

Hitachi Data Systems

Command Control Interface (CCI) Quick Reference Guide

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Documentation

- Hitachi Freedom Storage™ Thunder 9500™ V Series Synchronous TrueCopy 9500V User's Guide MK-92DF608-07
- Hitachi Freedom Storage™ Thunder 9500™ V Series Command Control Interface (CCI) User and Reference Guide MK-92DF609-11
- Hitachi Freedom Storage™ Thunder 9500™ and 9200™ V Series Resource Manager User's Guide Graphical User Interface (GUI), MK-92DF605
- HiCommand Device Manager Web Client User's Guide MK-91HC001-12
- HiCommand Device Manager ShadowImage/TrueCopy Setup Guide MK-93HC043-02

TrueCopy Prerequisites

- TrueCopy License** installed in all associated subsystems.
- At least 1 **TrueCopy Link(s)** (recommended 2) configured in each subsystem.
Note: If direct connect use FCAL topology. If switches use point-to-point topology.
- At least 1 (recommended 2) **command device(s)** configured in each subsystem.

ShadowImage Prerequisites

- ShadowImage License** installed in associated subsystems.
- At least 1 (recommended 2) **command device(s)** configured in each subsystem.

Copy on Write Prerequisites

- Copy on Write (CoW) [QuickShadow] License** installed in associated subsystems.
- At least 1 (recommended 2) **command device(s)** configured in each subsystem.

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 command devices are defined, they are recognized as alternate command devices.

Command Device

- Accepts Synchronous TrueCopy 9500V, ShadowImage 9500V, and QuickShadow 9500V CCI commands. The host does not communicate Synchronous TrueCopy 9500V, ShadowImage 9500V, or QuickShadow 9500V commands directly to the volumes on the 9500V. The CCI commands are always sent through the 9500V 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 the 9500V by the Resource Manager.
- 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 (1 block = 512 bytes) (33 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 Resource Manager.
- Up to two (2) command devices can be assigned per 9500V subsystem. If two (2) command devices are defined, both will be **"Alternate Command Devices"**. Only one 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 **"horcctl -C"** command.

- When you use the Synchronous TrueCopy 9500V function, Resource Manager must set the command devices on both the local and remote disk subsystems.
- Will not be managed by HDLM

GUID: Global Unique Identifier

- Created for a disk when Windows' Disk Management defines a partition.

TIP: Use GUID for command device if using Windows. The "raidscan -x findcmddev drive#(x.y)" will display PhysicalDrive# and GUID

Warning: Do not set two 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 9500V software.

Warning: Do not execute commands that change pair status. (paircreate, pairsplit, pairresync) when loading microcode. The microcode load can take up to 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 Resource Manager
- 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 **"horcctl -D"** command.

horcctl -D

Current control device = /dev/rds1/c0t0d0*

If the output displays the device file name appended with "*", this indicates the Protect Function is enabled.

P-VOL: Primary (Source) volume

- TrueCopy and ShadowImage and QuickShadow

S-VOL: Secondary (Target) volume:

- Applies to TrueCopy and ShadowImage

V-VOL: Virtual (Target) volume used with QuickShadow.

- Also called a snapshot volume

Warnings on creating PVOL and SVOL pairs for ShadowImage (SI) and TrueCopy (TC):

- If SI default controller must be identical.
- SI and TC require same number of data drives in RAID group.
- SI and TC require identical volume size in pair.
- If using HiCommand the SVOL can't be mounted.
- If using High Command, the Device Manager 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 services file. If HiCommand is later used to remove all of the

associated pairs and groups, then the corresponding entries in the services file and the horcm*.conf files will be deleted.

Log files:

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

Miscellaneous 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 RAID Manager protection is enabled for the command device using "Resource Manager".

