Hitachi Data Systems

Hitachi Command Control Interface (CCI) Quick Reference Guide

Documentation

- Hitachi TagmaStore® Adaptable Modular Storage and Workgroup Modular Storage TrueCopy® Synchronous Remote Replication User's Guide MK-95DF710-09
- Hitachi TagmaStore Adaptable Modular Storage Command Control Interface (CCI) User and Reference Guide MK-95DF701-12
- Hitachi TagmaStore Adaptable Modular Storage and Workgroup Modular Storage Navigator Modular Graphical User Interface (GUI) User's Guide, MK-95DF711

Hitachi TrueCopy® Remote Replication Software Prerequisites

- **TrueCopy software license** installed in all associated storage systems
- At least one (1) Differential Management LUN (recommend 2) (Adaptable Modular Storage system only)
- At least one (1) **TrueCopy software link(s)** (two (2) recommended) configured in each storage system
  Note: If direct connect use Fibre Channel Arbitrated Loop (FC-AL) topology. If switches, use point-to-point topology.
- At least one (1) (two (2) recommended) **Command Device(s)** configured in each storage system

Hitachi ShadowImage™ In-System Software Prerequisites

- **ShadowImage software license** installed in associated storage systems
- At least one (1) Differential Management LUN (two (2) recommend) (Hitachi Workgroup Modular Storage and Adaptable Modular Storage systems only)
- At least one (1) (two (2) recommended) **Command Device(s)** configured in each storage system

Hitachi Copy-on-Write Snapshot Software Prerequisites

- **Copy-on-Write software [QuickShadow] license** installed in associated storage systems
- At least one (1) Differential Management LUN (two (2) recommend) (Workgroup Modular Storage and Adaptable Modular Storage systems only)
- At least one (1) (two (2) recommended) **Command Device(s)** configured in each storage system

Terms

Alternate Command Device

- A member of a defined pair of **Command Devices**
- Used to recover from a failure of the current Command Device
- When two (2) Command Devices are defined, they are recognized as alternate Command Devices

Command Device

- Accepts TrueCopy Synchronous software, ShadowImage software, and Copy-on-Write software for Hitachi storage systems CCI commands. The host does not communicate TrueCopy Synchronous software, ShadowImage software, or Copy-on-Write software commands directly to the volumes on Hitachi storage systems. The CCI commands are always sent through the Hitachi storage system Command Device.
- The Command Device is dedicated to CCI communications and should not be used by any other applications.
- Each Command Device must be defined in Hitachi Thunder 9500™ V Series modular storage systems, Workgroup Modular Storage, and Adaptable Modular Storage systems by the CCI.
- Each Command Device must also be defined in the **HORCM_CMD** section of the config file for the CCI instance on the attached host. See **HORCM_CMD dev_name** for additional information.
- Command Device must be equal to or greater than 65,538 blocks (one (1) block = 512 bytes) 33 megabytes (MB)
- **WARNING:** Do not create a file system or mount a volume that will be specified as a Command Device.
- Each Command Device must be mapped to a fibre port by the CCI.
- Up to two (2) Command Devices can be assigned per Thunder 9500 V Series system. If two (2) Command Devices are defined, both will be "**Alternate Command Devices**". Only one (1) of these will be current, the other will be for recovery of a failure. The HOST must see both of these "Alternate Command Devices".
- To force a switch to the other "**Alternate Command Device**", issue the "**horcctl –C**" command.
- When you use the Synchronous TrueCopy software for the Thunder 9500 V function, CCI must set the Command Devices on both the local and remote disk subsystems.
- Will not be managed by Hitachi Dynamic Link Manager software

GUID: Global Unique Identifier

- Created for a disk when Microsoft® Windows®, Disk Management defines a partition

***TIP*:** Use GUID for the Command Device if using Windows. The "raidscan –x findcmddev drive#(x,y)" will display PhysicalDrive# and GUID

Warning: Do not set two (2) or more paths for a single server to the same Command Device because Windows 2000/2003 may change the "GUID" when a volume with an identical GUID is found.

Microprogram: The internal Thunder 9500 V Series system's software.

Warning: Do not execute commands that change pair status. (paircreate, pairsplit, pairresync) when loading microcode. The microcode load can take up to four (4) minutes per controller and some scripts/batch jobs may indicate a failure. The controller with the new code will be restarted and CCI commands should not be run during this time.

Protection Function

- Protects a volume that cannot be recognized by the hosts from pair operations
- Enabled/disabled for the Command Device by CCI
- Also can be enabled/disabled by the **HORCMPROMOD** environment variable
  Note: If enabled via Resource Manager,
  HORCMPROMOD has no affect.

***TIP:** To determine if Protection Mode is enabled for the Command Device, issue the "horcctl –D" command.*

 # horcctl –D
Current control device = /dev/rdsl/c0t0d0*
If the output displays the device file name appended with "*", this indicates the Protect Function is enabled.

