



**TROUBLESHOOTING
and
TECHNICAL
REFERENCE GUIDE
Volume 1**

4th Edition
January 30, 2007
Compiled and edited
by Stephen Gragert
World Wide Technical Support Trainer



This document and information herein is the property of Engenio Storage Group, LSI Logic, Inc. and all unauthorized use and reproduction is prohibited.

Copyright © 1999-2007 by Engenio Storage Group, LSI Logic, Inc. All rights reserved. Printed in USA.
Engenio Storage Group, LSI Logic, Inc. is an active member of the RAID Advisory Board, an industry consortium dedicated to fostering the understanding and utilization of RAID technology.

Engenio Storage Group, LSI Logic, Inc. is an active member of the Technical Support Alliance Network.

This page intentionally left blank

Table of Contents

1.	<i>Introduction</i>	5
2.	<i>Comparison of Commands Before and After 06.16</i>	6
3.	<i>Shell Commands - Usage and Explanation</i>	11
3.1	Starting the Shell	11
3.2	Shell Commands	12
3.2.1	Quick Overview of Commands	12
3.2.2	Drive/VOLUME Status Commands	13
3.2.2.01	cfgPh <ch,id>	13
3.2.2.02	cfgPbDev <ch,id,volume>	13
3.2.2.03	cfgPhy <ch,id>	14
3.2.2.04	cfgPhyList	16
3.2.2.05	cfgUnit <volume>	16
3.2.2.06	cfgUnitList	19
3.2.2.07	ghsList	19
3.2.2.08	vdAll <cmd>	20
3.2.2.09	vdShow <volume>	20
3.2.2.10	cfgShow	23
3.2.2.11	cfgSundTab	23
3.2.2.12	cfgDd <ch,id>	24
3.2.3	Drive/VOLUME Modify Commands	24
3.2.3.01	isp cfgPrepareDrive,0x<phydev>	24
3.2.3.02	isp cfgFailDrive,0x<devnum>	24
3.2.3.03	isp cfgReplaceDrive,0x<devnum>	24
3.2.3.04	isp cfgSetDevOper,0x<devnum>	24
3.2.3.05	isp cfgDelVdisk,<volume>	24
3.2.3.06	isp cfgRefreshVdisk,<volume>,<devnum of optimal drive>,0	24
3.2.3.05	incrementCfgGenerationNumber	24
3.2.4	Controller/RDAC Status Commands	25
3.2.4.01	arrayPrint	25
3.2.4.02	arrayPrintSummary	26
3.2.5	Controller/RDAC Modify Commands	27
3.2.5.01	isp rdacMgrSetModeActivePassive	27
3.2.5.02	isp rdacMgrSetModeDualActive	27
3.2.5.03	isp rdacMgrAltCtlFail	27
3.2.5.04	isp rdacMgrAltCtlResetRelease	27
3.2.5.05	acsAutoCodeSync	27
3.2.5.06	isp rdacMgrAltCtlReset	27
3.2.6	Other Useful Shell Commands and Procedures	27
3.2.6.01	cacheAnalyze	27
3.2.6.02	ccmStateAnalyze	28
3.2.6.03	memShow & memoryShow	29
3.2.6.04	moduleList	30
3.2.6.05	moduleShow	32
3.2.6.06	spmShow	32
3.2.6.07	spmShowMaps	34
3.2.6.08	getObjectGraph_MT 8	35
3.2.6.09	mhmPrintPeanutStatus	45
3.2.6.10	mhmPrintFredStatus	45
3.2.6.11	svlShow	45

