

Hitachi AMS 2000 Family Command Control Interface (CCI) Installation Guide

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Glossary

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Preface

Hitachi AMS Command Control Interface (CCI) Installation Guide describes and provides instructions for installing, uninstalling, and upgrading CCI software on the UNIX and pc host platforms.

This preface includes the following information:

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Intended audience

This document is intended for system administrators, Hitachi Data Systems representatives, and Authorized Service Providers who are involved in installing, configuring, and/or operating the AMS.

This document assumes that you, as the user:

- Have a background in data processing and understand RAID storage systems and their basic functions.
- Are familiar with the AMS system and have read the AMS User and Reference Guide.
- Are familiar with the Storage Navigator Modular 2 software for the AMS and have read the Storage Navigator Modular 2 User's Guide.
- Are familiar with the operating system and web browser software on the system hosting the Storage Navigator Modular 2 software.

Product version

This document revision applies to Command Control Interface (CCI) Installation Guide 01-32-03/01 or later, and AMS 2000 Family firmware version 08C3/R or later.

Release notes and readme

Read the release notes and readme file before installing and using this product. They may contain requirements or restrictions that are not fully described in this document and/or updates or corrections to this document.

Document revision level

Revision	Date	Description
MK-97DF8122-00	October 2008	Initial Release
MK-97DF8122-01	December 2008	Revision 1, supersedes and replaces revision 00.
MK-97DF8122-02	March 2009	Revision 2, supersedes and replaces revision 01.
MK-97DF8122-03	June 2009	Revision 3, supersedes and replaces revision 02.
MK-97DF8122-04	August 2009	Revision 4, supersedes and replaces revision 03.
MK-97DF8122-05	November 2009	Revision 5, supersedes and replaces revision 04.
MK-97DF8122-06	January 2010	Revision 6, supersedes and replaces revision 05.
MK-97DF8122-07	April 2010	Revision 7, supersedes and replaces revision 06.
MK-97DF8122-08	November 2010	Revision 8, supersedes and replaces revision 07.
MK-97DF8122-09	December 2010	Revision 9, supersedes and replaces revision 08.
MK-97DF8122-10	February 2011	Revision 10, supersedes and replaces revision 09.
MK-97DF8122-11	May 2011	Revision 11, supersedes and replaces revision 10.
MK-97DF8122-12	March 2012	Revision 12, supersedes and replaces revision 11.
MK-97DF8122-13	April 2012	Revision 13, supersedes and replaces revision 12.

Revision	Date	Description
MK-97DF8122-14	December 2012	Revision 14, supersedes and replaces revision 13.
MK-97DF8122-15	January 2013	Revision 15, supersedes and replaces revision 14.
MK-97DF8122-16	September 2013	Revision 16, supersedes and replaces revision 15.
MK-97DF8122-17	December 2013	Revision 17, supersedes and replaces revision 16.
MK-97DF8122-18	April 2014	Revision 18, supersedes and replaces revision 17.
MK-97DF8122-19	August 2014	Revision 19, supersedes and replaces revision 18.

Changes in this revision

- Added new step 5 to [Changing the CCI user for UNIX systems \(page 1-4\)](#).

Document organization

The following table provides an overview of the contents and organization of this document. Click the [chapter title](#) in the left column to go to that chapter. The first page of each chapter provides links to the sections in that chapter.

Chapter	Description
Chapter 1, Installing and configuring CCI	Provides installation and configuration definition file information and instructions.
Chapter 2, Uninstalling and upgrading CCI	Provides uninstall and upgrading instructions.

Applicable platforms

This document applies to the following platforms:

Vendor	Operating System
Oracle	Solaris 8 (SPARC)
	Solaris 9 (SPARC)
	Solaris 10 (SPARC)
	Solaris 10 (x86)
	Solaris 10 (x64)
Microsoft	Windows 2000
	Windows Server 2003 (IA32)
	Windows Server 2008 (IA32)
	Windows Server 2003 (x64)
	Windows Server 2008 (x64)
	Windows Server 2003 (IA64)
	Windows Server 2008 (IA64)
	Windows Server 2012 (x64)
Red Hat	Red Hat Linux AS 2.1 (IA32)
	Red Hat Linux AS/ES 3.0 (IA32)
	Red Hat Linux AS/ES 4.0 (IA32)
	Red Hat Linux AS/ES 5.0 (IA32)
	Red Hat Linux AS/ES 3.0 (AMD64/EM64T)
	Red Hat Linux AS/ES 4.0 (AMD64/EM64T)
	Red Hat Linux AS/ES 5.0 (AMD64/EM64T) Note 2
	Red Hat Linux AS/ES 6.0 (AMD64/EM64T) Note 2
	Red Hat Linux AS/ES 3.0 (IA64)
	Red Hat Linux AS/ES 4.0 (IA64) Note 1
HP	HP-UX 11i V1.0 (PA-RISC)
	HP-UX 11i V2.0 (PA-RISC)
	HP-UX 11i V3.0 (PA-RISC)
	HP-UX 11i V2.0 (IPF)
	HP-UX 11i V3.0 (IPF)
	Tru64 UNIX 5.1
IBM	AIX 5.1
	AIX 5.2
	AIX 5.3
	AIX 6.1
SGI	IRIX 6.5.x



NOTE 1:The 32-bit library is required to execute the CCI command in the AMD64/EM64T environment. The 32-bit library is not installed in the AMD64/EM64T by default; install the 32-bit library.



NOTE 2:To execute the CCI command when Red Hat Linux AS4.0 is used in the IPF environment (IA64), it is required to install all the 32-bit compatible packages for IA-32EL (Execution Layer). When you install the IA-32EL, install all the 32-bit compatible packages (except CCI for Linux/IA64).

Virtual OS applies to the following platforms:

Vendor	Host Operating System	Guest Operating System
VMware	VMware ESX Server 3.0	Windows 2000
		Windows Server 2003
		Red Hat Linux AS3.0
		Red Hat Linux AS4.0
	VMware ESX Server 4.0	Windows Server 2003
		Windows Server 2008
	VMware ESXi Server 5.0	Windows Server 2003
		Windows Server 2008
		Red Hat Linux AS5.0
Microsoft	Windows Server 2008 Hyper-V	Windows Server 2003 SP2
		Windows Server 2008
	Windows Server 2008 R2 Hyper-V2.0	Windows Server 2003 SP2
		Windows Server 2008 R2
Hitachi	Virtage (58-12)	Windows Server 2008 R2
		Red Hat Enterprise Linux 5.4




The following table shows the Internet Protocol version 6 (IPv6)-supported platforms.

