STORAGEWORKS RAID Array (RA) 3000 with a single HSZ22 controller using D10i or newer firmware. The RA3000 has two host ports on its HSZ22 controller. Each port has its own set of disks and each port can be connected to a different SCSI bus. Thus, the RA3000 can support two Windows NT clusters, one on each host port. Non-clustered homogeneous and heterogeneous configurations on a single host port (same SCSI bus) are not supported by the RA3000 subsystem as it does not support exclusive storage unit access

OR

- STORAGEWORKS RAID Array (RA) 450 with a single or dual-redundant HSZ50 controllers using HSOV V5.2 or newer firmware, but only in clustered configurations. Non-clustered homogeneous and heterogeneous configurations are not supported by the RA450 subsystem as it does not support exclusive storage unit access.

NOTES

- The RA450 subsystem only supports SCSI IDs 0-7. Devices requiring SCSI IDs 8-15 **cannot** be used in a RA450 configuration without causing substantial SCSI bus problems.
- The RA450 SCSI bus transfer rate is limited to Fast-10 (20 MB/sec, 10 MHz).

- UltraSCSI Hub, DWZZH-03, with three differential ports

NOTE

The DWZZH-21 3-port UltraSCSI hub, with 2 single-ended ports and 1 differential port, is for special OEM applications only. It is not supported in shared storage configurations.

OR

- UltraSCSI Hub, DWZZH-05, with five differential ports and fair arbitration

In a configuration that includes a 5-port UltraSCSI hub and a Window NT host using the SWXA3-BD (Adaptec 2944UW) host adapter, the hub itself (Part No. 70-33250-03) must have a minimum revision level of E01. For Part No. DS-DWZZH-05, which includes the hub and documentation, the minimum revision level is F01.

Configuration Set-up Procedures

NOTE

Please refer to the *DWZZH 16-Bit UltraSCSI Hub User's Guide* before proceeding with the following configuration set-up procedures.

The following describes the set-up procedures for a shared storage configuration which includes a non-clustered standalone Windows NT host. These procedures apply to homogeneous (same operating system) and heterogenous (different operating systems) configurations. The differences required by a Windows NT cluster are described following the procedures.

Before connecting the host systems to the storage subsystem via the Hub, complete the following:

Host Adapters:

1. Verify the host adapters are internally terminated:
 - For host adapters with removable terminators, verify that the host terminators are securely installed on the host adapter board

OR

- For host adapters with termination configurable by a setup utility, verify that the termination setting is listed as "Enabled" or "On"
2. Set each host bus adapter to a unique SCSI ID.

NOTE

For a 5-port hub with fair arbitration enabled, the host adapter SCSI IDs **must** be set to 15, 14, 13, and 12. If narrow addressing is used, the adapter SCSI IDs must be set to 3, 2, 1 and 0. For further information on adapter SCSI ID settings, consult the *DWZZH 16-Bit UltraSCSI Hub User's Guide*.

3. Set the SCSI bus transfer speed to either *Fast-20* or *UltraSCSI*.
4. Disable SCSI Bus Reset. Most hosts will issue one or more Bus Resets during boot and possibly during shutdown. These Bus Resets will interrupt any SCSI operation being performed by other hosts, but they will not cause data loss or corruption. The hosts will retry the SCSI operation and may report a warning or error from the "unexpected" Bus Reset. The actual warning or error reported is dependent on the operating system of that host. Disabling SCSI Bus Reset on the adapter will prohibit it from issuing its own Bus Resets. This reduces the impact a booting host has on other hosts.

NOTE

Please refer to the specific host adapter's configuration guide for detailed information on setting the SCSI bus parameters.

Storage Controller:

NOTE

The following controller function settings are modified using either STORAGEWORKS Command Console (SWCC) or Command Line Interface (CLI).

1. Set the HOST_FUNCTION mode to "D" for all controller target IDs (storage sets) that will be used by the Windows NT host system. For example, if you are using the HSZ70 Command Line Interface, enter:

```
SET THIS_CONTROLLER HOST_FUNCTION=(4,D)
```

This sets the HSZ70 controller SCSI target ID 4 to HOST_FUNCTION mode D.

For the RA3000, set the Host Mode to "NT".