3.2.6.12	avtHostShow	46
3.2.7	netCfgShow and netCfgSet	46
3.2.7.1	Troubleshooting	49
3.2.7.2	Common Network Problems	51
3.2.8	writeZerosFlag	51
3.2.8.01	Turning writeZerosFlag On	51
3.2.8.02	Turning writeZerosFlag Off	52
3.2.9	Reviving a Dead Volume	53
3.2.10	Deleting a Host Port from the Shell	53
3.2.11	Volume is not accessible from the host	54
3.2.12	Drive path redundancy lost	54
3.2.13	How to retrieve the Major Event Log (MEL) from the shell	55
3.2.14	Adding drives that have a previous DacStor on them	55
3.2.15	Changing the modification priority	56
3.2.16	How to identify a drive from the shell	56
3.2.17	How to create and delete a Global Hot Spare from the shell	56
3.2.18	Monitoring and Stopping Media Scan from the shell	56
3.2.19	hdd 90	57
3.2.20	Turning tracing on and repairing bad blocks	57
3.2.21	Clearing the Storage Partition Management Region	58
4.	<i>Fibre Channel Driver Commands</i>	59
4.1	Overview	59
4.1.1	Cables	59
4.1.2	Watchdog Timer	59
4.2	Debugging Problems with the Fibre Channel Interface	59
4.3	The fc commands	60
4.3.1	fc <Usage>	60
4.3.1.01	fc 2 (Fibre Channel History)	61
4.3.1.02	fc 3 (list of open exchanges)	64
4.3.1.03	fc 5 (Quick Status)	64
4.3.1.04	fc 6 (Frame Mgr Status Log)	65
4.3.1.05	fc 7 (Check Condition Log)	66
4.3.1.06	fc 8 (Event Log)	66
4.3.1.07	fc 10 (host login list)	67
4.3.1.08	fc 10,10,3 (detailed host login list)	68
4.3.1.09	fc 12 (firmware versions)	70
4.3.1.10	fc 20 (Tachyon Line-level Statistics)	70
4.3.1.11	Clear Counters (fc90)	72
4.3.1.12	Clearing the accumulated totals and the trace (fc 91)	72
4.3.1.13	fc 100 (World Wide Name change information)	72
4.3.1.14	fcNames (How to get worldwide names for all the channels)	72
4.3.1.15	fc101	73
4.3.1.16	fc111	73
4.3.1.17	fcAll (How to get an overall status)	73
4.3.1.18	fcTail (Display last few entries of each log)	74
4.3.1.19	fcHosts	74
4.3.1.20	fcDump	78
4.3.2	fcDevs	78
4.3.2.01	fcDevs 1 - All Views by View Type (Active)	78
4.3.2.02	fcDevs 2 - Inquiry View	79
4.3.2.03	fcDevs 3 - Names View	80
4.3.2.04	fcDevs 4 - Path View	81
4.3.2.05	fcDevs 5 - Common Names View	82
4.3.2.06	fcDevs 6 - Bufs View	83

4.3.2.07	fcDevs 7 - Detail (All Luns) View and fcDevs 8 - Detail (Active Luns Only) View	83
4.3.2.08	fcDevs 9 - All Views by LUN Device	83
4.3.2.09	fcDevs 10 - All Views by View Type (Detailed)	83
4.3.2.10	fcDevs 11 - RLS View	84
4.3.2.11	fcDevs 12 - Devices with any Errors	89
4.3.2.12	fcDevs 13 - Devices with RW Errors Returned by VDD	89
4.3.2.13	fcDevs 14 - Devices with Major Errors	90
4.3.2.14	hddDump	90
5.	<i>ION Driver Commands</i>	91
5.1	Overview	91
5.1.1	ion Commands	91
5.1.1.01	ionHelp	91
5.1.1.02	ch and chall	93
5.1.1.03	lu and luall	94
5.1.1.04	iditn and iditnall	95
5.1.1.05	tditn and tditnall	97
5.1.1.06	ionShowInquiry	97
5.1.1.07	ionShow 12	98
5.1.1.08	ionShow 99	98
5.1.1.09	Controller I/O Breakdown	98
5.2.1	hids Commands	99
5.2.1.01	hids 104 or 'h'	100
5.2.1.02	hids 2	101
5.2.1.03	hids 32	101
5.2.1.04	hids 77	102
5.2.1.05	hids 108	103
5.3.1	fcn Commands	103
5.3.1.01	fcnHelp	103
5.3.1.02	fcnShow	104
5.3.1.03	fcnShow 11 and fcnRls	105
5.3.1.02	fcnChannelReport and fcnCMClearCounts	106
5.4	Serially Attached SCSI (SAS)	107
5.4.1.01	sasHelp	107
5.4.1.02	sasShowChannels	108
5.4.1.03	sasShowMiswires	108
5.4.1.04	sasShowPhyErrStats	108
5.4.1.05	sasShowDevices	109
5.4.1.06	sasShowExpanders	110
5.4.1.07	sasShowAllExpanders	111
5.5	Subsystem Monitor (SSM)	111
5.5.1.01	ssmHelp	112
5.5.1.02	ssmShow	113
5.5.1.03	ssmShowEnclosures	114
5.5.1.04	ssmAudibleAlarm	116
5.5.1.05	ssmIdentifyDrive	116
Appendix		117
A.1	Destination Driver MEL Events Decoder	117
A.1.1	FIBRE DRIVE-SIDE INTERFACES ONLY	117
A.2	LOOP-ID to ALPA conversion table	120
A.3	Engenio Host Sense Data and ASC/ASCQ codes	121
A.3.1	Host Sense Data	121
A.3.1.01	Request Sense Data Format	121