PVOL: Primary (Source) volume

- TrueCopy, ShadowImage, and Copy-on-Write software

SVOL: Secondary (Target) volume:

- Applies to TrueCopy and ShadowImage software

V-VOL: Virtual (Target) volume used with Copy-on-Write software

- Also called a snapshot volume

Warnings on creating PVOL and SVOL pairs for ShadowImage and TrueCopy software:

- ShadowImage software default controller must be identical
- ShadowImage and TrueCopy software require the same number of data drives in a RAID Group.
- ShadowImage and TrueCopy software require an identical volume size in pair.
- If using HiCommand, the SVOL can't be mounted
- If using HiCommand, the Hitachi Device Manager software Agent must have recognized the PVOL and SVOL.
- If LUSE, the number of LDEVs must be same

Files

Configuration and Services files:

/etc/horcm*.conf	UNIX®
C:\winnt\horcm*.conf	Windows

- Config for each instance (* = instance number)
- Best practice is horcm0.conf is for PVOLs
- Best practice is horcm1.conf is for SVOLs

/etc/services	UNIX
C:\winnt\system32\drivers\etc\services	Windows

- port names and numbers for horcm* instances.
- horcm0 11000/udp #HDS HORCM Instance 0
- horcm1 11001/udp #HDS HORCM Instance **1**

Note: When using HiCommand to define a new group, it will ask for Group Name, HORCM Instances and HORCM ports. HiCommand will create new HORCM*.conf files with all the necessary information and write the HORCM port entries in the services file. If HiCommand is used later to remove all of the associated pairs and groups, the corresponding entries in the services file and the horcm*.conf files will be deleted.

Log files:

/HORCM/log*/curlog	UNIX
C:\HORCM\log*\curlog	Windows

Miscelleneous files:

/etc/horcmperm*.conf	UNIX
WINNT\horcmperm*.conf	Windows

- The default file that contains the list of the protected volumes
- Only used if **HORCMPROMOD is set** or if Hitachi RAID Manager protection is enabled for the Command Device using "CCI".

CCI Commands

Important Notes:

To get help for commands

- On the command line, enter the command with a –h example: **pairdisplay -h**

To get help for subcommands

- On the command line, enter the command with a –xh example: **pairdisplay -xh**

To run a subcommand

- Enter the main command with a –x subcommand example: c:\horcm\etc\>**pairdisplay –x mount**

List of Common CCI commands:

- **horcctl:** used for maintenance and troubleshooting.
- **horcmshutdown:** shuts down HORCM instance(s)
- **horcmstart:** starts HORCM instance(s)
- **inqraid:** displays device info from a HOST perspective
- **paircreate:** Creates pairs
- **paircurchk::** Checks consistency of SVOL
- **pairdisplay:** Displays pair status
- **pairevtwait:** Waits for return status of pair operations
- **pairmon:** Monitors pair activity
- **pairresync:** Resyncs a split pair
- **Pairsplit**: Suspends updates to the SVOL
- **Pairvolchk**: Display volume or group status
- **raidar:** displays configuration, status, and I/O activity
- **raidqry:** displays configuration of Host and subsystem
- **raidscan:** displays configuration and status of subsystem

Common subcommands for Windows:

- **-x drivescan:** displays the relationship between the Thunder 9500 V Series system's LDEV to the Windows hard drives
- **-x env:** Displays environment variables
- **-x findcmddev:** searches for Command Devices
- **-x mount:** displays/mounts specified drives
- **-x portscan:** Displays devices on specified port(s)
- **-x setenv:** sets environment variables
- **-x sleep:** causes CCI to wait/sleep for specified seconds
- **-x sync:** Flushes unwritten data from Windows to specified devices. The logical and physical devices to be synchronized must be offline to all other applications. The sync does not propagate to a specified drive, which has a directory mount on the Windows 2000/2003 system.
- **-x umount:** Unmounts the specified logical drive and deletes the drive letter. Before deleting the drive letter, this subcommand executes sync internally for the specified logical drive and flushes unwritten data.
- **-x usetenv:** resets environment variables

Details of CCI commands

horcctl:

-d Set to the trace control of the client
-c Set to the trace control of HORCM
-S Shutdown of HORCM
-D Displays the Command Device name currently used by HORCM. If the command device is blocked due to online maintenance (microcode replacement) of the Thunder 9500 V Series system, you can check the Command Device name in advance using this option.
-C Changes the control device of HORCM
-u <unitid> Specifies the unitid for '-D or -C' options
-ND Show network addr and port name currently used
-NC Changes the network addr of HORCM
-g <group> Specifies the group name in the HORCM file for '-ND or -NC' options
-l <level> Set to the trace_level
-b <y/n> Set to the trace_mode
-s <size(KB)> Set to the trace_size

horcmshutdown: Stops HORCM application
One (1) CCI instance:
- UNIX: # horcmshutdown.sh
- Windows: > horcmshutdown

Two (2) CCI instances called 0 and 1:
- UNIX: # horcmshutdown.sh 0 1
- Windows: **>** horcmshutdown 0 1

horcmstart {inst}: Starts HORCM application
One (1) CCI instance:
- UNIX: # horcmstart.sh
- Windows: > horcmstart

Two (2) CCI instances called 0 and 1:
- UNIX: # horcmstart.sh 0 1
- Windows: **>** horcmstart 0 1

Notes:
If argument has no instance number, then it starts one (1) HORCM and uses the environment variables set by the user.