Vendor	Operating System	IPv4 Mapped IPv6
Microsoft	Windows Server 2003 + IPv6 install (IA32)	N/A
	Windows Server 2008 (IA32)	N/A
	Windows Server 2003 + IPv6 install (x64)	N/A
	Windows Server 2008 (x64)	N/A
	Windows Server 2003 + IPv6 install (IA64)	N/A
	Windows Server 2008 (IA64)	N/A
	Windows Server 2012 (x64)	N/A

Vendor	Operating System	IPv4 Mapped IPv6
Oracle	Solaris 8 (SPARC)	
	Solaris 9 (SPARC)	
	Solaris 10 (SPARC)	
	Solaris 10 (x86)	
	Solaris 10 (x64)	
IBM	AIX 5.1	
	AIX 5.2	
	AIX 5.3	
	AIX 6.1	
Red Hat	Red Hat Linux AS/ES 2.1 (IA32)	
	Red Hat Linux AS/ES 3.0 (IA32)	
	Red Hat Linux AS/ES 4.0 (IA32)	
	Red Hat Linux AS/ES 5.0 (IA32)	
	Red Hat Linux AS/ES 3.0 (AMD64/EM64T)	
	Red Hat Linux AS/ES 4.0 (AMD64/EM64T)	
	Red Hat Linux AS/ES 5.0 (AMD64/EM64T)	
	Red Hat Linux AS/ES 6.0 (AMD64/EM64T)	
	Red Hat Linux AS/ES 3.0 (IA64)	
	Red Hat Linux AS/ES 4.0 (IA64)	
HP	HP-UX 11i V2.0 (PA-RISC)	
	HP-UX 11i V3.0 (PA-RISC)	
	HP-UX 11i V2.0 (IPF)	
	HP-UX 11i V3.0 (IPF)	

Document conventions

This document uses the following symbols to draw attention to important safety and operational information.

Symbol	Meaning	Description
	Tip	Tips provide helpful information, guidelines, or suggestions for performing tasks more effectively.
	Note	Notes emphasize or supplement important points of the main text.
	Caution	Cautions indicate that failure to take a specified action could result in damage to the software or hardware.

The following typographic conventions are used in this document.

Convention	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click OK .
<i>Italic</i>	Indicates a variable, which is a placeholder for actual text provided by you or the system. Example: copy <i>source-file target-file</i> Angled brackets (< >) are also used to indicate variables.
screen/code	Indicates text that is displayed on screen or entered by you. Example: # pairdisplay -g oradb
< > angled brackets	Indicates a variable, which is a placeholder for actual text provided by you or system. Example: # pairdisplay -g <group> Italic font is also used to indicate variables.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a b] indicates that you can choose a, b, or nothing. { a b } indicates that you must choose either a or b.
underline	Indicates the default value. Example: [<u>a</u> b]



NOTE: In this document, the term “Windows Server” refers collectively to Windows Server 2003, Windows Server 2008 and Windows Server 2012.

Related documents

The AMS 2000 Family user documentation is available on the Hitachi Data Systems Portal: <https://portal.hds.com>. Please check this site for the most current documentation, including important updates that may have been made after the release of the product.

This documentation set consists of the following documents.


Release notes

- Adaptable Modular Storage System Release Notes
- Storage Navigator Modular 2 Release Notes



Please read the release notes before installing and/or using this product. They may contain requirements and/or restrictions not fully described in this document, along with updates and/or corrections to this document.

Installation and getting started

The following documents provide instructions for installing an AMS 2000 Family storage system. They include rack information, safety information, site-preparation instructions, getting-started guides for experienced users, and host connectivity information. The symbol  identifies documents that contain initial configuration information about Hitachi AMS 2000 Family storage systems.

 **AMS2100/2300 Getting Started Guide**, MK-98DF8152

Provides quick-start instructions for getting an AMS 2100 or AMS 2300 storage system up and running as quickly as possible.

 **AMS2500 Getting Started Guide**, MK-97DF8032

Provides quick-start instructions for getting an AMS 2500 storage system up and running as quickly as possible.

AMS 2000 Family Site Preparation Guide, MK-98DF8149

Contains initial site planning and pre-installation information for AMS 2000 Family storage systems, expansion units, and high-density expansion units. This document also covers safety precautions, rack information, and product specifications.

AMS 2000 Family Fibre Channel Host Installation Guide,
MK-08DF8189

Describes how to prepare Hitachi AMS 2000 Family Fibre Channel storage systems for use with host servers running supported operating systems.

AMS 2000 Family iSCSI Host Installation Guide, MK-08DF8188

Describes how to prepare Hitachi AMS 2000 Family iSCSI storage systems for use with host servers running supported operating systems.

Storage and replication features

The following documents describe how to use Storage Navigator Modular 2 (Navigator 2) to perform storage and replication activities.

Storage Navigator 2 Advanced Settings User's Guide, MK-97DF8039

Contains advanced information about launching and using Navigator 2 in various operating systems, IP addresses and port numbers, server certificates and private keys, boot and restore options, outputting configuration information to a file, and collecting diagnostic information.

Storage Navigator Modular 2 User's Guide, MK-99DF8208

Describes how to use Navigator 2 to configure and manage storage on an AMS 2000 Family storage system.

AMS 2000 Family Dynamic Provisioning Configuration Guide, MK-09DF8201

Describes how to use virtual storage capabilities to simplify storage additions and administration.

Storage Navigator 2 Storage Features Reference Guide for AMS, MK-97DF8148

Contains concepts, preparation, and specifications for Account Authentication, Audit Logging, Cache Partition Manager, Cache Residency Manager, Data Retention Utility, LUN Manager, Performance Monitor, SNMP Agent, and Modular Volume Migration.

AMS 2000 Family Copy-on-write SnapShot User Guide, MK-97DF8124

Describes how to create point-in-time copies of data volumes in AMS 2100, AMS 2300, and AMS 2500 storage systems, without impacting host service and performance levels. Snapshot copies are fully read/write compatible with other hosts and can be used for rapid data restores, application testing and development, data mining and warehousing, and nondisruptive backup and maintenance procedures.

AMS 2000 Family ShadowImage In-system Replication User Guide, MK-97DF8129

Describes how to perform high-speed nondisruptive local mirroring to create a copy of mission-critical data in AMS 2100, AMS 2300, and AMS 2500 storage systems. ShadowImage keeps data RAID-protected and fully recoverable, without affecting service or performance levels. Replicated data volumes can be split from host applications and used for system backups, application testing, and data mining applications while business continues to operate at full capacity.

AMS 2000 Family TrueCopy Remote Replication User Guide, MK-97DF8052

Describes how to create and maintain multiple duplicate copies of user data across multiple AMS 2000 Family storage systems to enhance your disaster recovery strategy.

AMS 2000 Family TrueCopy Extended Distance User Guide,
MK-97DF8054

Describes how to perform bi-directional remote data protection that copies data over any distance without interrupting applications, and provides failover and recovery capabilities.


AMS 2000 Data Retention Utility User's Guide, MK-97DF8019

Describes how to lock disk volumes as read-only for a certain period of time to ensure authorized-only access and facilitate immutable, tamper-proof record retention for storage-compliant environments. After data is written, it can be retrieved and read only by authorized applications or users, and cannot be changed or deleted during the specified retention period.

Storage Navigator Modular 2 online help

Provides topic and context-sensitive help information accessed through the Navigator 2 software.

Hardware maintenance and operation

The following documents describe how to operate, maintain, and administer an AMS 2000 Family storage system. They also provide a wide range of technical information and specifications for the AMS 2000 Family storage systems. The symbol  identifies documents that contain initial configuration information about Hitachi AMS 2000 Family storage systems.