A.3.1.02	Incorrect Length Indicator (ILI) - Byte 2	121
A.3.1.03	Sense Key - Byte 2	122
A.3.1.04	Information Bytes - Bytes 3-6	122
A.3.1.05	Additional Sense Length - Byte 7	122
A.3.1.06	Command Specific Information - Bytes 8-11	122
A.3.1.07	Additional Sense Codes - Bytes 12-13	122
A.3.1.08	Field Replaceable Unit Code - Byte 14	122
A.3.1.09	Sense Key Specific Bytes - Bytes 15-17	124
A.3.1.10	Recovery Actions - Bytes 18-19	124
A.3.1.11	Total Number Of Errors - Byte 20	124
A.3.1.12	Total Retry Count - Byte 21	124
A.3.1.13	ASC/ASCQ Stack - Bytes 22-25	124
A.3.1.14	Additional FRU Information - Bytes 26-33	124
A.3.1.15	Error Specific Information - Bytes 34-36	128
A.3.1.16	Error Detection Point - Bytes 37-40	128
A.3.1.17	Original CDB - Bytes 41-50	128
A.3.1.18	Host ID - Byte 51	128
A.3.1.19	Host Descriptor - Bytes 52-53	128
A.3.1.20	Controller Serial Number - Bytes 54-69	128
A.3.1.21	Array Software Revision - Bytes 70-73	128
A.3.1.22	LUN Number - Byte 75	128
A.3.1.23	LUN Status - Byte 76	128
A.3.1.24	Drive Software Revision - Bytes 79-82	129
A.3.1.25	Drive Product ID - Bytes 83-98	129
A.3.1.26	Array Power-up Status - Bytes 99-100	129
A.3.1.27	RAID Level - Byte 101	129
A.3.1.28	Drive Sense Identifier - Bytes 102-103	129
A.3.1.29	Drive Sense Data - Bytes 104-135	129
A.3.1.30	Sequence Number - Bytes 136-139	129
A.3.1.31	Date and Time Stamp - Bytes 140-155	129
A.3.2	Sense Codes	129
A.3.2.1	Sense Keys	129
A.3.2.2	Additional Sense Codes And Qualifiers	130
A.4	Industry Standard ASC/ASCQ Codes	144
A.4.1	SCSI ASC/ASCQ Table Format Explanation	144
A.4.2	SCSI ASC/ASCQ Assignments	144
A.5	SATA ASC/ASCQ Codes	159
	Subject Index – Volume 1	160
	Subject Index – Volume 2	162

1. Introduction

This document is intended for Engenio, OEM, Reseller Engineers and Technical Support personnel as a reference source when working with Engenio based storage systems. It includes useful commands to determine controller, drive and volume/LUN status; the usage and meaning of general debugging commands; and explanations of commands for analyzing controller behavior. Not all of the available commands are listed in this document, only the most common and/or useful commands.

Additional reference material has been included such as command line interface usage, scripting, host specific information, white papers and reference tables plus any other documents that may be of benefit to support personnel.