2. Restrict the access to the storage units used by the Windows NT server (HSZ70 controller only). The access to the storage unit is made exclusive to a specific host initiator SCSI ID. For example, if you are using the HSZ70 Command Line Interface, enter:

SET D400 ACCESS_ID=15

This restricts access to storage unit D400 to the host with SCSI ID 15.

NOTE

Exclusive storage unit access is **not** supported by the RA3000 subsystem (HSZ22 controller) nor by the RA450 subsystem (HSZ50 controller).

For further instructions on setting up the storage controllers, refer to:

- HSZ70; *HSZ70 Array Controller, HSOF Version 7.0, Configuration Manual*
- HSZ22; *Getting Started, RAID Array 3000 for Windows NT, Installation Guide*
- HSZ50; *HSZ50 Array Controller, HSOF 5.1, Configuration Manual*

UltraSCSI Hub:

1. Place the UltraSCSI hub in either a STORAGEWORKS BA356 storage shelf or pedestal, or in the lower right-hand device slots of the BA370 shelf within the RA7000 or ESA10000. The 3-port hub may also be placed in a device slot of the RA3000. Installation in a BA356 shelf is the preferred approach.

CAUTION

Do not exceed 25 meters maximum length per bus segment when installing the UltraSCSI hub.

NOTE

If the UltraSCSI Hub is installed in the RA3000 enclosure, the door will not close.

2. Cable the host port of the storage controller to a port of the UltraSCSI hub. When using fair arbitration on a 5-port hub, the top port is designated as the storage controller port.
3. Cable the host adapters to the other ports of the UltraSCSI hub.

NOTE

For a 5-port hub with fair arbitration enabled, the correct adapters must be cabled to the correct ports. In a narrow SCSI addressing configuration, it is necessary to connect the jumper pins on the back of the 5-port hub. No jumper is required for a wide SCSI addressing configuration. For further information on 5-port hub settings, refer to the *DWZZH 16-Bit UltraSCSI Hub User's Guide*.

Clustering:

Windows NT clusters with UltraSCSI hubs are configured with:

- All host servers running Windows NT 4.0, Service Pack 3 and either Microsoft Cluster Server (MSCS) 1.0 or DIGITAL Clusters for Windows NT 1.1, Service Pack 1.
- Only **two** hosts per cluster. Both must be either Intel-based servers or both Alpha servers. It is not possible to have one of each.
- A cluster having exclusive use of the SCSI bus. A cluster is not supported with additional non-clustered hosts nor with additional clusters on the same UltraSCSI hub.
- HSZ70 controllers (RA7000 or ESA10000) set up as described above, but **without** restricted access to the storage units. If access has been restricted, reset the storage units for access by all hosts. For example, if you are using the HSZ70 Command Line Interface, enter:

```
SET D400 ACCESS_ID=ALL
```

This allows access to storage unit D400 by all hosts, as required in a cluster environment.

NOTE

See your host server's "Supported Options List" for more information on cluster-supported adapters.

Example Configurations:**NOTE**

The host adapters shown in the following diagrams are configured with internal termination.