 **AMS 2100/2300 Storage System Hardware Guide,** MK-97DF8010

Provides detailed information about installing, configuring, and maintaining AMS 2100 and 2300 storage systems.

 **AMS 2500 Storage System Hardware Guide,** MK-97DF8007

Provides detailed information about installing, configuring, and maintaining an AMS 2500 storage system.

 **AMS 2000 Family Storage System Reference Guide,** MK-97DF8008

Contains specifications and technical information about power cables, system parameters, interfaces, logical blocks, RAID levels and configurations, and regulatory information about AMS 2100, AMS 2300, and AMS 2500 storage systems. This document also contains remote adapter specifications and regulatory information.

AMS 2000 Family Storage System Service and Upgrade Guide,
MK-97DF8009

Provides information about servicing and upgrading AMS 2100, AMS 2300, and AMS 2500 storage systems.

AMS 2000 Family Power Savings User Guide, MK-97DF8045

Describes how to spin down volumes in selected RAID groups when they are not being accessed by business applications to decrease energy consumption and significantly reduce the cost of storing and delivering information.

Command and Control (CCI)

The following documents describe how to install the Hitachi AMS 2000 Family Command Control Interface (CCI) and use it to perform TrueCopy and ShadowImage operations.

AMS 2000 Family Command Control Interface (CCI) Installation Guide, MK-97DF8122 — this document

Describes how to install CCI software on open-system hosts.

AMS 2000 Family Command Control Interface (CCI) Reference Guide, MK-97DF8121

Contains reference, troubleshooting, and maintenance information related to CCI operations on AMS 2100, AMS 2300, and AMS 2500 storage systems.

AMS 2000 Family Command Control Interface (CCI) User's Guide, MK-97DF8123

Describes how to use CCI to perform TrueCopy and ShadowImage operations on AMS 2100, AMS 2300, and AMS 2500 storage systems.

Command Line Interface (CLI)

The following documents describe how to use Hitachi Storage Navigator Modular 2 to perform management and replication activities from a command line.

Storage Navigator Modular 2 Command Line Interface (CLI) Unified Reference Guide, MK-97DF8089

Describes how to interact with all Navigator 2 bundled and optional software modules by typing commands at a command line.

Storage Navigator 2 Command Line Interface Replication Reference Guide for AMS, MK-97DF8153

Describes how to interact with Navigator 2 to perform replication activities by typing commands at a command line.

Dynamic Replicator documentation

The following documents describe how to install, configure, and use Hitachi Dynamic Replicator to provide AMS Family storage systems with continuous data protection, remote replication, and application failover in a single, easy-to-deploy and manage platform.

Hitachi Dynamic Replicator - Scout Release Notes (RN-99DF8211)

Hitachi Dynamic Replicator - Scout Host Upgrade Guide (MK-99DF8267)

Hitachi Dynamic Replicator - Scout Host User Guide (MK-99DF8266)

Hitachi Dynamic Replicator - Scout Installation and Configuration Guide (MK-98DF8213)

Hitachi Dynamic Replicator - Scout Quick Install/Upgrade Guide (MK-98DF8222)

Getting help

If you need to contact the Hitachi Data Systems support center, please provide as much information about the problem as possible, including:

- The circumstances surrounding the error or failure.
- The exact content of any messages displayed on the host systems.
- The exact content of any messages displayed on Storage Navigator Modular 2.
- The Storage Navigator Modular 2 configuration information. This information is used by service personnel for troubleshooting purposes.

The Hitachi Data Systems customer support staff is available 24 hours a day, seven days a week. If you need technical support, please log on to the Hitachi Data Systems Portal for contact information: <https://portal.hds.com>

Comments

Please send us your comments on this document: doc.comments@hds.com. Include the document title, number, and revision, and refer to specific sections and paragraphs whenever possible.

Thank you! (All comments become the property of Hitachi Data Systems.)

Installing and configuring CCI

- System requirements
- Hardware installation
- Software installation
- Creating/editing the configuration file
- CCI startup

System requirements

CCI operations involve the CCI software on the UNIX/PC host and the AMS arrays containing the command devices set using Hitachi Storage Navigator Modular 2. From Hitachi Storage Navigator Modular 2, you also specify a local and a remote path of the AMS array.

The system requirements for CCI are:

- **CCI software product.** The CCI software is supplied on CD-ROM. The CCI software files take up 5.5 MB of space. The log files can take up to 3 MB of space.
- **Host platform.** CCI is supported on several UNIX-based and PC host platforms, including Solaris, Linux, Windows Server, Windows 2000 systems.
 - Root/administrator access to the host is required to perform CCI operations.
 - Static memory capacity: minimum = 600 kB, maximum = 1,200 kB Dynamic memory capacity (depends on the setting in `HORCM_CONF`):
minimum = (200 kB × number of unit ID) + (360 bytes × number of LU) + (180 bytes × number of entry)
 - Sometimes the local and remote hosts cannot recognize paired logical volumes; therefore, use hosts with same operating system architecture. However, a combination of Solaris, Windows, and Linux hosts can be used for pair operation only.
- **AMS array.** The AMS arrays support CCI operations.
 - The AMS command device must be defined and accessed as a raw device (no file system, no mount operation).
- **Hitachi Storage Navigator Modular 2.** Hitachi Storage Navigator Modular 2 is used to define the LUs, remote path, and the CCI command device.

Hardware installation

The hardware required for CCI is installed by you and the Hitachi representative. User responsibilities are: identify the ShadowImage, SnapShot, and/or TrueCopy/TCE primary and secondary volumes, so that the CCI hardware and software components can be installed and configured properly.

- Verify that the UNIX/PC host hardware and software are properly installed and configured.
- Connect the AMS arrays to the UNIX/PC hosts.
- Install and enable the ShadowImage, SnapShot, and/or TrueCopy/TCE features on the AMS arrays.

Software installation

The user, with assistance as needed from the Hitachi representative, installs the CCI hosts software.

Installation on UNIX

An offer medium is placed in a preservation format "cpio". You install to HORC server the entire configuration.

When the installation media is provided by CD, use RMinstsh under the "./program/RM/version name/OS name" directory on the CD (for Linux/IA64, move the directory to LINUX/IA64). Move the current directory to the directory containing the RMinstsh you are going to use before executing it. This installation script requests "installation directory input." Responding to this input request automates the following procedure.

It is recommended to install this program in a location other than the root disk; otherwise, other installed applications or stored data may encroach on the root disk area.