This document is divided into two volumes. The first volume covers shell commands for firmware versions 04.xx to 06.15 plus items mentioned in the previous paragraph. Some of the shell commands may still be used at firmware levels above 06.15. The commands listed in Volume 1 that are still used with the newer code levels, as well as some of the replacement commands of the newer code levels, are listed in a chart in Volume 2, Chapter 2. Also in Volume 2 are shell commands and other items unique to firmware beginning with 06.16. At the end of both volumes is an index of both Volume 1 and Volume 2 for easy of use and cross-reference purposes.

Any suggestions for additions, deletions, changes, comments and/or remarks are welcome and should be forwarded to Steve Gragert (steve.gragert@lsi.com), Engenio Storage Group, LSI Logic, Inc.

Important Note:

THE INFORMATION CONTAINED IN THIS DOCUMENT, THE COMMANDS SHOWN, AND THE CODE IMPLEMENTATION IS SUBJECT TO CHANGE WITHOUT NOTICE.

THIS IS FOR REFERENCE ONLY AND DOES NOT, NOR INTENDED TO, COVER ALL PROBLEMS AND/OR METHODS OF MAINTENANCE.

THIS DOCUMENT IS NOT INTENDED FOR END-USERS.

2. Comparison of Commands Before and After 06.16

Commands Prior to 06.16	Commands for 06.16 and later
A	
acsAutoCodeSync	acsAutoCodeSync
arrayPrint	arrayPrint
arrayPrintSummary	arrayPrintSummary
avtShow	avtShow
avtHostShow	avtHostShow
C	
cacheAnalyze	cacheAnalyze
cacheDirtySyncSet	cacheDirtySyncSet
cachePerfMonReportPrt	cachePerfMonReportPrt
ccmEventNotify	ccmEventNotify
ccmStateAnalyze	ccmStateAnalyze
cfgConfigVdisk	cfgConfigVdisk
cfgDd	cfgDd
cfgDelVdisk	cfgDelVdisk
cfgFailDrive	cfgFailDrive
cfgMarkDriveGroupOnline	cfgMarkDriveGroupOnline
cfgMarkDriveHotSpare	cfgMarkDriveHotSpare
cfgMarkNonOptimalDriveGroupOnline	cfgMarkNonOptimalDriveGroupOnline
cfgPbDev	cfgPbDev
cfgPh	cfgPh
cfgPhy	cfgPhy
cfgPhydevAll	cfgPhydevAll
cfgPhyList	cfgPhyList
cfgPrepareDrive	cfgPrepareDrive
cfgRefreshDrive	cfgRefreshDrive
cfgRefreshVdisk	cfgRefreshVdisk
cfgRemoveHotSpare	cfgRemoveHotSpare
cfgReplaceDrive	cfgReplaceDrive
cfgSetDevOper	cfgSetDevOper
cfgSetReconParams	cfgSetReconParams
cfgShow	cfgShow
cfgStartIAF	cfgStartIAF
cfgSundTab	cfgSundTab
cfgUnit	cfgUnit
cfgUnitList	cfgUnitList

Commands Prior to 06.16	Commands for 06.16 and later
cfgUnitList	cfgUnitList
cfgWipe1	cfgWipe1
	chall
clearEnclosuresPage81	clearEnclosuresPage81
clearSYMBOLPassword	clearSYMBOLPassword
D	
deleteHostPort_MT	deleteHostPort_MT
dstDebugExecCDB	dstDebugExecCDB
E	
eelPrintfs	eelPrintfs
F	
fc	fc
fc 1	fc 1
fc 10	fc 10
fc 10,10,3	fc 10,10,3
fc 100	fc 100
fc 101	fc 101
fc 111	tditnall or ionShow 11
fc 12	fc 12
fc 13	fc 13
fc 2	fc 2
fc 20	fc 20
fc 3	fc 3
fc 5 (Not used as of 5.30)	N/A
fc 6	N/A
fc 7	N/A
fc 8	N/A
fc 90	fc 90 or iopPerfMonRestart
fc 91	iopPerfMonRestart
fc 99	N/A
fcAll	fcAll
fcChip	fcChip
fcDevs	ionShow & hids
fcDevs 1	ionShow 11
fcDevs 10	N/A
fcDevs 11	fcnShow 11
fcDevs 12	N/A