Figure 1 Example 3-Port UltraSCSI Hub Configuration Layout

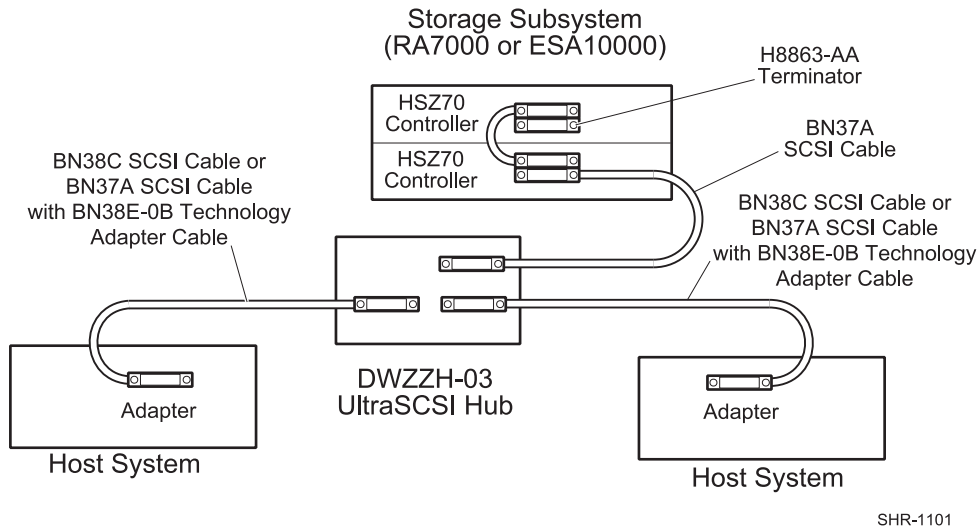
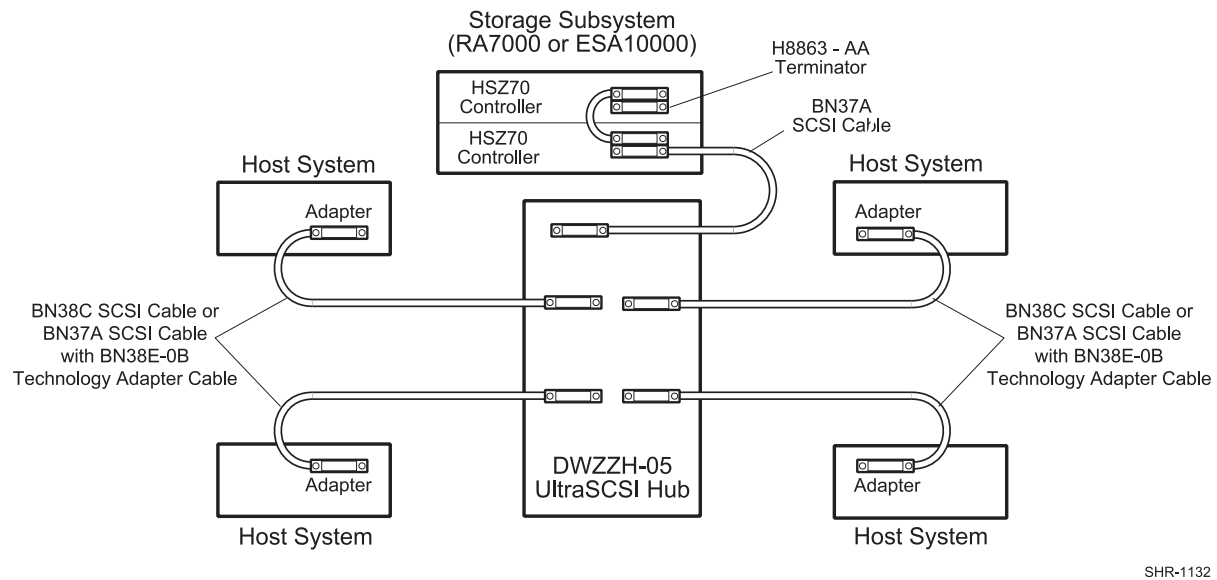


Figure 2 Example 5-Port UltraSCSI Hub Configuration Layout



The host adapters can be connected to the UltraSCSI hubs using two interchangeable cabling options:

- BN38C VHDCI-to-HD68 SCSI cables
- BN37A VHDCI-to-VHDCI SCSI cables coupled with BN38E-0B VHDCI-to-HD68 technology adapter cables

The BN38C cables are recommended. See the *UltraSCSI Configuration Guidelines* for a complete list of the available cables.

Configuration Parts List:**Required Components (Minimum) for 3-Port UltraSCSI Hub**

3-Port Hub:	Part Name	Part #	Quantity
	Storage Subsystem: RA7000 or ESA 10000		
	HSZ70 Controller, HSOF V7.0 firmware or newer	DS-HSZ70-AH	1 to 4
	VHDCI UltraSCSI Tri-Link	H8861-AA	1 to 4
	VHDCI UltraSCSI Differential Terminator	H8863-AA	1
	RA3000		
	HSZ22 Controller, D10i firmware or newer	DS-HSZ22-AA	1
	RA450		
	HSZ50 Controller, HSOF V5.2 firmware or newer	HSZ50-xx	1 or 2
	HD68 SCSI-3 Tri-Link	H885-AA	1 or 2
	HD68 SCSI-3 Differential Terminator	H879-AA	1
	Host Adapters (Wide Differential):		1 or 2
	HD68 UltraSCSI, firmware version 4.49 or newer, driver version 2.29 or newer (Alpha only)	KZPBA-CB	
	HD68 SCSI, firmware version A11 or newer, driver version 1.41 or newer (Alpha only)	KZPSA-BB	
	HD68 UltraSCSI (Adaptec 2944UW), firmware version 1.25 only, driver version 125C only (Intel only)	SWXA3-BD	
	UltraSCSI Hub (3 Differential Ports)	DS-DWZZH-03	1