New installation into a non-root directory

1. Insert the installation medium into the appropriate I/O device.
2. Move to the desired directory for CCI. The specified directory must be mounted by a partition of except root disk or an external disk.

```
# cd /Specified Directory
```

3. Extract all files from the RMHORC file using the **cpio** command. For HP-UX, for example:

```
# cpio -idmu < ./program/RM/01-23-03_08/HP-UX/RMHORC 01-23-03_08 = CCI version
./ = is mounted point
```

4. Make a symbolic link for /HORCM:

```
# ln -s /Specified Directory/HORCM /HORCM
```

5. Execute the HORCM installation command:

```
# /HORCM/horcminstall.sh
```

6. Verify installation of the proper version using the **raidqry** command:

```
# raidqry -h
Model   : RAID-Manager/HP-UX
Ver&Rev: XX-XX-XX/XX      XX = product version number
Usage   : raidqry [options] for HORC
-h      Help/Usage
:
```

New installation into a root directory

1. Insert the installation medium into the appropriate I/O device.
2. Move to the current root directory:

```
# cd /
```

3. Extract all files from the RMHORC file using the **cpio** command. For HP-UX, for example:

```
# cpio -idmu < ./program/RM/01-23-03_08/HP-UX/RMHORC 01-23-03_08 = CCI version
./ = is mounted point
```

4. Execute the HORCM installation command:

```
# /HORCM/horcminstall.sh
```

5. Verify installation of the proper version using the **raidqry** command:

```
# raidqry -h
Model : RAID-Manager/HP-UX
Ver&Rev: XX-XX-XX/XX      XX = product version
number
Usage : raidqry [options] for HORC
-h      Help/Usage
:
```

Changing the CCI user for UNIX systems

The CCI software is initially configured to allow only the root user (system administrator) to execute CCI commands. If root access is not available, the system administrator can change the CCI user from root to another user name.

To change the CCI user

1. Change the owner of the following CCI files from the root user to the desired user name:
/HORCM/etc/horcmgr
All CCI commands in the /HORCM/usr/bin directory.
All CCI log directories in the /HORCM/log directories.
2. Change the owner of the raw device file of the HORCM_CMD command device in the configuration definition file from the root user to the desired user name.
3. **Optional:** Establishing the HORCM (/etc/horcmgr) start environment: If users have designation of the full environment variables (HORCM_LOG HORCM_LOGS), they start horcmstart.sh command without an argument. In this case, the HORCM_LOG and HORCM_LOGS directories must be owned by the CCI administrator. The environment variable (HORCMINST, HORCM_CONF) is established as necessary.
4. **Optional:** Establishing the command execution environment: If users have designation of the environment variables (HORCC_LOG), the HORCC_LOG directory must be owned by the CCI administrator. The environment variable (HORCMINST) is established as necessary.

5. Establishing the UNIX domain socket: If the HORCM execution user is different than the user of the command, the system administrator must change an owner of the following directory that is created every HORCM (/etc/horcmgr) start-up.

/HORCM/.uds/.lcmcl* directory

To replace the security of UNIX domain socket to old version, provide writeable permission to /HORCM/.uds, set the HORCM_EVERYCLI=1 environment variable, and then start HORCM (/etc/horcmgr).



NOTE: A user account for the Linux system must have the "CAP_SYS_ADMIN" and "CAP_SYS_RAWIO" privileges to use the SCSI Class driver (command device). The system administrator can apply these privileges by using the PAM_capability module. However, if the system administrator cannot set those user privileges, then use the following method. This method starts the HORCM daemon only with the root user; as an alternative, you can execute CCI commands.

6. **System administrator:** Place the script that starts up horcmstart.sh in the following directory so that the system can start HORCM from /etc/rc.d/rc: /etc/init.d
7. **Users:** When the log directory is only accessible by the system administrator, you cannot use the "inraid" or "raidscan -find" commands. Therefore, set the command log directory by setting the environment variables (HORCC_LOG), and executing the CCI command.

Installation on Windows Server Systems

Install CCI on all hosts involved in CCI operations. If the network (TCP/IP) is not established, install a network of the Windows Server™ attachment, and add TCP/IP protocol.

To install the CCI software on a Windows Server™ system

1. If a previous version of CCI is already installed, uninstall (remove) it as follows:
 - Confirm that HORCM is not running. If it is running, shut it down:
One CCI instance:

```
D:\HORCM\etc> horcmshutdown
```


Two CCI instances:

```
D:\HORCM\etc> horcmshutdown 0 1
```
 - If Hitachi replication software commands are running in the interactive mode, terminate the interactive mode and exit these commands using the **-q** option.
 - Remove the previous version of CCI using **Add/Remove Programs** in the Control Panel.
2. Insert the installation medium into the appropriate I/O device.

3. Run **Setup.exe** and follow the instructions on screen to complete the installation.
4. Verify installation of the proper version using the **raidqry** command:

```
D:\HORCM\etc> raidqry -h
Model   : RAID-Manager/WindowsNT
Ver&Rev: XX-XX-XX/XX      XX = product version number
Usage   : raidqry [options] for HORC
-h      Help/Usage
:
```



NOTE: In Windows CCI, it is required to specify the installation destination folder to the HORCM folder directly under the drive.

Creating/editing the configuration file

The configuration definition file is a text file that is created and/or edited using any standard text editor, such as UNIX vi editor or Windows Notepad. A sample configuration definition file, HORCM_CONF (/HORCM/etc/horcm.conf), is included with the CCI software. This file should be used as the basis for creating your configuration definition files. The system administrator should copy the sample file, set the necessary parameters in the copied file, and place the copied file in the proper directory.

See the sections on creating and editing a configuration definition file and sample CCI configurations in *Hitachi AMS Command Control Interface (CCI) User's Guide*.



CAUTION! Do not edit the configuration definition file while HORCM is running. Shut down HORCM, edit the configuration file as needed, and then restart HORCM.

[Table 1-1 on page 1-7](#) lists the parameters defined in the configuration file and specifies the default value, type, and limit for each parameter.

Table 1-1: Configuration (HORCM_CONF) Parameters

Parameter	Default Value	Type	Limit
ip_address	None	Character string	63 characters
service	None	Character string or numeric value <i>(Note 1)</i>	15 characters
poll(10ms)	1000 <i>(Note 2)</i>	Numeric value <i>(Note 1)</i>	None <i>(Note 3)</i>
timeout(10ms)	3000	Numeric value <i>(Note 1)</i>	None
HORCM_DEV dev_name	None	Character string	31 characters Recommended value = 8 or less.
dev_group	None	Character string	31 characters Recommended value = 8 or less.
port #	None	Character string	31 characters
Target ID	None	Numeric value <i>(Note 1)</i>	7 characters
LU#	None	Numeric value <i>(Note 1)</i>	7 characters
MU#	0	Numeric value <i>(Note 1)</i>	7 characters
Serial#	None	Numeric value <i>(Note 1)</i>	12 characters
HORCM_CMD dev_name	None	Character string	63 characters

Note 1: Use decimal notation for numeric values (not hexadecimal).



Note 2: For Hitachi replication software operations, you must change the default value using the equation described in section 2.5.3 of the Hitachi AMS Command Control Interface (CCI) User's Guide. Setting the value incorrectly may cause a conflict in the internal process, which suspends the process temporary and stops the internal process of the AMS array. Note at indent level 1.

Note 3: For details on calculating the value and the equation for poll(10ms), see section 2.5.3 of the Hitachi AMS Command Control Interface (CCI) User's Guide.

CCI startup

After you have installed the CCI software and set the configuration definition files, you can begin using the CCI software (HORCM) to perform ShadowImage, SnapShot, and/or TrueCopy/TCE operations on the attached AMS arrays.



When multiple host groups are defined, high host I/O activity might extend the HORCM start time. Be aware of host I/O activities when starting HORCM.