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 sub commands

- 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)
- inraid**: displays device info from a HOST perspective
- paircreate**: Creates pairs
- paircurechk**: Checks consistency of SVOL
- pairdisplay**: Displays pair status
- pairwait**: 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 sub commands for Windows:

- x drivescan**: displays relationship between 9500V LDEV to Windows Hard drives
- x env**: Display 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 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 9500V, you can check the command device name in advance using this option.
- C Change control device of HORCM

-u <unitid> Specify the unitid for '-D' or '-C' options
-ND Show network addr and port name currently used
-NC Change network addr of HORCM
-g <group> Specify 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 CCI instance:

- UNIX: # horcmshutdown.sh
- Windows: > horcmshutdown

Two CCI instances called 0 and 1:

- UNIX: # horcmshutdown.sh 0 1
- Windows: > horcmshutdown 0 1

horcmstart (inst): Starts HORCM application

One CCI instance:

- UNIX: # horcmstart.sh
- Windows: > horcmstart

Two CCI instances called 0 and 1:

- UNIX: # horcmstart.sh 0 1
- Windows: > horcmstart 0 1

Notes:

If argument has no instance number, then starts 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 the contents of the horcm*.conf files
- Verify command device(s) are 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 CLI format.
- [-CLIWP] Display the Port_WWN for this host with CLI format.
- [-CLIWV] Display the Node_WWN for this host with CLI format.
- [-sort] Display and sort by Serial#,LDEV#.
- [-sort -CM] Display and sort 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 pairedisplay from harddisk#... in the STDIN.
- [-gplba] Get the LBA for usable partition from disk#... in the STDIN.
- [-gvinf] Get a drive layout and makes a layout file from disk#... in the STDIN.
- [-svinf[=PTN]] Set 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 Windows2000.
- [inqraid \$Phys -gvinf -CLI] Get a drive layout and makes a layout file from all of the Physical Drives.
- [echo hd0-10 | inqraid -svinf] Set 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.
- [pairedisplay -l -fd -g VG1 | inqraid -svinf=Harddisk] Set a drive layout to disk# related to a group(VG1).

paircreate:

- -g <group> Specify the group_name
- -d <pair Vol> Specify the pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specify the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] Specify the LDEV# in the RAID without '-g' option
- -f <fence> [CTGID] Specify the fence_level (never/status/data/async) [TC/HUR]
- -c <size> Specify the track size for copy (1-15)
- -split [SI/CoW Only] Splits the paired volume after the initial copy operation is complete.
- -m <mode...> Specify the create mode<'cyl or trk'> for S-VOL. <grp CTG# (0-127)> [SI Only] Makes a group for splitting all Si pairs specified in a group (like TC Async), or <cc> [SI Only] Specifies the Volume Migrator (Cruise Control) mode for volume migration
- -nocopy Set to the No_copy_mode (TC only)
- -nomsg Not display message of paircreate
- -jp <id> (HORC/UR only): Basically, the UR has the same characteristic as an Aynchronous Remote Copy journal group, so this option is used to specify a journal group ID for PVOL.
- -js <id> (HORC/UR only): This option is used to specify a journal group ID for 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 Specify the vector(Local_node)
- -vr Specify 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, then make sure the correct env variable is set. (Best practice is 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, then 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 secondary volume is not mounted on any system. If the secondary volume is mounted after paircreate, delete the pair, unmount the secondary volume, then 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 S-VOL and is used to check consistency and is used in conjunction with the **horctakeover** command.

- -g <group> Specify the group_name
- -d <pair Vol> Specify the pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specify the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] Specify the LDEV# in the RAID without '-g' option
- -nomsg Not display message of paircurchk

pairedisplay:

Displays the pairing status 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> ... Specify the SUB command

