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Hitachi Freedom Storage™ Thunder 9500™ V Series

HP-UX® Host Installation Guide

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Source Document Revision Level

The following source documents were used to produce this 9500V host installation guide:

- *Hitachi Freedom Storage™ Thunder 9200™ HP-UX® Host Installation Guide* (MK-91DF542)

Changes for this Revision

- Deleted references to sd.conf file

Preface

The *Hitachi Freedom Storage™ Thunder 9500™ V Series HP-UX® Host Installation Guide* describes and provides instructions for configuring the devices on the Hitachi 9500V disk array subsystem for operation with the HP-UX® operating system. This configuration guide assumes that:

- the user has a background in data processing and understands direct-access storage device subsystems and their basic functions,
- the user is familiar with the Hitachi 9500V array subsystem,
- the user is familiar with the HP-UX® operating system, the HP® 9000 system, and the fibre-channel adapters, and
- the user is familiar with the UNIX® file system, system commands, and utilities.

Note: The term "9500V" refers to the entire Hitachi Freedom Storage™ 9500™ V Series subsystem family, unless otherwise noted. Please refer to the *Hitachi Thunder 9500™ V Series User and Reference Guide* (MK-92DF601) for further information on the 9500V disk array subsystems.

Note: For further information on the HP-UX® operating system, please consult the HP-UX® user documentation, or contact HP® technical support.

COMMENTS

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Make sure to include the document title, number, and revision.
Please refer to specific page(s) and paragraph(s) whenever possible.

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Thank you!

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1.1 9500V HP-UX® Configuration

This document describes the requirements and procedures for connecting the 9500V subsystem to an HP-UX® system and configuring the new 9500V devices for operation with the HP-UX® operating system.

Configuration of the 9500V disk devices for HP-UX® operations includes:

- Partitioning the disk devices (see section 3.1),
- Creating the file systems for the new volumes (see section 3.2),
- Setting the device parameters for the disk devices (see section 2.6),
- Creating the mount directories (see section 3.2),
- Mounting and verifying the file systems (see section 3.2), and
- Setting and verifying the auto-mount parameters (see section 3.2).

Note on the term "SCSI disk": The 9500V logical devices are defined to the host as SCSI disk devices, even though the interface is fibre-channel.

1.2 9500V Subsystem

The Hitachi 9500V RAID subsystem supports concurrent attachment to multiple UNIX®-based and PC-server platforms. Please contact your Hitachi Data Systems account team for the latest information on platform support. The 9500V subsystem provides continuous data availability, high-speed response, scaleable connectivity, and expandable capacity for PC server and open-system storage. The 9500V subsystem can operate with multihost applications and host clusters, and is designed to handle very large databases as well as data warehousing and data mining applications that store and retrieve terabytes of data.

For further information on the 9500V subsystem, please refer to the *Hitachi Thunder 9500™ V Series User and Reference Guide*, or contact your Hitachi Data Systems account team.

Chapter 2 Preparing for New Device Configuration

2.1 Configuration Requirements

The requirements for a 9500V HP-UX® configuration are:

- **Hitachi 9500V subsystem**.
  - The Resource Manager 9500V software is required to configure the fibre-channel (FC) ports.

  Note: The availability of 9500V features and functions depends on the level of microcode installed on the 9500V subsystem.
- HP® 9000/800 series system. For assistance with other HP® models, please contact the Hitachi Data Systems Support Center.
- HP-UX® operating system, version 10.20, 11.0, or 11i. ***Important:*** Please contact HP to make sure that the most current OS patches are installed on the HP-UX® system(s).

  Note: For further information on supported HP-UX® versions, please contact Hitachi Data Systems.
- **High-availability (HA) software.** The 9500V currently supports the following software product. Please contact your Hitachi Data Systems account team for the latest information on supported software products.
  - Hitachi Dynamic Link Manager and VERITAS® Volume Manager™ for path failover and logical volume management.
- Fibre-channel adapters. Make sure to install all utilities, tools, and drivers that come with the adapter(s).
  - The 9500V subsystem supports full-speed (1 and 2 Gb/s), shortwave, non-OFC (open fibre control) optical fibre-channel interface and multimode optical cables with SC and/or LC connectors. Do not connect any OFC-type fibre-channel interface to the 9500V subsystem.