Startup for UNIX systems

One instance

To start up one instance of CCI on a UNIX system

1. Modify `/etc/services` to register the port name/number (service) of the configuration definition file. Make the port name/number the same on all servers.

horcm **xxxxx/udp** xxxxx = the port name/number of horcm.conf

2. If you want HORCM to start automatically each time the system starts up, add `/HORCM/usr/bin/horcmstart.sh` to the system automatic start-up file (for example, `/sbin/rc`).
3. Execute the `horcmstart.sh` script manually to start the CCI instance:

```
# horcmstart.sh
```

4. Set the log directory (`HORCC_LOG`) in the command execution environment as needed.
5. If you want to perform ShadowImage/SnapShot operations, set the `HORCC_MRCF` environment variable for the HORCM execution environment.

If you want to perform TrueCopy/TCE operations, do not set the `HORCC_MRCF` environment variable for the HORCM execution environment.

For B shell:

```
# HORCC_MRCF=1
# export HORCC_MRCF
```

For C shell:

```
# setenv HORCC_MRCF 1
```

6. Execute the **pairedisplay** command to verify the configuration.

```
# pairedisplay -g xxxxx        xxxxx = group-name
```


Two instances

To start up two instances of CCI on a UNIX system

1. Make two copies of the sample configuration definition file.

```
# cp /etc/horcm.conf /etc/horcm0.conf
# cp /etc/horcm.conf /etc/horcm1.conf
```

2. Modify **/etc/services** to register the port name/number (service) of each configuration definition file. The port name/number must be different for each CCI instance.

horcm0 **xxxxx/udp** xxxxx = the port name/number for horcm0.conf

horcm1 **yyyyy/udp** yyyyy = the port name/number for horcm1.conf

3. If you want HORCM to start automatically each time the system starts up, add **/etc/horcmstart.sh 0 1** to the system automatic start-up file (for example, **/sbin/rc**).
4. Execute the **horcmstart.sh** script manually to start the CCI instances:

```
# horcmstart.sh 0 1
```

5. Set an instance number to the environment which executes a command:

For B shell:

```
# HORCMINST=X                    X = instance number = 0 or 1
# export HORCMINST
```

For C shell:

```
# setenv HORCMINST X
```

6. Set the log directory (**HORCC_LOG**) in the command execution environment as needed.
7. If you want to perform ShadowImage/SnapShot operations, set the **HORCC_MRCF** environment variable for the HORCM execution environment.

If you want to perform TrueCopy/TCE operations, do not set the **HORCC_MRCF** environment variable for the HORCM execution environment.

For B shell:

```
# HORCC_MRCF=1
# export HORCC_MRCF
```

For C shell:

```
# setenv HORCC_MRCF 1
```

8. Execute the **pairedisplay** command to verify the configuration.

Startup for Windows systems

One instance

To start up one instance of CCI on Windows 2000/Windows Server™ system

1. Copy the sample file (`\HORCM\etc\horcm.conf`) to the specified directory.

For Windows 2000:

```
D:\HORCM\etc> \HORCM\etc\horcm.conf \WINNT\horcm.conf
```

For Windows Server™ system:

```
D:\HORCM\etc> \HORCM\etc\horcm.conf \WINDOWS\horcm.conf
```

2. Modify `\WINNT\system32\drivers\etc\services` or `\WINDOWS\system32\drivers\etc\services` to register the port name/number (service) of the configuration definition file. Make the port name/number the same on all hosts:

horcm **xxxxx/udp** xxxxx = the port name/number of horcm.conf

3. If you want HORCM to start automatically each time the system starts up, utilize services that are the functions of the system.
4. Execute the `horcmstart` script manually to start CCI:

```
D:\HORCM\etc> horcmstart
```

5. Set the log directory (`HORCC_LOG`) in the command execution environment as needed.
6. When setting up ShadowImage and SnapShot operations, set the `HORCC_MRCF` environment variable for the HORCM execution environment:

```
D:\HORCM\etc> set HORCC_MRCF=1
```

When setting up TrueCopy and TCE operations, *do not* set the `HORCC_MRCF` environment variable.

7. Execute the **pairedisplay** command to verify the configuration.

```
D:\HORCM\etc> pairedisplay -g xxxxxxxx = group name
```

Two instances

To start up two instances of CCI on Windows 2000/Windows Server™ system

1. Make two copies of the sample configuration definition file.

For Windows 2000:

```
D:\HORCM\etc> copy \HORCM\etc\horcm.conf \WINNT\horcm0.conf
D:\HORCM\etc> copy \HORCM\etc\horcm.conf \WINNT\horcm1.conf
```

For Windows Server™ system:

```
D:\HORCM\etc> copy \HORCM\etc\horcm.conf \WINDOWS\horcm0.conf
D:\HORCM\etc> copy \HORCM\etc\horcm.conf \WINDOWS\horcm1.conf
```

2. Modify **\WINNT\system32\drivers\etc\services** or **\WINDOWS\system32\drivers\etc\services** to register the port name/number (service) of the configuration definition files. Make sure that the port name/number is different for each instance:

horcm0 **xxxxx/udp** xxxxx = the port name/number of horcm0.conf

horcm1 **yyyyy/udp** yyyyy = the port name/number of horcm1.conf

3. If you want HORCM to start automatically each time the system starts up, utilize services that are the functions of the system.
4. Execute the `horcmstart` script manually to start CCI:

```
D:\HORCM\etc> horcmstart 0 1
```

5. Set an instance number to the environment which executes a command:

```
D:\HORCM\etc> set HORCMINST=X X = instance number = 0 or 1
```

6. Set the log directory (`HORCC_LOG`) in the command execution environment as needed.
7. When setting up ShadowImage and SnapShot operations, set the `HORCC_MRCF` environment variable for the HORCM execution environment:

```
D:\HORCM\etc> set HORCC_MRCF=1
```

When setting up TrueCopy/TCE operations, *do not* set the `HORCC_MRCF` environment variable for the HORCM execution environment.

8. Execute the **pairedisplay** command to verify the configuration.

```
D:\HORCM\etc> pairedisplay -g xxxxxxxx = group name
```

Starting CCI as a service (Windows systems)

Usually, CCI (HORCM) is started by executing the start-up script from the Windows services. However, in the VSS environment, there is no interface to automatically start CCI. As a result, CCI provides the following `svcx.exe` command and a sample script (`HORCM0_run.txt`) file so that CCI can be started automatically from the services:

C:\HORCM\tool\>svcx.exe

- Usage for adding [HORCM_START_SVC]: `svcx.exe /A=command_path`
 - for deleting [HORCM_START_SVC]: `svcx.exe /D`
 - for specifying a service: `svcx.exe /S=service_name`
 - for dependent services: `svcx.exe /C=service_name,service_name`

This command example uses HORCM0 for the registration of the service name for HORCM instance#0:

- Example for adding [HORCM0]: `svcx.exe /S=HORCM0 "/A=C:\HORCM\Tool\svcx.exe"`
 - for deleting [HORCM0]: `svcx.exe /S=HORCM0 /D`
 - for starting [HORCM0] :[1] make a `C:\HORCM\Tool\HORCM0_run.txt` file.
 - :[2] set a user account to this service.
 - :[3] confirm to start by 'horcmstart 0'.
 - :[4] confirm to stop by 'horcmshutdown 0'.
 - :[5] start from a service by 'net start HORCM0'.