- -g <group> Specify the group_name
 - -d <pair Vol> Specify the pair_volume_name
 - -d[g] <drive#(0-N)> [mun#] Specify the Physical drive# without '-g' option
 - -d[g] <Seq#> <ldev#> [mun#] Specify the LDEV# in the RAID without '-g' option
 - -c Specify the pair_check
 - -l Specify the local only
 - -m <mode> Specify the display_mode(cas/all) for cascading configuration
 - -f[x] Specify display of LDEV#(hex)
 - -f[c] Specify display of COPY rate
 - -f[d] Specify display of Device file name
 - -f[m] Specify display of Bitmap table
 - -f[e] Specify display of External LUN mapped to LDEV
 - -CLI Specify display of CLI format
 - -FHORC Specify the force operation for cascading HORC_VOL
 - -FMRCF [mun#] Specify the force operation for cascading MRCF_VOL
 - -v jnl[t] Specify display of the journal information interconnected to the group [HUR only]
 - -v ctg Specify display of the CT group information interconnected to the group [TC/HUR]
 - -v smk Specify display of the Marker on the volume
- pairevtwait:**
- -x <command> <arg> ... Specify the SUB command
 - -g <group> group_name
 - -d <pair Vol> pair_volume_name
 - -d[g] <drive#(0-N)> [mun#] Specify the Physical drive# without '-g' option
 - -d[g] <Seq#> <ldev#> [mun#] the LDEV# in the RAID without '-g' option
 - -nomsg Not display message of pairevtwait
 - -nowait Set to the No_wait_mode
 - -s <status> ... Specify the status_name(smpl/copy/pair/psus/psuse(psue))
 - -t <timeout> [interval] Wait_time
 - -l Specify the local only
 - -FHORC Specify the force operation for cascading HORC_VOL
 - -FMRCF [mun#] Specify the force operation for cascading MRCF_VOL

pairmon:

- -x Help/Usage for SUB commands
- -x <command> <arg> ... SUB command
- -D Set to the Default_mode
- -allsnd Set to the All_send_mode
- -revert Set to the Reset_mode
- -nowait Set to the No_wait_mode
- -s <status> ... Specify the status_name(smpl/copy/pair/psus/psuse(psue))

pairresync:

- -x <command> <arg> ... Specify the SUB command
- -g <group> group_name
- -d <pair Vol> pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specify the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] the LDEV# in the RAID without '-g' option
- -nomsg Not display message of pairresync
- -c <size> Specify the track size for copy (1-15)
- -l Specify the local only
- -restore Specify Re_sync from S-VOL to P-VOL [SI only]
- -FHORC Specify the force operation for cascading HORC_VOL
- -FMRCF [mun#] Specify the force operation for cascading MRCF_VOL

- -swapp Specify Swap_resync for Changing P-VOL to S-VOL on the P-VOL side
- -swaps Specify Swap_resync for Changing S-VOL to P-VOL on the S-VOL side

Warning for pairresync using CCI's:

- Insure SVOL is not mounted prior to issuing the pairresync.
- Insure PVOL is not mounted prior to issuing the pairresync with the restore argument.

pairsplit:

- -x <command> <arg> ... Specify the SUB command
- -g <group> Specify the group_name
- -d <pair Vol> Specify the pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specify the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] Specify the LDEV# in the RAID without '-g' option

- -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 Specify the local only
- -FHORC Specify the force operation for cascading HORC_PVOL
- -FMRCF [mun#] Specify the force operation for cascading MRCF_PVOL

pairvolchk:

- -x <command> <arg> ... Specify the SUB command
- -g <group> group_name
- -d <pair Vol> pair_volume_name
- -d[g] <drive#(0-N)> [mun#] Specify the Physical drive# without '-g' option
- -d[g] <Seq#> <ldev#> [mun#] the LDEV# in the RAID without '-g' option
- -nomsg No message of pairvolchk
- -c Remote_volume_check
- -ss Encode of pair_status
- -FHORC Specify the force operation for cascading HORC_VOL
- -FMRCF [mun#] Specify the force operation for cascading MRCF_VOL

raidar:

- -x <command> <arg> ... Specify the SUB command
- -s <interval> [count] Specify the starting and interval(sec)
- -sm <interval> [count] Specify the starting and interval(min)
- -p <port> <tag> <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:

- -x <command> <arg> ... Specify the SUB command
- -l Specify the local query
- -r <group> Specify the remote query
- -f Specify display for floatable host

raidscan:

- -x <command> <arg> ... Specify the SUB command
- -p <port> [hgrp#] Specify 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'> Specify the 'strings' for -find option without using STDIN
- -t <tag> Specify the target_ID
- -l <lun> Specify 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 Specify display of CLI format
- -find[g] Find out the LDEV from the Physical drive# via STDIN.
- -find inst [-fx] Register the Physical drive via STDIN to HORCM and
 - 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] Display the Physical drive in horcm.conf image.
- -find sync [mun#] [-g name] Flush 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]]
 - \$variable specifies as follows.
 - \$LETALL -> All of the Drive Letter
 - \$Phys -> All of the Physical Drives
 - \$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 [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 commands.