2.2 Installing the 9500V Subsystem

The 9500V subsystem comes with all hardware and cabling required for installation. Installation of the 9500V subsystem involves the following activities:

Hardware installation. Perform hardware installation as specified in Hitachi Data Systems' documentation and Hitachi, Ltd. source documentation. Follow all precautions and procedures in this documentation. Check all specifications to ensure proper installation and configuration. Hardware installation includes:

- Assembling all hardware and cabling.
- Upgrading to the latest microcode level.
- Creating RAID groups and LUNs and formatting LUNs using the Resource Manager 9200 software. For information and instructions on using Resource Manager, please refer to the *Hitachi Thunder 9200™ Resource Manager User's Guide* (MK-91DF552).
- Installing the fibre-channel adapters and cabling.

  9500V FC Port: The fibre topology parameters for each 9500V fibre-channel port depend on the type of device to which the 9500V port is connected. Determine the topology parameters supported by the device, and set your topology accordingly (see section 2.8).

2.3 Preparing to Connect the 9500V

Before the 9500V is connected to the HP® system, you must perform the following tasks:

- Set the host-specific parameters for the 9500V fibre-channel port(s) (see section 2.3.1), and
- Verify host bus adapter installation (see section 2.4).

You will use the Resource Manager 9500V software to configure the 9500V fibre ports. For instructions on using Resource Manager, please refer to the *Hitachi Thunder 9200™ Resource Manager User's Guide* (MK-91DF552).

2.3.1 Setting the Host-Specific Parameters for the 9500V Ports

The 9500V ports must be configured for the connected operating system.

Fibre Topology. You need to configure the 9500V FC ports to define the fibre topology parameters and port addresses (see Table 2.1). The 9500V subsystem supports up to 64 LUs. You will select the appropriate settings for each 9500V FC port based on the device to which the port is connected. Determine the topology parameters supported by the device, and set your topology accordingly.

Note: If you plan to connect different types of servers to the 9500V via the same fabric switch, you must use either **zoning** on the switch or the Hitachi SANtinel™ (LUN security) on the 9500V.

Port address. In fabric environments, the port addresses are assigned automatically by fabric switch port number and are not controlled by the 9500V port settings. In FC arbitrated-loop (FCAL) environments, the port addresses are set by entering an AL-PA (arbitrated-loop physical address, or loop ID, or port address). The host communicates with the devices comprising the loop with 8-bit AL-PA. See Table 2.1.

Table 2.1 shows the available AL-PA values and the corresponding SCSI TID address. The number of available port addresses is 126. (There are 127 port addresses, but address 00H is reserved for fibre connection.) Fibre-channel protocol uses the AL-PAs to communicate on the fibre-channel link, but the software driver of the platform host adapter translates the AL-PA value assigned to the 9500V port to a SCSI TID.

Devices communicate with hosts using individual port addresses. However, hosts map SCSI protocol to fibre channel devices. The hosts access the device's LUs using the device files /dev/dsk/c*t*d* and /dev/rdsk/c*t*d*. SCSI and fibre-channel devices are accessed the same way; however, the device files for SCSI and fibre-channel devices are configured differently.

Table 2.1 Fibre Port Addressing

AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID	AL-PA	TID
EF	0	CD	16	B2	32	98	48	72	64	55	80	3A	96	23	112
E8	1	CC	17	B1	33	97	49	71	65	54	81	39	97	23	113
E4	2	CB	18	AE	34	90	50	6E	66	53	82	36	98	1F	114
E2	3	CA	19	AD	35	8F	51	6D	67	52	83	35	99	1E	115
E1	4	C9	20	AC	36	88	52	6C	68	51	84	34	100	1D	116
E0	5	C7	21	AB	37	84	53	6B	69	4E	85	33	101	1B	117
DC	6	C6	22	AA	38	82	54	6A	70	4D	86	32	102	18	118
DA	7	C5	23	A9	39	81	55	69	71	4C	87	31	103	17	119
D9	8	C3	24	A7	40	80	56	67	72	4B	88	2E	104	10	120
D6	9	BC	25	A6	41	7C	57	66	73	4A	89	2D	105	0F	121
D5	10	BA	26	A5	42	7A	58	65	74	49	90	2C	106	08	122
D4	11	B9	27	A3	43	79	59	63	75	47	91	2B	107	04	123
D3	12	B6	28	9F	44	76	60	5C	76	46	92	2A	108	02	124
D2	13	B5	29	9E	45	75	61	5A	77	45	93	29	109	01	125
D1	14	B4	30	9D	46	74	62	59	78	43	94	27	110		
CE	15	B3	31	9B	47	73	63	56	79	3C	95	26	111		