Performing additional configuration tasks

1. Registering the HORCM instance as a service.

The system administrator must add the HORCM instance by using the following command:

```
C:\HORCM\Tool\>svcx.exe /S=HORCM0 "/A=C:\HORCM\Tool\svcx.exe"
```

2. Customizing a sample script file.

The system administrator must customize the sample script file (`HORCM0_run.txt`) according to the HORCM instance. For details, refer to the descriptions in the `HORCM0_run.txt` file.

3. Setting the user account.

The system administrator must set the user account for the CCI administrator by using the GUI.

4. Starting the HORCM instance from the service.

After you have confirmed starting and stopping using "horcmstart 0" and "horcmshutdown 0", you must verify that HORCM0 starts from the service and that HORCM0 started automatically from REBOOT, using the following command:

```
C:\HORCM\Tool\>net start HORCM0
```

5. Stopping HORCM instance as a service.

Instead of using the "horcmshutdown 0" command, you must use the following command to stop HORCM0:

```
C:\HORCM\Tool\>net stop HORCM0
```

(By using the "horcmshutdown 0" command, the script written into HORCM0_run.txt will automatically restart HORCM0).



NOTE: The sample script (`HORCM0_run.txt`) is overwritten when RAID Manager is upgraded. Be sure to use a different service name than HORCM0. If HORCM0 is being used as a service name, have a backup of the `HORCM0_run.txt` before upgrading RAID Manager and replace it with the backup after the upgrade.

Uninstalling and upgrading CCI

- ❑ [Uninstalling CCI on UNIX](#)
- ❑ [Upgrading CCI on Unix](#)
- ❑ [Uninstalling CCI on Windows 2000/Windows Server system](#)
- ❑ [Upgrading CCI on Windows 2000/Windows Server system](#)

Uninstalling CCI on UNIX

To uninstall the CCI software, execute the following procedure.

1. Before uninstalling the CCI software, delete all ShadowImage/SnapShot/TrueCopy/TCE pairs. Do not delete all volume pairs if you want to continue the copy operation using Navigator 2.
2. After verifying that the CCI software is not running, uninstall the CCI software. If the CCI software is still running when you want to uninstall, shut down the CCI software using the `horcmshutdown.sh` command to ensure a normal end to all Hitachi replication software functions. When the CCI command is started in the interactive mode, use the `-q` option, and terminate the interactive mode.
3. When the installation media is provided by a CD, use the `RMuninst` script under the `./program/RM/version name` directory on the CD. If there is no CD, CCI can be uninstalled manually using the method below.

To uninstall the CCI software from a root directory: Issue the `uninstall` command (see [Figure 2-1](#)), go to the root directory, and delete the `HORCM` directory.

To uninstall the CCI software from a non-root directory: Issue the `uninstall` command (see [Figure 2-2](#)), go to the root directory, delete the `HORCM` link, and delete the `HORCM` directory.

```
...  
#/HORCM/horcmuninstall.sh    ← Issue the uninstall command.  
#cd /                        ← Change directories.  
#rm -rf /HORCM                ← Delete the CCI directory.
```

Figure 2-1: Uninstalling the CCI Software from a Root Directory

```
...  
#/HORCM/horcmuninstall.sh    ← Issue the uninstall command.  
#cd /                        ← Change directories.  
#rm /HORCM                    ← Delete the CCI link.  
#rm -rf /non-root_directory_name/HORCM ← Delete the CCI directory.
```

Figure 2-2: Uninstalling the CCI Software from a Non-Root Directory

Upgrading CCI on Unix

After verifying that CCI is not running, you can upgrade the CCI software. If CCI is still running when you want to upgrade software versions, shut down the CCI software using the `horcmshutdown.sh` command to ensure a normal end to all Hitachi replication software functions. For instructions on upgrading the CCI software in a UNIX environment, refer to Chapter 1.

Uninstalling CCI on Windows 2000/Windows Server system

To uninstall the CCI software, execute the following procedure.

1. Before uninstalling the CCI software, delete all ShadowImage/SnapShot/TrueCopy/TCE pairs. However, in case of a plan to continue the copy operation using Navigator 2, do not delete all volume pairs.
2. After verifying that the CCI software is not running, you can uninstall the CCI software. If the CCI software is still running when you want to uninstall, shut down the CCI software using the `horcmshutdown` command to ensure a normal end to all Hitachi replication software functions. When the CCI command starts in the interactive mode, use the `-q` option, and terminate the interactive mode.
3. On the Control Panel, click **Add or Remove Programs**.
4. When the Add or Remove Programs Properties panel opens, click **Change or Remove Programs** and click **CCI** from the program products list.
5. Click the **Remove** button to remove the CCI software.

Upgrading CCI on Windows 2000/Windows Server system

After verifying that the CCI software is not running, you can upgrade the CCI software. If the CCI software is still running when you want to upgrade software versions, shut down the CCI software using the `horcmshutdown` command to ensure a normal end to all Hitachi replication software functions.

To upgrade the CCI software

1. On the Control Panel, click the **Add or Remove Programs** option.
2. When the Add or Remove Programs Properties panel opens, click **Change or Remove Programs** and click CCI from the program products list.
3. Click the **Remove** button to remove the CCI software
4. Insert the installation medium in the proper I/O device.
5. From the **Start** menu, select **Run**.
6. When the Run window opens, enter `x:\Setup.exe` (where `x:` is a CD drive) in the **Open** pull-down list box.
7. An InstallShield will open. Follow the on-screen instructions to install the CCI software.
8. Verify that the correct version of the CCI software is running on your system by executing the `raidqry -h` command.



Glossary

This glossary provides definitions for replication terms as well as terms related to the technology that supports Hitachi CCI and AMS. Click the letter of the glossary section to display the related page.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------	-------------------

A

array

A set of hard disks mounted in a single enclosure and grouped logically together to function as one contiguous storage space.

asynchronous

Asynchronous data communications operate between a computer and various devices. Data transfers occur intermittently rather than in a steady stream. Asynchronous replication does not depend on acknowledging the remote write, but it does write to a local log file. Synchronous replication depends on receiving an acknowledgement code (ACK) from the remote system and the remote system also keeps a log file.

B

background copy

A physical copy of all tracks from the source volume to the target volume.

bps

Bits per second. The standard measure of data transmission speeds.

C

cache

A temporary, high-speed storage mechanism. It is a reserved section of main memory or an independent high-speed storage device. Two types of caching are found in computers: memory caching and disk caching. Memory caches are built into the architecture of microprocessors and often computers have external cache memory. Disk caching works like memory caching; however, it uses slower, conventional main memory that on some devices is called a memory buffer.

capacity

The amount of information (usually expressed in megabytes) that can be stored on a disk drive. It is the measure of the potential contents of a device; the volume it can contain or hold. In communications, capacity refers to the maximum possible data transfer rate of a communications channel under ideal conditions.