Required Components (Minimum) for 3-Port UltraSCSI Hub (continued)

3-Port Hub:	Part Name	Part #	Quantity
	<p>UltraSCSI Cables: RA7000, ESA10000, or RA3000</p> <p>VHDCI UltraSCSI, to connect the controller with the UltraSCSI Hub</p> <p>VHDCI-to- HD68 UltraSCSI, to connect the Adapters with the UltraSCSI Hub</p> <p>OR</p> <p>VHDCI UltraSCSI</p> <p>VHDCI to HD68 UltraSCSI Technology Adapter Cable</p> <p>See the <i>UltraSCSI Configuration Guidelines</i> for a complete list of the available cables</p>	<p>BN37A-xx</p> <p>BN38C-xx</p> <p>BN37A-xx</p> <p>BN38E-0B</p>	<p>1</p> <p>2</p> <p>3</p> <p>2</p>
	<p>RA450</p> <p>VHDCI-to-HD68 UltraSCSI</p> <p>OR</p> <p>VHDCI UltraSCSI</p> <p>VHDCI-to-HD68 UltraSCSI Technology Adaptec Cable.</p> <p>See the <i>UltraSCSI Configuration Guidelines</i> for a complete list of the available cables</p>	<p>BN38C-xx</p> <p>BN37A-xx</p> <p>BN38E-0B</p>	<p>3</p> <p>3</p> <p>3</p>
	<p>STORAGEWORKS shelf with dual power supplies, for the UltraSCSI Hub</p>	<p>DS-BA356-xx</p>	<p>1</p>

Required Components (Minimum) for 5-Port UltraSCSI Hub

5-Port Hub:	Part Name	Part #	Quantity
	Storage Subsystem: RA7000 or ESA 10000		
	HSZ70 Controller, HSOV V7.0 firmware or newer	DS-HSZ70-AH	1 to 4
	VHDCI UltraSCSI Tri-Link	H8861-AA	1 to 4
	VHDCI UltraSCSI Differential Terminator	H8863-AA	1
	RA3000		
	HSZ22 Controller, D10i firmware or newer	DS-HSZ22-AA	1
	RA450		
	HSZ50 Controller, HSOV V5.2 firmware or newer	HSZ50-xx	1 or 2
	HD68 SCSI-3 Tri-Link	H885-AA	1 or 2
	HD68 SCSI-3 Differential Terminator	H879-AA	1
	Host Adapters (Wide Differential):		1 to 4
	HD68 UltraSCSI, firmware version 4.49 or newer, driver version 2.29 or newer (Alpha only)	KZPBA-CB	
	HD68 SCSI, firmware version A11 or newer, driver version 1.41 or newer (Alpha only)	KZPSA-BB	
	HD68 UltraSCSI (Adaptec 2944UW), firmware version 1.25 only, driver version 125C only (Intel only)*	SWXA3-BD	
	UltraSCSI Hub (5 Differential Ports)	DS-DWZZH-05	1

* In a configuration that includes a 5-port SCSI bus and a Windows NT host using the SWXA3-BD (Adaptec 2944UW) host adapter, the hub itself (Part No. 70-33250-03) must have a minimum revision level of E01. For Part No. DS-DWZZH-05, which includes the hub and documentation, the minimum revision level is F01.