For UNIX-based platforms if HORCMINST is specified:
- HORCM_CONF = /etc/horcm*.conf (* is instance number)
  HORCM_LOG = /HORCM/log*/curlog HORCM_LOGS = /HORCM/log*/tmplog

For UNIX-based platforms If no HORCMINST is specified:
- HORCM_CONF = /etc/horcm.conf
  HORCM_LOG = /HORCM/log/curlog
  HORCM_LOGS = /HORCM/log/tmplog

For Windows NT®/2000 platform If HORCMINST is specified:
- HORCM_CONF = \WINNT\horcm*.conf (* is instance number)
  HORCM_LOG = \HORCM\log*\curlog
  HORCM_LOGS = \HORCM\log*\tmplog

For Windows NT/2000 platform If no HORCMINST is specified:
- HORCM_CONF = \WINNT\horcm.conf
  HORCM_LOG = \HORCM\log\curlog
  HORCM_LOGS = \HORCM\log\tmplog

If HORCM fails to start:
- Check contents of the horcm*.conf files
- Verify that the Command Device(s) is valid.

inqraid:
- [-inqdump] Dump option for STD inquiry info
- [-fx] Display of LDEV# with hexadecimal
- [-fp] Display of the H.A.R.D volume with adding '*'
- [-fl] Display of the LDEV GUARD volume with adding '*'
- [-fg] Display of the host group ID with port
- [-fw] Display of the volstat with wide format
- [-CLI] Display with the command line interface (CLI) format
- [-CLIWP] Displays the Port_WWN for this host with the CLI format
- [-CLIWN] Displays the Node_WWN for this host with the CLI format
- [-sort] Displays and sorts by Serial# and LDEV#
- [-sort -CM] Displays and sorts the cmddev by Serial# in horcm.conf image
- [-fv] Display of Volume{GUID} via $Volume for Windows 2000.
- [No arg] Find out the LDEV from harddisk#... in the STDIN
- [-find[c]] Find the group by using pairdisplay from harddisk#... in the STDIN.
- [-gplba] Obtains the logical block access (LBA) for usable partition from disk#... in the STDIN.
- [-gvinf] Obtains a drive layout and makes a layout file from disk#... in the STDIN
- [-svinf[=PTN]] Sets a drive layout to disk[=PTN]# in the STDIN
- [harddisk#...] Find out the LDEV from args(harddisk#...)
- [$DosDevice] Find out the LDEV from DosDevice
- $LETALL -> Specifies all of the Drive Letter
  $C: -> Specifies a 'C:' drive
  $Phys -> Specifies all Physical Drives
  $Volume -> Specifies all LDM Vols for Win2K
  $Volume{...} -> Specifies a Volume{...} for Win2K
- [echo hd0-10 | inqraid] Find out the LDEV from harddisk#... of the echo
- [echo hd0-10 | inqraid -find] Find out the group from harddisk#... of the echo
- [inqraid $LETALL -CLI] Find out the LDEV from all of the Drive letter
- [inqraid $Volume -CLI] Find out the LDEV from all of the LDM Volumes for Win2k.
- [inqraid $Phys -gvinf -CLI] Gets a drive layout and makes a layout file from all of the Physical Drives
- [echo hd0-10 | inqraid -svinf] Sets a drive layout to disk#0-10
- [ls /dev/rdsk/* | /HORCM/usr/bin/inqraid] Find out the LDEV from /dev/rdsk/... of the ls
- [ls /dev/rdsk/* | /HORCM/usr/bin/inqraid -find] Find out the group from /dev/rdsk/... of the ls
- [vxdisk list | grep vg_name | /HORCM/usr/bin/inqraid] Find out the LDEV from vg_name of the vxdisk
- [pairdisplay -l -fd -g VG1 | inqraid -svinf=Harddisk] Sets a drive layout to disk# related to a group(VG1).

paircreate:
- -g <group> Specifies the group_name
- -d <pair Vol> Specifies the pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specifies the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] Specifies the LDEV# in the RAID without '-g' option
- -l[#] Set to HORCMINST#
- -lH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -lM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -f <fence> [CTGID] Specifies the fence_level (never/status/data/async) [TrueCopy and Universal Replicator software]
- -c <size> Specifies the track size for copy (1-15)
- -split [ShadowImage and Copy-on-Write software only] Splits the paired volume after the initial copy operation is complete.
- -m <mode..> Specifies the create mode<'cyl or trk'> for SVOL, <grp CTG# (0-127)> [ShadowImage software only] Makes a group for splitting all ShadowImage software pairs specified in a group, such as TrueCopy Asynchronous software, or <cc> [ShadowImage software only]. Specifies the Hitachi Volume Migration software (CruiseControl) mode for volume migration
- -nocopy Set to the No_copy_mode (TrueCopy software only)
- -nomsg Not display message of paircreate
- -pid <id#> Specifies the pool ID for pooling SVOL (Copy-on-Write software for enterprise storage systems)
- -jp <id> (HORC/Universal Replicator software only): Basically, Universal Replicator software has the same characteristic as a TrueCopy Asynchronous software Remote Copy Consistency Group; therefore, this option is used to specify a Journal Group ID for the PVOL.
- -js <id> (HORC/Universal Replicator software only): This option is used to specify a Journal Group ID for the SVOL. Both the -jp <id> and -js <id> options are valid when the fence level is set to "ASYNC", and each Journal Group ID is automatically bound to the CTGID.
- -vl Specifies the vector(Local_node)
- -vr Specifies the vector(Remote_node)

Warnings for paircreate using CCI:
- Use –vl if this server has the HORCCM instance that controls the PVOLs. However, if multiple HORCM instances are running in this server, make sure the correct env variable is set. (Best practice is to use horcm instance 0 and set HORCMINST=0)
- Use –vr if this server does not have the HORCM instance that controls the PVOLs. If multiple HORCM instances are running in this server, make sure the correct env variable is set because this server will use the remote instance specified in the **HORCM_INST ip_address** of the horcm*.conf file that is specified in the local env HORCMINST variable.
- Before issuing the paircreate command, verify that the SVOL is not mounted on any system. If the SVOL is mounted after paircreate, delete the pair, unmount the SVOL, and reissue the paircreate command.