CCI

See command control interface.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Glossary–2

CLI

See command line interface.

cluster

A group of disk sectors. The operating system assigns a unique number to each cluster and then keeps track of files according to which clusters they use.

cluster capacity

The total amount of disk space in a cluster, excluding the space required for system overhead and the operating system. Cluster capacity is the amount of space available for all archive data, including original file data, metadata, and redundant data.

command control interface (CCI)

Hitachi's Command Control Interface software provides command line control of Hitachi array and software operations through the use of commands issued from a system host. Hitachi's CCI also provides a scripting function for defining multiple operations.

command devices

Dedicated logical volumes that are used only by management software such as CCI, to interface with the storage systems. Command devices are not used by ordinary applications. Command devices can be shared between several hosts.

command line interface (CLI)

A method of interacting with an operating system or software using a command line interpreter. With Hitachi's Storage Navigator Modular Command Line Interface, CLI is used to interact with and manage Hitachi storage and replication systems.

concurrency of S-VOL

Occurs when an S-VOL is synchronized by simultaneously updating an S-VOL with P-VOL data AND data cached in the primary host memory. Discrepancies in S-VOL data may occur if data is cached in the primary host memory between two write operations. This data, which is not available on the P-VOL, is not reflected on to the S-VOL. To ensure concurrency of the S-VOL, cached data is written onto the P-VOL before subsequent remote copy operations take place.

concurrent copy

A management solution that creates data dumps, or copies, while other applications are updating that data. This allows end-user processing to continue. Concurrent copy allows you to update the data in the files being copied, however, the copy or dump of the data it secures does not contain any of the intervening updates.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

configuration definition file

The configuration definition file describes the system configuration for making CCI operational in a TrueCopy Extended Distance Software environment. The configuration definition file is a text file created and/or edited using any standard text editor, and can be defined from the PC where the CCI software is installed. The configuration definition file describes configuration of new TrueCopy Extended Distance pairs on the primary or remote storage system.

consistency group (CTG)

A group of two or more logical units in a file system or a logical volume. When a file system or a logical volume which stores application data, is configured from two or more logical units, these multiple logical units are managed as a consistency group (CTG) and treated as a single entity. A set of volume pairs can also be managed and operated as a consistency group.

consistency of S-VOL

A state in which a reliable copy of S-VOL data from a previous update cycle is available at all times on the remote storage system. A consistent copy of S-VOL data is internally pre-determined during each update cycle and maintained in the remote data pool. When remote takeover operations are performed, this reliable copy is restored to the S-VOL, eliminating any data discrepancies. Data consistency at the remote site enables quicker restart of operations upon disaster recovery.

CRC

Cyclical Redundancy Checking. A scheme for checking the correctness of data that has been transmitted or stored and retrieved. A CRC consists of a fixed number of bits computed as a function of the data to be protected, and appended to the data. When the data is read or received, the function is recomputed, and the result is compared to that appended to the data.

CTG

See Consistency Group.

cycle time

A user specified time interval used to execute recurring data updates for remote copying. Cycle time updates are set for each storage system and are calculated based on the number of consistency groups CTG.

cycle update

Involves periodically transferring differential data updates from the P-VOL to the S-VOL. TrueCopy Extended Distance Software remote replication processes are implemented as recurring cycle update operations executed in specific time periods (cycles).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Glossary–4

D

data pool

One or more disk volumes designated to temporarily store un-transferred differential data (in the local storage system or snapshots of backup data in the remote storage system). The saved snapshots are useful for accurate data restoration (of the P-VOL) and faster remote takeover processing (using the S-VOL).

data volume

A volume that stores database information. Other files, such as index files and data dictionaries, store administrative information (metadata).

differential data control

The process of continuously monitoring the differences between the data on two volumes and determining when to synchronize them.

differential data copy

The process of copying the updated data from the primary volume to the secondary volume. The data is updated from the differential data control status (the pair volume is under the suspended status) to the primary volume.

Differential Management Logical Unit (DMLU)

The volumes used to manage differential data in a storage system. In a TrueCopy Extended Distance system, there may be up to two DM logical units configured per storage system. For Copy-on-Write and ShadowImage, the DMLU is an exclusive volume used for storing data when the array system is powered down.

differential-data

The original data blocks replaced by writes to the primary volume. In Copy-on-Write, differential data is stored in the data pool to preserve the copy made of the P-VOL to the time of the snapshot.

disaster recovery

A set of procedures to recover critical application data and processing after a disaster or other failure. Disaster recovery processes include failover and failback procedures.

disk array

An enterprise storage system containing multiple disk drives. Also referred to as "disk array device" or "disk storage system."

DMLU

See Differential Management-Logical Unit.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

dual copy

The process of simultaneously updating a P-VOL and S-VOL while using a single write operation.

duplex

The transmission of data in either one or two directions. Duplex modes are full-duplex and half-duplex. Full-duplex is the simultaneous transmission of data in two directions. For example, a telephone is a full-duplex device, because both parties can talk at once. In contrast, a walkie-talkie is a half-duplex device because only one party can transmit at a time.

E**entire copy**

Copies all data in the primary volume to the secondary volume to make sure that both volumes are identical.

extent

A contiguous area of storage in a computer file system that is reserved for writing or storing a file.

F**failover**

The automatic substitution of a functionally equivalent system component for a failed one. The term failover is most often applied to intelligent controllers connected to the same storage devices and host computers. If one of the controllers fails, failover occurs, and the survivor takes over its I/O load.

fallback

Refers to the process of restarting business operations at a local site using the P-VOL. It takes place after the storage systems have been recovered.

Fault tolerance

A system with the ability to continue operating, possibly at a reduced level, rather than failing completely, when some part of the system fails.

FC

See fibre channel.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Glossary–6

fibre channel

A gigabit-speed network technology primarily used for storage networking.

firmware

Software embedded into a storage device. It may also be referred to as Microcode.

full duplex

The concurrent transmission and the reception of data on a single link.

G**Gbps**

Gigabit per second.

granularity of differential data

Refers to the size or amount of data transferred to the S-VOL during an update cycle. Since only the differential data in the P-VOL is transferred to the S-VOL, the size of data sent to S-VOL is often the same as that of data written to the P-VOL. The amount of differential data that can be managed per write command is limited by the difference between the number of incoming host write operations (inflow) and outgoing data transfers (outflow).

GUI

Graphical user interface.

I**I/O**

Input/output.

initial copy

An initial copy operation involves copying all data in the primary volume to the secondary volume prior to any update processing. Initial copy is performed when a volume pair is created.

initiator ports

A port-type used for main control unit port of Fibre Remote Copy function.

IOPS

I/O per second.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

iSCSI

Internet-Small Computer Systems Interface. A TCP/IP protocol for carrying SCSI commands over IP networks.

iSNS

Internet-Small Computer Systems Interface. A TCP/IP protocol for carrying SCSI commands over IP networks.

L**LAN**

Local Area Network. A computer network that spans a relatively small area, such as a single building or group of buildings.

load

In UNIX computing, the system load is a measure of the amount of work that a computer system is doing.

logical

Describes a user's view of the way data or systems are organized. The opposite of logical is physical, which refers to the real organization of a system. A logical description of a file is that it is a quantity of data collected together in one place. The file appears this way to users. Physically, the elements of the file could live in segments across a disk.

logical unit

See logical unit number.

logical unit number (LUN)

An address for an individual disk drive, and by extension, the disk device itself. Used in the SCSI protocol as a way to differentiate individual disk drives within a common SCSI target device, like a disk array. LUNs are normally not entire disk drives but virtual partitions (or volumes) of a RAID set.