2.4 Verifying the Host Fibre-Channel Adapter Installation

Before the 9500V is connected to the HP-UX® system, you must verify the FC adapter installation. To ensure that the host fibre configuration is correct, you will verify recognition of the FCA and the FCA driver. using the **ioscan -nfC** command (see Figure 2.1).

```
# ioscan -nfC disk ↵
ClassI    H/W Path            Driver      S/W State   H/W Type     Description
================================================================================
disk 37  8/12.8.0.255.0.0.0  sdisk       CLAIMED     DEVICE       HITACHI DFXXXF
                               /dev/dsk/c7t0d0   /dev/rdsk/c7t0d0
disk 38  8/12.8.0.255.0.0.1  sdisk       CLAIMED     DEVICE       HITACHI DFXXXF
                               /dev/dsk/c7t0d1   /dev/rdsk/c7t0d1
disk 0   10/0.6.0            sdisk       CLAIMED     DEVICE       SEAGATE ST34573WC
                               /dev/dsk/c0t6d0   /dev/rdsk/c0t6d0
disk 1   10/0.8.0            sdisk       CLAIMED     DEVICE       SEAGATE ST34573WC
                               /dev/dsk/c0t8d0   /dev/rdsk/c0t8d0
disk 2   10/0.9.0            sdisk       CLAIMED     DEVICE       SEAGATE ST34573WC
                               /dev/dsk/c0t9d0   /dev/rdsk/c0t9d0
#
```

Figure 2.1 Verifying Host Fibre-Channel Adapter Installation

2.5 Connecting the 9500V Subsystem to the HP-UX® System

The 9500V subsystem comes with all the hardware and cabling required for connection to the host system(s). Connection of the 9500V subsystem involves the following activities:

1. **Verify subsystem installation**. The Hitachi Data Systems representative verifies the fibre-port address configuration and the status of the FC adapters and LDEVs (normal).
2. **Shut down the HP-UX® system**. The user should perform this activity. You must shut down and power off the HP-UX® system before connecting the 9500V:
   a) Shut down the HP® system.
   b) When shutdown is complete, power off the HP® display.
   c) Power off all peripheral devices except for the 9500V subsystem.
   d) Power off the HP® system. You are now ready to connect the 9500V subsystem.
3. **Connect the 9500V to the HP® system**. The Hitachi Data Systems representative installs the fibre-channel cables between the 9500V and the HP-UX® system. ***Note:*** The Hitachi Data Systems representative must use the 9500V maintenance manual during all installation activities. Follow all precautions and procedures in the maintenance manual, and always check all specifications to ensure proper installation and configuration.
4. **Power on the HP® system**. The user or Hitachi Data Systems representative can perform this activity. To power on the HP® system after connecting the 9500V subsystem:
   a) Power on the HP® system display.
   b) Power on all peripheral devices. The 9500V subsystem should already be on, the host modes should already be set, and the fibre-channel ports should already be configured. If the host modes or fibre ports are configured after the HP® system is powered on, the system must be restarted to recognize the new devices.
   c) Confirm the ready status of all devices.
   d) Power on the HP® system. You are now ready to configure the new 9500V devices.

2.6 Setting the Disk and Device Parameters

Once the 9500V is installed and connected, you must set the queue depth parameter (**sd_max_throttle**) and I/O time-out value (**sd_io_time**) for the 9500V devices. The required I/O time-out value (TOV) for 9500V devices is 60 seconds (0x3C), which is also the default TOV value. If the I/O TOV has been changed from the default, you must change it back to 60 seconds by editing the **sd_io_time** parameter in the **/etc/system** file.