Note: HiCommand will not create pairs if the SVOL is mounted.

paircurchk:
The paircurchk command assumes that the target is an SVOL, is used to check consistency, and is used in conjunction with the **horctakeover command**.
- -g <group> Specifies the group_name
- -d <pair Vol> Specifies the pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specifies the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] Specifies the LDEV# in the RAID without '-g' option
- -l[#] Set to HORCMINST#
- -lH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -lM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -nomsg Not display message of paircurchk

pairdisplay:
Displays the pairing status, which enables you to verify the completion of pair creation or pair resynchronization. This command is used to confirm the configuration of the paired volume connection path (physical link of paired volumes among the servers).
- -x <command> <arg> ... Specifies the SUB command
- -g <group> Specifies the group_name
- -d <pair Vol> Specifies the pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specifies the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] Specifies the LDEV# in the RAID without '-g' option
- -l[#] Set to HORCMINST#
- -lH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -lM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -c Specifies the pair_check
- -l Specifies the local only
- -m <mode> Specifies the display_mode(cas/all) for cascading configuration
- -f[x] Specifies the display of LDEV#(hex)
- -f[c] Specifies the display of COPY rate
- -f[d] Specifies the display of the Device file name
- -f[m] Specifies the display of the Bitmap table
- -f[e] Specifies the display of the External LUN mapped to LDEV
- -CLI Specifies the display of the CLI format
- -FHORC Specifies the force operation for cascading HORC_VOL
- -FMRCF [mun#] Specifies the force operation for cascading MRCF_VOL
- -v jnl[t] Specifies the display of the journal information interconnected to the group (Universal Replicator only)
- -v ctg Specifies the display of the CT group information interconnected to the group (TrueCopy and Universal Replicator software only]
- -v smk Specifies display of the Marker on the volume

pairevtwait:
- -x <command> <arg> ... Specifies the SUB command
- -g <group> group_name
- -d <pair Vol> pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specifies the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] the LDEV# in the RAID without '-g' option
- -l[#] Set to HORCMINST#
- -lH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -lM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -nomsg Not display message of pairevtwait

- -nowait Set to the No_wait_mode
- -s <status> ... Specifies the status_name(smpl/copy/pair/psus/psuse(psue))
- -t <timeout> [interval] Wait_time
- -l Specifies the local only
- -FHORC Specifies the force operation for cascading HORC_VOL
- -FMRCF [mun#] Specifies the force operation for cascading MRCF_VOL

pairmon:
- -xh Help/Usage for SUB commands
- -x <command> <arg> ... SUB command
- -D Set to the Default_mode
- -I[#] Set to HORCMINST#
- -IH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -IM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -allsnd Set to the All_send_mode
- -resevt Set to the Reset_mode
- -nowait Set to the No_wait_mode
- -s <status> ... Specifies the status_name(smpl/copy/pair/psus/psuse(psue))

pairresync:
- -x <command> <arg> ... Specifies the SUB command
- -g <group> group_name
- -d <pair Vol> pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specifies the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] the LDEV# in the RAID without '-g' option
- -I[#] Set to HORCMINST#
- -IH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -IM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -nomsg Not display message of pairresync
- -c <size> Specifies the track size for copy (1-15)
- -l Specifies the local only
- -restore Specify Re_sync from SVOL to PVOL [ShadowImage software only]
- -FHORC Specifies the force operation for cascading HORC_VOL
- -FMRCF [mun#] Specifies the force operation for cascading MRCF_VOL
- -swapp Specifies Swap_resync for Changing PVOL to SVOL on the PVOL side
- -swaps Specifies Swap_resync for Changing SVOL to PVOL on the SVOL side

Warning for pairresync using CCIs:
- Ensure SVOL is not mounted prior to issuing the pairresync
- Ensure PVOL is not mounted prior to issuing the pairresync with the restore argument

pairsplit:
- -x <command> <arg> ... Specifies the SUB command
- -g <group> Specifies the group_name
- -d <pair Vol> Specifies the pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specifies the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] Specifies the LDEV# in the RAID without '-g' option
- -I[#] Set to HORCMINST#
- -IH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -IM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -nomsg Not display message of pairsplit
- -r split_mode(Read_Only)
- -rw split_mode(Read_Write)
- -S Specify the split_mode(Simplex)
- -R split_mode(Svol_Simplex)
- -P split_mode(Pvol_Suspend)
- -l Specifies the local only
- -FHORC Specifies the force operation for cascading HORC_PVOL
- -FMRCF [mun#] Specifies the force operation for cascading MRCF_PVOL

pairvolchk:
- -x <command> <arg> ... Specifies the SUB command
- -g <group> group_name
- -d <pair Vol> pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specifies the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] the LDEV# in the RAID without '-g' option
- -I[#] Set to HORCMINST#
- -IH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -IM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -nomsg No message of pairvolchk
- -c Remote_volume_check
- -ss Encode of pair_status
- -FHORC Specifies the force operation for cascading HORC_VOL
- -FMRCF [mun#] Specifies the force operation for cascading MRCF_VOL

raidar:
- -I[#] Set to HORCMINST#
- -IH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -IM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -x <command> <arg> ... Specifies the SUB command
- -s <interval> [count] Specifies the starting and interval(sec)
- -sm <interval> [count] Specifies the starting and interval(min)
- -p <port> <targ> <lun> port(CL1-A or cl1-a... cl3-a or CL3-A ... for the expansion(Lower) port) target_ID LUN#
- -pd[g] <drive#(0-N)> Physical drive#