Commands Prior to 06.16	Commands for 06.16 and later
fcDevs 13	N/A
fcDevs 14	N/A
fcDevs 2	ionShowInquiry and ionShow 12
fcDevs 3	ionShowInquiry
fcDevs 4	luall
fcDevs 5	luall 5
fcDevs 6	hids 'o'
fcDevs 7	N/A
fcDevs 8	N/A
fcDevs 9	N/A
fcDump	N/A
	fcnHelp
fcHosts	fcHosts
fcNames	fcNames
fcSend	fcSend
G	
getObjectGraph_MT 8	getObjectGraph_MT 8
getVolumeActionProgress_MT	getVolumeActionProgress_MT
ghsList	ghsList
H	
hdd 5	N/A
hdd 90	N/A
hddDump	N/A
hddEnablePrintDriveSense	N/A
hddBalanceLoad	N/A
N/A	hidShow
I	
i	i
I	I
N/A	iditnall
ignoreConfigLock	ignoreConfigLock
ignoreDacstoreLock	ignoreDacstoreLock
incrementCfgGenerationNumber	incrementCfgGenerationNumber
N/A	ionHelp
iopPerfMonEnable	iopPerfMonEnable
iopPerfMonReportPrt	iopPerfMonReportPrt
iopPerfMonRestart	iopPerfMonRestart
iopShow	iopShow

Commands Prior to 06.16	Commands for 06.16 and later
M	
m	m
memoryShow	memoryShow
memShow	memShow
mhmPrintFredStatus	mhmPrintFredStatus
mhmPrintPeanutStatus	mhmPrintPeanutStatus
moduleList	moduleList
mon	mon
N	
netCfgSet	netCfgSet
netCfgShow	netCfgShow
P	
printBatteryAge	printBatteryAge
R	
rdacMgrAltCtlFail	rdacMgrAltCtlFail
rdacMgrAltCtlReset	rdacMgrAltCtlReset
rdacMgrAltCtlResetRelease	rdacMgrAltCtlResetRelease
rdacMgrSetModeActivePassive	rdacMgrSetModeActivePassive
rdacMgrSetModeDualActive	rdacMgrSetModeDualActive
reboot	reboot
resetAllDrvFitLEDs	N/A
resetController_MT	resetController_MT
resetDriveIdentify	ssmIdentifyDrive
rpaGetBatteryAge	rpaGetBatteryAge
rpaSetBatteryAge	rpaSetBatteryAge
S	
safeSysWipe	safeSysWipe
setDriveIdentify	ssmIdentifyDrive
setSAMediaScanPeriod_MT	setSAMediaScanPeriod_MT
setVolumeMediaScanParams_MT	setVolumeMediaScanParams_MT
showEnclosures	showEnclosures
showEnclosuresPage81	showEnclosuresPage81
showMajorEvents	showMajorEvents
socClearSYMbolErrorStats	socClearSYMbolErrorStats
socShow	socShow
spmClearDac	N/A

Commands Prior to 06.16	Commands for 06.16 and later
spmClearDatabase	spmDbClear
spmGetDefaultHostPortType	spmGetDefaultHostPortType
spmSetAltDefaultHPTI	spmSetAltDefaultHPTI
spmShow	spmShow
spmShowMaps	spmShowMaps
ssmAudibleAlarm	ssmAudibleAlarm
sstorClearDrives	sstorClearDrives
svlShow	svlShow
syncShow	syncShow
sysReboot	sysReboot
sysWipe	sysWipe
sysWipeZero	sysWipeZero
sysWipeZero 1	sysWipeZero 1
T	
tt "sodMain"	tt "sodMain"
tt "tRAID"	tt "tRAID"
V	
vdAll	vdAll
vdPerfMonReportPrt	vdPerfMonReportPrt
vdPerfMonReportPrtInfo	vdPerfMonReportPrtInfo
vdReconFixURE	vdReconFixURE
vdShow	vdShow
VKI_EDIT_OPTIONS	VKI_EDIT_OPTIONS
VKI_KMZALLOC	VKI_KMZALLOC
W	
writeZerosFlag	writeZerosFlag

N/A – No equivalent command available.