Required Components (Minimum) for 5-Port UltraSCSI Hub (continued)

5-Port Hub:	Part Name	Part #	Quantity
	<p>UltraSCSI Cables: RA7000, ESA10000, or RA3000</p> <p>VHDCI UltraSCSI, to connect the HSZ70 controller with the UltraSCSI Hub</p> <p>VHDCI- to-HD68 UltraSCSI, to connect the Adapters with the UltraSCSI Hub</p> <p>OR</p> <p>VHDCI UltraSCSI</p> <p>VHDCI-to-HD68 UltraSCSI Technology Adapter Cable</p> <p>See the <i>UltraSCSI Configuration Guidelines</i> for a complete list of the available cables</p>	<p>BN37A-xx</p> <p>BN38C-xx</p> <p>BN37A-xx</p> <p>BN38E-0B</p>	<p>1</p> <p>4</p> <p>5</p> <p>4</p>
	<p>RA450</p> <p>VHDCI-to-HD68 UltraSCSI</p> <p>OR</p> <p>VHDCI UltraSCSI</p> <p>VHDCI-to-HD68 UltraSCSI Technology Adaptec Cable</p> <p>See the <i>UltraSCSI Configuration Guidelines</i> for a complete list of the available cables</p>	<p>BN38C-xx</p> <p>BN37A-xx</p> <p>BN38E-0B</p>	<p>5</p> <p>5</p> <p>5</p>
	<p>STORAGEWORKS shelf with dual power supplies, for the UltraSCSI Hub</p>	<p>DS-BA356-xx</p>	<p>1</p>

Configuration References

The following documents provide further information for the configuration of the components utilized in shared storage configurations:

Topic	Document Title	Order Number
<i>Windows NT - Alpha RA7000/ESA10000</i>	<i>Getting Started, HSZ70 Solution Software V7.0A for Windows NT Server - Alpha, Installation Guide</i>	<i>AA-R84DC-TE</i>
<i>Windows NT - Alpha RA7000/ESA10000</i>	<i>Release Notes, RAID Array 7000/Enterprise Storage Array 10000 for Windows NT-Alpha</i>	<i>AA-R84EC-TE</i>
<i>Windows NT - Alpha RA3000</i>	<i>Getting Started, RAID Array 3000 for Windows NT - Alpha, Installation Guide</i>	<i>AA-RACUA-TE</i>
<i>Windows NT - Alpha RA3000</i>	<i>Release Notes, RAID Array 3000 for Windows NT - Alpha</i>	<i>AA-RACVA-TE</i>
<i>Windows NT - Intel RA7000/ESA10000</i>	<i>Getting Started, HSZ70 Solution Software V7.0A for Windows NT Server - Intel, Installation Guide</i>	<i>AA-R770C-TE</i>
<i>Windows NT - Intel RA7000/ESA10000</i>	<i>Release Notes, V7.0, RA7000/ESA 10000 for Windows NT-Intel</i>	<i>AA-R771C-TE</i>
<i>Windows NT - Intel RA3000</i>	<i>Getting Started, RAID Array 3000 for Windows NT - Intel, Installation Guide</i>	<i>AA-RACZA-TE</i>
<i>Windows NT - Intel RA3000</i>	<i>Release Notes, RAID Array 3000 for Windows NT - Intel</i>	<i>AA-RAD0A-TE</i>
<i>RA7000 / ESA10000 (HSZ70 Controller)</i>	<i>RA7000 and ESA10000 Storage Subsystems, User's Guide</i>	<i>EK-SMCP-UG</i>
<i>HSZ70 Controller</i>	<i>HSZ70 Array Controller, HSOF Version 7.0, Configuration Manual</i>	<i>EK-HSZ70-CG</i>
<i>RAID Array 450 (HSZ50 Controller)</i>	<i>HSZ50 Array Controllers, HSOF 5.1, Configuration Manual</i>	<i>EK-HSZ50-CG</i>
<i>STORAGWORKS Command Console</i>	<i>Command Console Version 2.0, User's Guide</i>	<i>AA-R60EA-TE</i>
<i>UltraSCSI</i>	<i>UltraSCSI Configuration Guidelines</i>	<i>EK-ULTRA-CG</i>
<i>UltraSCSI Hub</i>	<i>DWZZH 16-Bit UltraSCSI Hub, User's Guide</i>	<i>EK-DWZZH-UG</i>
<i>Shared Storage</i>	<i>Shared Storage Solutions Using UltraSCSI Hubs</i>	<i>EK-SMA21-AN</i>

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