raidqry:
- -I[#] Set to HORCMINST#
- -IH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -IM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -x <command> <arg> ... Specifies the SUB command
- -l Specifies the local query
- -r <group> Specifies the remote query
- -f Specifies display for floatable host

raidscan:
- -I[#] Set to HORCMINST#
- -IH[#] or -ITC[#] Set to HORC mode [and HORCMINST#]
- -IM[#] or -ISI[#] Set to MRCF mode [and HORCMINST#]
- -x <command> <arg> ... Specifies the SUB command
- -p <port> [hgrp#] Specifies the port_name(CL1-A or cl1-a... cl3-a or CL3-A... for the expansion(Lower) port)
- -pd[g] <drive#(0-N)> Physical drive#
- -pi <'strings'> Specifies the 'strings' for -find option without using STDIN
- -t <targ> Specifies the target_ID
- -l <lun> Specifies the LUN#
- -m <mun> Scan the specified MU# only
- -s <Seq#> Seq#(Serial#) of the RAID
- -f[f] display of the volume-type
- -f[x] display of the LDEV#(hex)
- -f[g] display of the Group-name
- -f[d] display of the Device file name
- -f[e] display of the External LUN only
- -CLI Specifies display of CLI format
- -find[g] Find out the LDEV from the Physical drive# via STDIN.
- -find inst [-fx] Registers the Physical drive via STDIN to HORCM and
  - o permits its volumes on horcm.conf in Protection Mode
- -find verify [mun#] [-f[x][d]] Find out the relation between Group
  - on horcm.conf and Physical drive via STDIN
- -find[g] conf [mun#][-g name] Displays the Physical drive in horcm.conf image.
- -find sync [mun#][-g name] Flushes the system buffer associated to a group.
- For example: [C:\HORCM\etc>raidscan -pi $Phys –find]

```
DEVICE_FILE UID S/F PORT TARG LUN SERIAL LDEV PRODUCT_ID
Harddisk0    0  F  CL2-A  25   0  2496   16 DF600F-CM
Harddisk1    0  F  CL2-A  25   1  2496   18 DF600F
Harddisk2    0  F  CL2-A  25   2  2496   19 DF600F
```

- For example: [raidscan -pi hd0-10 -find [-fx]]
- For example: [echo hd0-10 | raidscan -find [-fx]]
- For example: [echo $Phys | raidscan -find [-fx]]
  - o $variable specifies as follows.
  - o $LETALL -> All of the Drive Letter
  - o $Phys -> All of the Physical Drives
  - o $Volume -> All of the LDM Volumes for Windows2000

Details of Windows Sub Commands

-x drivescan: -x drivescan drive#(0-N)
Example of displaying windows drives 0 - 20:
C:\horcm\etc\>raidscan -x drivescan harddisk0, 20

-x findcmddev: -x findcmddev drive#(0-N)
Example to search for command device in drives 0– 20
C:\horcm\etc\>raidscan -x findcmddev hdisk0, 20

-x mount:
-x mount drive: hdisk# partition# ... (for Windows NT®)
-x mount drive: Volume#(0-N) ... (for Windows 2000/2003)
-x mount drive: [\[directory]] Volume#(0-N) ... (for Windows 2000/2003)
Example to display all mounted filesystems:
C:\horcm\etc\>raidscan –x mount

-x portscan: -x portscan port#(0-N)
Example of displaying drives on ports 0 - 20:
C:\horcm\etc\>raidscan -x portscan port0, 20

-x sync:
-x sync A: B: C: ...
-x sync all
-x sync drive#(0-N) ...
-x sync Volume#(0-N) ... (Windows 2000/2003 systems)
-x sync D:\directory or \directory pattern ... (Windows 2000/2003 systems only)
Example of flushing data to drive D:
C:\horcm\etc\> pairsplit –x sync D:

-x umount:
-x umount drive:
-x umount drive:[\[directory]] … Windows 2000/2003
Example of unmounting F: and G: and then splitting the volume group called oradb
C:\horcm\etc\> pairsplit -x umount F: -x umount G: -g oradb

Environment Variables

HORCC_LOG:
- Specifies the command log directory name, default = /HORCM/log* (* = instance number).

HORCC_MRCF
- Required for ShadowImage or Copy-on-Write software [formally QuickShadow]
- To display for Win, "Set h"
- To set on for Win, "Set HORCC_MRCF=1"
- To set off for Win, "Set HORCC_MRCF="
- To set For B shell, "# HORCC_MRCF=1" followed by "# export HORCC_MRCF"
- To set for C shell, "# setenv HORCC_MRCF 1"
- **Do not set on this env variable if issuing TrueCopy Synchronous/Asynchronous software commands.**

HORCM_CONF:
- Names the HORCM configuration file. default = /etc/horcm.conf

HORCMINST:
- Specifies the instance number when using two (2) or more CCI instances on the same server. The command execution environment and the HORCM activation environment require an instance number to be specified. Set the configuration definition file (HORCM_CONF) and log directories (HORCM_LOG and HORCC_LOG) for each instance.
- To display for Win, "Set h"
- To set on instance 0 for Win, "Set HORCMINST=0"
- To set on instance 1 for Win, "Set HORCMINST=1"
- To set off for Win, Set HORCMINST ="
- To set on instance 0 for B shell, "# HORCMINST=0" followed by "# export HORCMINST"
- To set for C shell, "# setenv HORCMINST 0"