LU

Logical unit.

LUN

See logical unit number.

LUN Manager

This storage feature is operated through Storage Navigator Modular 2 software and manages access paths among host and logical units for each port in your array.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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M

metadata

In sophisticated data systems, the metadata -- the contextual information surrounding the data -- will also be very sophisticated, capable of answering many questions that help understand the data.

microcode

The lowest-level instructions directly controlling a microprocessor. Microcode is generally hardwired and cannot be modified. It is also referred to as firmware embedded in a storage subsystem.

Microsoft Cluster Server

Microsoft Cluster Server is a clustering technology that supports clustering of two NT servers to provide a single fault-tolerant server.

mount

To mount a device or a system means to make a storage device available to a host or platform.

mount point

The location in your system where you mount your file systems or devices. For a volume that is attached to an empty folder on an NTFS file system volume, the empty folder is a mount point. In some systems a mount point is simply a directory.

P

pair

Refers to two logical volumes that are associated with each other for data management purposes, such as replication and migration). A pair is usually composed of a primary or source volume and a secondary or target volume as defined by you.

pair splitting

The operation that splits a pair. When a pair is "Paired", all data written to the primary volume is also copied to the secondary volume. When the pair is "Split", the primary volume continues being updated, but data in the secondary volume remains as it was at the time of the split, until the pair is re-synchronized.

pair status

Internal status assigned to a volume pair before or after pair operations. Pair status transitions occur when pair operations are performed or as a result of failures. Pair statuses are used to monitor copy operations and detect system failures.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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paired volume

Two volumes that are paired in a disk array.

parity

The technique of checking whether data has been lost or corrupted when it's transferred from one place to another, such as between storage units or between computers. It is an error detection scheme that uses an extra checking bit, called the parity bit, to allow the receiver to verify that the data is error free. Parity data in a RAID array is data stored on member disks that can be used for regenerating any user data that becomes inaccessible.

parity groups

RAID groups can contain single or multiple parity groups where the parity group acts as a partition of that container.

peer-to-peer remote copy (PPRC)

A hardware-based solution for mirroring logical volumes from a primary site (the application site) onto the volumes of a secondary site (the recovery site).

point-in-time logical copy

A logical copy or snapshot of a volume at a point in time. This enables a backup or mirroring application to run concurrently with the system.

pool volume

Used to store backup versions of files, archive copies of files, and files migrated from other storage.

primary or local site

The host computer where the primary volume of a remote copy pair (primary and secondary volume) resides. The term "primary site" is also used for host failover operations. In that case, the primary site is the host computer where the production applications are running, and the secondary site is where the backup applications run when the applications on the primary site fail, or where the primary site itself fails.

primary volume (P-VOL)

The storage volume in a volume pair. It is used as the source of a copy operation. In copy operations a copy source volume is called the P-VOL while the copy destination volume is called "S-VOL" (secondary volume).

P-VOL

See primary volume.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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R

RAID

Redundant Array of Independent Disks. A disk array in which part of the physical storage capacity is used to store redundant information about user data stored on the remainder of the storage capacity. The redundant information enables regeneration of user data in the event that one of the array's member disks or the access path to it fails.

Recovery Point Objective (RPO)

After a recovery operation, the RPO is the maximum desired time period, prior to a disaster, in which changes to data may be lost. This measure determines up to what point in time data should be recovered. Data changes preceding the disaster are preserved by recovery.

Recovery Time Objective (RTO)

The maximum desired time period allowed to bring one or more applications, and associated data back to a correct operational state. It defines the time frame within which specific business operations or data must be restored to avoid any business disruption.

remote or target site

Maintains mirrored data from the primary site.

remote path

A route connecting identical ports on the local storage system and the remote storage system. Two remote paths must be set up for each storage system (one path for each of the two controllers built in the storage system).

remote volume stem

In TrueCopy operations, the remote volume (R-VOL) is a volume located in a different subsystem from the primary host subsystem.

resynchronization

Refers to the data copy operations performed between two volumes in a pair to bring the volumes back into synchronization. The volumes in a pair are synchronized when the data on the primary and secondary volumes is identical.

RPO

See Recovery Point Objective.

RTO

See Recovery Time Objective.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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S

SAS

Serial Attached SCSI. An evolution of parallel SCSI into a point-to-point serial peripheral interface in which controllers are linked directly to disk drives. SAS delivers improved performance over traditional SCSI because SAS enables up to 128 devices of different sizes and types to be connected simultaneously.

SATA

Serial ATA is a computer bus technology primarily designed for the transfer of data to and from hard disks and optical drives. SATA is the evolution of the legacy Advanced Technology Attachment (ATA) interface from a parallel bus to serial connection architecture.

secondary volume (S VOL)

A replica of the primary volume (P-VOL) at the time of a backup and is kept on a standby storage system. Recurring differential data updates are performed to keep the data in the S-VOL consistent with data in the P-VOL.

SMPL

Simplex.

snapshot

A term used to denote a copy of the data and data-file organization on a node in a disk file system. A snapshot is a replica of the data as it existed at a particular point in time.

SNM2

See Storage Navigator Modular 2.

Storage Navigator Modular 2

A multi-featured scalable storage management application that is used to configure and manage the storage functions of Hitachi arrays. Also referred to as "Navigator 2".

suspended status

Occurs when the update operation is suspended while maintaining the pair status. During suspended status, the differential data control for the updated data is performed in the primary volume.

S-VOL

See secondary volume.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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S-VOL determination

Independent of update operations, S-VOL determination replicates the S-VOL on the remote storage system. This process occurs at the end of each update cycle and a pre-determined copy of S-VOL data, consistent with P-VOL data, is maintained on the remote site at all times.

T

target copy

A file, device, or any type of location to which data is moved or copied.

V

virtual volume (V-VOL)

In Copy-on-Write, a secondary volume in which a view of the primary volume (P-VOL) is maintained as it existed at the time of the last snapshot. The V-VOL contains no data but is composed of pointers to data in the P-VOL and the data pool. The V-VOL appears as a full volume copy to any secondary host.

volume

A disk array object that most closely resembles a physical disk from the operating environment's viewpoint. The basic unit of storage as seen from the host.

volume copy

Copies all data from the P-VOL to the S-VOL.

volume pair

Formed by pairing two logical data volumes. It typically consists of one primary volume (P-VOL) on the local storage system and one secondary volume (S-VOL) on the remote storage systems.

V-VOL

See virtual volume.

V-VOLTL

Virtual Volume Tape Library.

W

WMS

Workgroup Modular Storage.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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write order guarantee

Ensures that data is updated in an S-VOL, in the same order that it is updated in the P-VOL, particularly when there are multiple write operations in one update cycle. This feature is critical to maintain data consistency in the remote S-VOL and is implemented by inserting sequence numbers in each update record. Update records are then sorted in the cache within the remote system, to assure write sequencing.

write workload

The amount of data written to a volume over a specified period of time.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
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