2.7 Setting and Recognizing the LUs

You must set and recognize the new LUs by adding the 9500V logical devices.

2.8 Configuring the Host Fibre-Channel Adapters

After setting the disk and device parameters and setting and recognizing the LUs, you are ready to configure the FC adapter(s) connected to the 9500V. The host bus adapters (HBAs) have many configuration options. This section provides minimum requirements for configuring FC adapters for operation with the 9500V subsystem.

Please make sure that you have read the MAN pages and user documentation for the adapter.

2.9 Rebooting the HP-UX® System

After setting the disk and device parameters, setting and recognizing the LUs, and configuring the HBAs, you are ready to reboot the HP-UX® System.

After rebooting, you are now ready to configure the new LUs as described in Chapter 3.

Chapter 3 Configuring the 9500V Devices

After 9500V installation and connection are complete, the devices on the 9500V subsystem are ready to be configured for use. Configuration of the 9500V devices is performed by the user and requires root access to the Sun® system. The activities involved in device configuration are:

The activities involved in 9500V device configuration are:

- Partitioning the new devices (see section 3.1)
- Creating the file systems for the new volumes (see section 3.2),
- Setting the device parameters for the disk devices (see section 2.6),
- Creating and mounting the file system (see section 3.2), and
- Setting and verifying the auto-mount parameters (see section 3.2).

Troubleshooting: Chapter 4 provides troubleshooting information.

3.1 Partitioning and Labeling the New Devices

After completing all activities in Chapter 2, you can begin partitioning and labeling the new devices. Each SCSI disk device can have more than one partition. The disk partitioning and labeling procedure involves the following tasks: setting the partition(s), labeling the disk, and verifying the disk label.

3.2 Creating and Mounting the File Systems

After you have partitioned and labeled all new disks, you can create and mount the file systems for the SCSI disk devices. Creating and mounting the file systems for the new SCSI disk devices involves:

- Creating the file systems (see section 3.2.1),
- Creating and verifying the mount directories (see section 3.2.2),
- Mounting and verifying the file systems (see section 3.2.3),
- Setting the auto-mount parameters (optional) (see section 3.2.4).

Note: Do not create file systems or mount directories for the raw devices. Raw devices do not require any further configuration after being partitioned and labeled.

3.2.1 Creating the File Systems

To create the file systems for the newly installed SCSI disk devices:

1. Create the file system using the **newfs /dev/vgyy/rlvol*Z*** command (see Figure 3.1).
2. Repeat step (1) for each new SCSI disk device on the 9500V subsystem.

```
# newfs /dev/vg03/rlvol1 ↵
newfs: /etc/default/fs is used for determining the file system type
     version 3 layout
     2093056 sectors, 2093056 blocks of size 1024, log size 1024 blocks
     unlimited inodes, 2093056 data blocks, 2091440 free data blocks
     64 allocation units of 32768 blocks, 32768 data blocks
     last allocation unit has 28672 data blocks
     first allocation unit starts at block 0
     overhead per allocation unit is 0 blocks
#
```

Figure 3.1 Creating the File Systems

3.2.2 Creating and Verifying the Mount Directories

After you have created the file systems, you can create and verify the mount directories for the new SCSI disk devices. Each logical partition requires a unique mount directory, and the mount directory name should identify the logical volume and the partition.

To create the mount directories for the newly installed SCSI disk devices, see the example in Figure 3.2:

```
# mkdir /array1 ↵
#
```

Figure 3.2 Creating and Verifying a Mount Directory

3.2.3 Mounting and Verifying the File Systems

After you have created the mount directories, you can mount and verify the file systems for the new SCSI disk devices. The file system for each logical partition should be mounted and verified to ensure that all new logical units are fully operational.