HORCMPROMOD:
- Sets HORCM forcibly to protection mode
- Command Devices in non-protection mode can be used as protection mode also

HORCMPERM:
- Specifies the file name for the protected volumes. When this variable is not specified, the default name is as follows:
  UNIX : /etc/horcmperm*.conf
  Windows NT/200X:WINNT\horcmperm*.conf
  (* as an instance number):

Note: The polling environment variables are validated for only the Hitachi Universal Storage Platform and Network Storage Controller and are also validated on TrueCopy-TrueCopy/ShadowImage cascading operations using "-FHOMRCF [MU#] option. To maintain compatibility across RAID subsystems, these variables are ignored by Hitachi Lightning 9900™ V/9900 Series enterprise storage systems, which enables you to use a script with "$HORCC_SPLT, $HORCC_RSYN, $HORCC_REST" for Universal Storage Platform/Network Storage Controller on the Lightning 9900 V/9900 storage systems.

HORCC_SPLT (for Enterprise):
- "Set HORCC_SPLT=NORMAL" The "pairsplit" and "paircreate –split" will be performed as non-quick mode regardless of the setting of the mode (122) via service processor (SVP) (Remote console).

- "Set HORCC_SPLT=QUICK" The "pairsplit" and "paircreate –split" will be performed as Quick Split regardless of the mode (122) via SVP (Remote console).

HORCC_RSYN (for Enterprise):
- "Set HORCC_RSYN=NORMAL" The "pairresync" will be performed as Non quick Resync mode regardless of setting of the mode (87) via SVP (Remote console).
- "Set HORCC_RSYN=QUICK" The "pairresync" will be performed as Quick Resync mode regardless of setting of the mode (87) via SVP (Remote console).

HORCC_REST (for Enterprise):
- "Set HORCC_REST=NORMAL" The "pairresync –restore" will be performed as Non quick mode regardless of the setting of the mode (80) via SVP (Remote console).
- "Set HORCC_REST=QUICK" The "pairresync –restore" will be performed as Quick Restore regardless of the setting of the mode (80) via SVP (Remote console).

horcm*.conf

HORCM_MON ip_address
- String type with max of 63 characters
- Actual IP address or alias name of this local server
- If all associated instances are in one (1) server, alias of localhost is OK
- If two (2) or more network addresses on different subnets, this item must be NONE

HORCM_MON Service
- String or numeric with max of 15 characters
- Port name (requires entry in appropriate services file) or port number of local server

HORCM_MON Poll (10 ms)
- The interval for polling (health check) of the other instance(s)
- **Calculating the value for poll(10ms):** 6000 x the number of all associated CCI instances. With two (2) instances, this equals 120000ms or a poll every two (2) minutes.
- If all the CCI instances are in a single server, turn off polling by entering –1 to increase performance

HORCM_MON Timeout (10 ms)
- Timeout value for no response from remote server. Default is 3000 x 10ms or 30 seconds.

HORCM_CMD dev_name
- String type with a max of 63 characters
- Command Device must be mapped to a server port running the CCI instance.

Examples of Command Devices:
HP-UX®: /dev/rdsk/c0t0d0

Solaris™: /dev/rdsk/c0t0d0s2
OR
/dev/rdsk/c0t50060E80000000000000A9C300000252d0s2
Note: format with no label required

AIX®: /dev/rhdisk*X*
Note: *X* = device number is created automatically by AIX

Tru64 UNIX: /dev/rdisk/dsk*X*c
Note: *X* = device number assigned by Tru64 UNIX

Linux®: /dev/sd*X*
Note: *X* = device number assigned by Linux

IRIX®: /dev/rdsk/dks*X*d*X*l*X*vol
OR
/dev/rdsk/node_wwn/lun*X*vol/c*X*p*X*
Note: *X* = device number assigned by IRIX

Windows NT/2000/2003: \\.\PhysicalDrive*X*
OR
\\.\CMD-Ser#-LDEV#-Port#
Note: Ser# is the Serial Number of the array, LDEV3 is the array internal LU number, and Port# is the Cluster/Port to which the command disk is assigned.
OR
\\.\Volume{guid} (Windows 2000/2003 only)
Note: *X* = device number assigned by Windows NT/2000/2003. If configurations change, Windows may assign a different physical drive number after a subsequent reboot and the Command Device will not be found. To avoid this problem, assign a partition and logical drive (without a drive letter and no Windows format) to the Command Device to get a GUID.
- When a server is connected to two (2) or more Thunder 9500 V systems, the HORCM identifies each system using the unit ID (see Figure 2.22). The unit ID is assigned sequentially in the order described in this section of the configuration definition file. If more than one (1) Command Device (maximum of two) is specified in a disk subsystem, the second Command Device has to be described side-by-side with the already described Command Device in a line. The server must be able to verify that the unit ID is the same as the Serial# (Serial ID) among servers when a Thunder 9500 V system is shared by two (2) or more servers, which can be verified using the **raidqry** command.