HORCM_CONF:

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

HORCMINST:

- Specifies the instance number when using two 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 folling environmentment variables are validated for only the TagmaStore USP/NSC, and are also validated on TC-TC/SI cacading operation using "-FHOMRCF [MU#] option. To maintain compatibility across RAID subsystems, these variables are ignored by 9900/9900V which enables you to use a script with "\$HORCC_SPLT, \$HORCC_RSYN,

\$HORCC_REST" for USP/NSC on the 9900/9900V subsystems.

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 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 server, alias of localhost is OK.
- If two 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 2 instances this equals 12000ms or a poll every 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 that is running the CCI instance.

Examples of Command Devices:

HP-UX®: /dev/rds/c0t0d0

Solaris™: /dev/rds/c0t0d0s2

OR

/dev/rds/c0t50060E80000000000000A9C300000252d0s2

Note: format with no label required

AIX®: /dev/rhdiskX

Note: X = device number is created automatically by AIX®

Tru64 UNIX®: /dev/rdisk/dskXc

Note: X = device number assigned by Tru64 UNIX®

Linux®: /dev/sdX

Note: X = device number assigned by Linux®

IRIX®: /dev/rdisk/dksXdXlXvol

OR

/dev/rds/node_www/lunXvol/cXpX

Note: X = device number assigned by IRIX®

Windows NT®/2000/2003: \\.\PhysicalDriveX

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 (Global Unique ID).

- When a server is connected to two or more Thunder 9500™ V subsystems, the HORCM identifies each 9500V 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 command device (maximum of two command devices) 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 Serial# (Serial ID) among servers when the 9500V is shared by two or more servers. This can be verified using the **raidqry** command.

HORCM_DEV dev_group

- String type with max of 31 but recommended value is 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 recommended value is 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 sub-system
- The 9500V 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 7 characters.
- Use TID from raidscan -p <port>.

HORCM_DEV dev_group LU#

- Numeric type (decimal) with a max of 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 pairs.
- MU# defines the remote copy number of ShadowImage and QuickShadow volumes.
- If Environment variable HORCC_MRCF=1, at least one pair must have a MU#.
- The S-VOL of ShadowImage or QuickShadow must be MU#0.

HORCM_LDEV dev_group

- String type with max of 31 but recommended value is 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 on 9900V/USP/NSC 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 recommended value is 8 characters.
- Each pair requires a unique dev_name.
- Warning: A duplicate dev_name will cause horcmstart to fail.**
- Only Available on 9900V/USP/NSC 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 S/N of the sub-system of the LDEV

- Only Available on 9900V/USP/NSC 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 6.
- Format can be CU:LDEV, decimal value, 0xhex value
- Only Available on 9900V/USP/NSC 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.

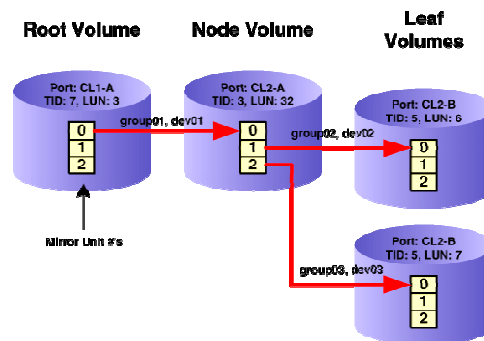
HORCM_INST ip_address

- ip address or alias name of remote server that contains the dev_group.
- If all associated instances are in one server, alias of 'localhost' is OK.
- If two or more network addresses 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 1:1, cascade is only ShadowImage on Enterprise.

Return Codes

Pairvolchk -ss:

- 11 SMPL
- For TrueCopy SYNC / ShadowImage
- 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 ASYNC / Universal Replicator

- 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	Return	
Mnemonic	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 9500V TrueCopy (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 9570 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 1. - Display TID and LUs for 9570 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 -v1 -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 Voume Group VG01 and verify 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 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 !!!