To mount and verify the file systems for the newly installed 9500V devices (see the example in Figure 3.3).

```
# mount /dev/vg03/lvol1 /array1 ↵
#
```

Figure 3.3 Mounting and Verifying the File System

3.2.4 Setting and Verifying the Auto-Mount Parameters

To set the auto-mount parameters for the desired devices, see the example in Figure 3.4

```
# cp -ip /etc/vfstab /etc/vfstab.standard                    ← Make backup before editing.
# vi␣/etc/fstab ↵
# System /etc/fstab file.  Static information about the file systems
# See fstab(4) and sam(1M) for further details on configuring devices.
/dev/vg00/lvol3      /       vxfs    delaylog       0  1
/dev/vg00/lvol1      /stand  hfs     defaults       0  1
/dev/vg00/lvol4      /home   vxfs    delaylog       0  2
/dev/vg00/lvol5      /opt    vxfs    delaylog       0  2
/dev/vg00/lvol6      /tmp    vxfs    delaylog       0  2
/dev/vg00/lvol7      /usr    vxfs    delaylog       0  2
/dev/vg00/lvol8      /var    vxfs    delaylog       0  2
/dev/vg01/lvol1      /home1  vxfs    delaylog       0  2
/dev/vg03/lvol1      /array1         vxfs    delaylog       0  3
```

Figure 3.4 Setting the Auto-Mount Parameters

Chapter 4 Troubleshooting

4.1 Troubleshooting

The Hitachi 9500V disk array subsystems provide continuous data availability.

Table 4.1 lists potential error conditions during 9500V HP-UX® configuration and provides instructions for resolving each condition. If you are unable to resolve an error condition, please contact your Hitachi Data Systems representative or VAR for help, or call the Hitachi Data Systems Support Center for assistance.

Table 4.1 Troubleshooting

Error Condition	Recommended Action
The logical devices are not recognized by the system.	Make sure that the READY indicator lights on the 9500V subsystem are ON. Make sure that the fibre-channel cables are correctly installed and firmly connected.
A physical volume cannot be created (PVCREATE command).	Make sure that the 9500V devices are properly formatted. Make sure that the character-type device file exists. Make sure that the correct character-type device file name is used with **pvcreate**.
A volume group cannot be created (VGCREATE command).	Make sure that the directory for the new volume group exists. Make sure that the control file exists. Make sure that the correct major # (64) and minor # are used with **mknod**. Make sure that the block-type file exists and is entered correctly with **vgcreate**. Make sure that the physical volume is not already allocated to another volume group.
A logical volume cannot be created (LVCREATE command).	Make sure that the specified capacity is not greater than 4096 MB. Make sure that the capacity of the volume group is not less than the capacity of the partitioned logical volume.
File system cannot be created (**newfs**).	Make sure that the character-type device file is entered correctly with **newfs**.
The file system is not mounted after rebooting.	Make sure that the system was restarted properly. Make sure that the auto-mount information in the /**etc/fstab** file is correct.
The HP® system does not reboot properly after hard shutdown.	If the HP® system is powered off without executing the shutdown process, wait **three minutes** before restarting the HP® system. This allows the 9500V's internal time-out process to purge all queued commands so that the 9500V is available (not busy) during system startup. If the HP® system is restarted too soon, the 9500V will continue trying to process the queued commands, and the HP® system will not reboot successfully.

4.2 Calling the Hitachi Data Systems Support Center

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much information about the problem as possible, including the circumstances surrounding the error or failure and the exact content of any error messages displayed on the host system (s).

The worldwide Hitachi Data Systems Support Centers are:

- Hitachi Data Systems North America/Latin America
  San Diego, California, USA
  1-800-348-4357
- Hitachi Data Systems Europe
  Contact Hitachi Data Systems Local Support
- Hitachi Data Systems Asia Pacific
  North Ryde, Australia
  011-61-2-9325-3300

Appendix A Acronyms and Abbreviations

AL	arbitrated loop
AL-PA	arbitrated loop physical address
FC	fibre-channel
FCA	fibre-channel adapter
FC-AL	fibre-channel arbitrated loop
H/W	hardware
HP	Hewlett-Packard Company
HRX	Hitachi RapidXchange
I/O, IO	input/output
LDEV	logical device
LU	logical unit
OFC	open fibre control
PA	physical address
PC	personal computer system
RAID	redundant array of independent disks
SCSI	small computer system interface
TID	target ID