HORCM_DEV dev_group
- String type with max of 31, but the recommended value is eight (8) characters
- Names a group of paired logical volumes and must be unique
- Commands can be executed for all corresponding volumes by group name

HORCM_DEV dev_name
- String type with a max of 31, but the recommended value is eight (8) characters
- Each pair requires a unique dev_name
- **Warning: A duplicate dev_name will cause horcmstart to fail.**

HORCM_DEV port
- String type with a max of 31 characters
- The port numbers must be CL1-x or CL2-x
- The port number can also be CL1-x-y, where y is the host storage group number as found on subsystem
- The Thunder 9500 V system uses the following mapping:
- CL1-A, CL1-B, CL1-C, CL1-D = 9500V/AMS/WMS port 0A, 0B, 0C and 0D
- CL2-A, CL2-B, CL2-C, CL2-D = 9500V/AMS/WMS port 1A, 1B, 1C and 1D

HORCM_DEV Target ID
- Numeric type (decimal) with a max of seven (7) characters
- Use TID from raidscan –p <port>.

HORCM_DEV dev_group LU#
- Numeric type (decimal) with a max of seven (7) characters
- Use LU values from raidscan –p <port>
- **Never use hex values or data corruption may occur. If hex has alpha character, then invalid MU# may occur.**

HORCM_DEV MU#
- Decimal
- MU# is blank for TrueCopy software pairs
- MU# defines the remote copy number of ShadowImage and Copy-on-Write, formerly QuickShadow volumes
- If Environment variable HORCC_MRCF=1, at least one (1) pair must have a MU#
- The SVOL of ShadowImage or Copy-on-Write, formerly QuickShadow must be MU#0

HORCM_LDEV dev_group
- String type with max of 31, but the recommended value is either (8) characters
- Names a group of paired logical volumes and must be unique
- Commands can be executed for all corresponding volumes by group name
- **Only available with CCI 1-16-X and higher – Can be used with/instead of HORCM_DEV**

HORCM_LDEV dev_name
- String type with a max of 31, but the recommended value is either (8) characters
- Each pair requires a unique dev_name
- **Warning: A duplicate dev_name will cause horcmstart to fail.**
- **Only available with CCI 1-16-X and higher – Can be used with/instead of HORCM_DEV**

HORCM_LDEV serial#
- Numeric type with a max of 12
- This is the Serial Number of the subsystem of the LDEV
- **Only Available with CCI 1-16-X and higher – Can be used with/instead of HORCM_DEV**

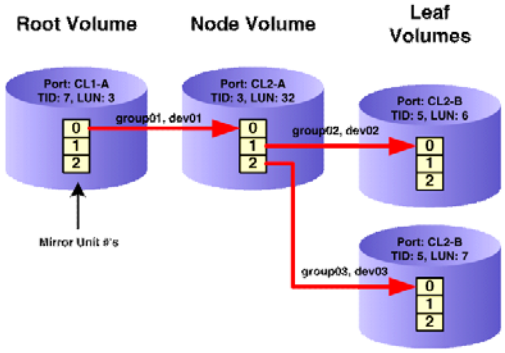
HORCM_LDEV CU:LDEV (LDEV#)
- Numeric type with a max of six (6)
- Format can be CU:LDEV, decimal value, 0xhex value
- **Only available on with CCI 1-16-X and higher – Can be used with/instead of HORCM_DEV**

HORCM_INST dev_group
- All group names defined in HORCM_DEV section must be entered here.

HORCM_INST ip_address
- IP address or alias name of the remote server that contains the dev_group.
- If all associated instances are in one (1) server, alias of `localhost' is OK
- If two (2) or more network addresses are on different subnets, this item must be NONE

HORCM_INST service
Port name (requires entry in appropriate services file) or port number of remote server.

Cascaded Mirrors Detail



Midrange only has 1:3, cascade is only ShadowImage software on enterprise storage systems.

Return Codes

Pairvolchk -ss:
11 SMPL
For TrueCopy Synchronous/ShadowImage software
22 PVOL_COPY or PVOL_RCPY
23 PVOL_PAIR
24 PVOL_PSUS
25 PVOL_PSUE
32 SVOL_COPY or SVOL_RCPY
33 SVOL_PAIR
34 SVOL_PSUS
35 SVOL_PSUE
For TrueCopy Asynchronous/Universal Replicator software
42 PVOL_COPY or PVOL_RCPY
43 PVOL_PAIR
44 PVOL_PSUS
45 PVOL_PSUE
52 SVOL_COPY or SVOL_RCPY
53 SVOL_PAIR
54 SVOL_PSUS
55 SVOL_PSUE

Pairevtwait -nowait:

Status Mnemonic	Return Value	Meaning
Smpl	1	Simplex (No Mirror)
Copy	2	Copy
Pair	3	Paired
Psus	4	Suspended
Psue	5	Suspended with Error

Pairevtwait :
0 Normal (Success)
232 Timeout waiting for specified status on the local host
233 Timeout waiting for specified status

Example of TrueCopy Synchronous Software for Thunder 9500 V Series System (Refer to Diagram)

Operations	Commands

Display CCI version	`C:\HORCM\etc>raidqry -h`
	`Model : RAID-Manager/WindowsNT`
	`Ver&Rev: 01-11-03/00`

Find Command Device
Note: HORCM must be shutdown to run this command.
	`C:\HORCM\etc>raidscan -x findcmddev drive#(0,20)`
	`cmddev of Ser# 462 = \\.\PhysicalDrive4`
	`cmddev of Ser# 463 = \\.\PhysicalDrive6`

Write cmd dev in horcm*.conf	`C:\HORCM\etc>notepad c:\winnt\horcm0.conf` `C:\HORCM\etc>notepad c:\winnt\horcm1.conf`

• Start horcm
• Set env variable for horcm instance 0
• Display TID and LUs for Thunder 9570V™ high-end systems serial #65010462
• Alter horcm0.conf if required
• HORCM must be shutdown and restarted for any changes to horcm*.conf files to take affect.
	`C:\HORCM\etc>horcmstart 0 1`
	`starting HORCM inst 0`
	`HORCM inst 0 starts successfully.`
	`starting HORCM inst 1`
	`HORCM inst 1 starts successfully.`
	`C:\HORCM\etc>set HORCMINST=0`
	`C:\HORCM\etc>raidscan -p cl1-b -fx -s 462`
	`PORT# /ALPA/C,TID#,LU#.Num(LDEV#....)...P/S, Status,Fence,LDEV#,P-Seq#,P-LDEV#`
	`CL1-B / ef/ 5, 1, 24.1(18).....SMPL ---- ------ ----, ----- ----`
	`CL1-B / ef/ 5, 1, 25.1(19).....SMPL ---- ------ ----, ----- ----`

• Set env variable for horcm instance one (1)
• Display TID and LUs for Thunder 9570V system serial #65010463
• Alter horcm1.conf if required
• HORCM must be shutdown and restarted for any changes to horcm*.conf files to take affect
	`C:\HORCM\etc>set HORCMINST=1`
	`C:\HORCM\etc>raidscan -p cl1-b -fx -s 463`
	`PORT# /ALPA/C,TID#,LU#.Num(LDEV#....)...P/S, Status,Fence,LDEV#,P-Seq#,P-LDEV#`
	`CL1-B / ef / 5, 1, 21.1(15).....SMPL ---- ------ ----, ----- ----`
	`CL1-B / ef / 5, 1, 22.1(16).....SMPL ---- ------ ----, ----- ----`

• Set env variable for horcm instance 0 • Start initial copy of Volume group VG01	`C:\HORCM\etc>set HORCMINST=0` `C:\HORCM\etc>paircreate -g VG01 -vl -c 15 -f never`

Display the copy status to verify COPY to PAIR status.	`C:\HORCM\etc>pairdisplay -g VG01 -fc`
	`Group PairVol(L/R) (Port#,TID,LU),Seq#,LDEV#.P/S,Status,Fence, % ,P-LDEV# M`
	`VG01 work01(L) (CL1-B , 1, 24) 462 24..P-VOL PAIR NEVER , 100 21 -`
	`VG01 work01(R) (CL1-B , 1, 21) 463 21..S-VOL PAIR NEVER , 100 24 -`
	`VG01 work02(L) (CL1-B , 1, 25) 462 25..P-VOL PAIR NEVER , 100 22 -`
	`VG01 work02(R) (CL1-B , 1, 22) 463 22..S-VOL PAIR NEVER , 100 25 -`

Suspend Volume Group VG01 and verify that status went from PAIR to PSUS.	`C:\HORCM\etc>pairsplit -g VG01`
	`C:\HORCM\etc>pairdisplay -g VG01 -fc`
	`Group PairVol(L/R) (Port#,TID,LU),Seq#,LDEV#.P/S,Status,Fence, % ,P-LDEV# M`
	`VG01 work01(L) (CL1-B , 1, 24) 462 24..P-VOL PSUS NEVER , 100 21 -`
	`VG01 work01(R) (CL1-B , 1, 21) 463 21..S-VOL SSUS NEVER , 100 24 -`
	`VG01 work02(L) (CL1-B , 1, 25) 462 25..P-VOL PSUS NEVER , 100 22 -`
	`VG01 work02(R) (CL1-B , 1, 22) 463 22..S-VOL SSUS NEVER , 100 25 -`

Resync Volume group VG01 and verify that status went from PSUS to PAIR. Make sure to use the –fc argument to display percentage, or the status may display PAIR and may not be completed.	`C:\HORCM\etc>pairdisplay -g VG01 -fc`
	`Group PairVol(L/R) (Port#,TID,LU),Seq#,LDEV#.P/S,Status,Fence, % ,P-LDEV# M`
	`VG01 work01(L) (CL1-B , 1, 24) 462 24..P-VOL PAIR NEVER , 100 21 -`
	`VG01 work01(R) (CL1-B , 1, 21) 463 21..S-VOL PAIR NEVER , 100 24 -`
	`VG01 work02(L) (CL1-B , 1, 25) 462 25..P-VOL PAIR NEVER , 100 22 -`
	`VG01 work02(R) (CL1-B , 1, 22) 463 22..S-VOL PAIR NEVER , 100 25 -`

Delete the pairs and verify status went from PAIR to SIMPLEX.	`C:\HORCM\etc>pairsplit -g VG01 -S`
	`C:\HORCM\etc>pairdisplay -g VG01 -fc`
	`Group PairVol(L/R) (Port#,TID,LU), Seq#,LDEV#.P/S,Status,Fence, % ,P-LDEV# M`
	`VG01 work01(L) (CL1-B , 1, 24) 462 24..SMPL ---- ------,----- ---- -`
	`VG01 work01(R) (CL1-B , 1, 21) 463 21..SMPL ---- ------,----- ---- -`
	`VG01 work02(L) (CL1-B , 1, 25) 462 25..SMPL ---- ------,----- ---- -`
	`VG01 work02(R) (CL1-B , 1, 22) 463 22..SMPL ---- ------,----- ---- -`

Shutdown horcm	`C:\HORCM\etc>horcmshutdown 0 1`
	`inst 0:`
	`HORCM Shutdown inst 0 !!!`
	`inst 1:`
	`HORCM Shutdown inst 1 !!!`