3. Shell Commands - Usage and Explanation

3.1 Starting the Shell

NOTES:

- A shell connection can also be gained via an **rlogin** session from a UNIX terminal window if the Ethernet ports have been setup for network use. (See section 3.2.7.06 for setting up the networking option.) The **telnet** connection is NOT supported on Engenio arrays.
 - As of 05.4x code, **rlogin** is disabled by default. In order to use **rlogin**, use the storage management software to enable it.
 - Later versions of code may ask for a user ID, use **root** then enter the password.
- Connect to the serial port (controller 1 or 2) on the controller module
 - Configure serial port - default array settings are 9600 (38,400 for SHV and RAID Core (RC) controllers), 8, None, 1, and no flow control. Serial port speed setting can support upto 115,200
 - Shell download protocol is Xmodem.
 - Enter **ALT-B** for control-break if using ProComm Plus.
 - For ProComm Plus, use **ALT-F6** to scroll screen.
 - For additional information on attaching to the serial connection, see Appendix A.4.
- Forget your password? Download NVSRAM again, the default (infiniti) will be used.
- Login shell is the Korn Shell.
- Use **ESC-K** to repeat the last commands.
- Use **lkup "name"** to print command variables with string "name" in their names(ie. **lkup "cfg"** will give a listing of all commands that have "cfg" in their name). This is not a man page.
- Enter **ld </Debug** to load the debug utilities.
- Enter **unld "Debug"** to unload the debug utilities.
- Enter **exit** to quit the shell commands, use **logout** if rlogin connection is used to release connection and exit.

```

Press within 5 seconds: <ESC> for SHELL, <BREAK> for baud rate

#####
###                               ###
###  LSI Logic Series 4 SCSI RAID Controller  ###
###      Copyright 2001, LSI Logic Inc.      ###
###                               ###
###      Serial number: 1T03910065          ###
###      Network name:  tslab032           ###
###                               ###
#####

Enter password to access shell: infiniti

#####
###                               ###
###  LSI Logic Series 4 Command Shell        ###
###                               ###
###  Executive Version: 5.3.1                ###
###  Core Kernel Version: WIND version 2.5  ###
###  Boot Version: 04.01.02.00              ###
###  Created: 05/11/01 17:07                ###
###  Memory Size: 0x2000000 (32 MB)         ### ← MPU Memory size
###                               ###
#####

Enter "exit" to terminate the Command Shell
->
    
```

3.2 Shell Commands

3.2.1 Quick Overview of Commands

NOTE: When using commands that refer to the channel (ch) and ID numbers the numbers are logical numbers of the devnum. This does NOT refer to the physical location of the drive.

Each devices location may be represented in one of several ways:

Hex mode	0x00c0000i	(c=logical channel, i=logical ID)
Dec mode	ch,id	(ch=logical channel, id=logical ID)
phyDev mode	0xffffffff	(memory address in a controller)
Tray/Slot	T/S	(physical location)
ALPA	xx	(Arbitrated Loop Physical Address)

Shell Commands to display VOLUME/Drive Status

Command	Usage
cfgPhy <ch, id>	Displays contents of internal phydev structure
cfgPh <ch, id>	Displays piece header structure from dacstore & update time stamp
cfgPhyList	Displays brief list of all drives in storage system
cfgPbDev <ch,id,volume>	Displays a unit's config from a given drive (drive must be spun up)
cfgUnit <volume>	Displays detailed VOLUME information from memory
cfgUnitList	Displays VOLUME state for all VOLUMES
cfgShow	Display device information used by the Virtual Disk Driver
vdAll cmd	Performs cmd for all existing VOLUMES (e.g. vdAll vdShow)
vdShow	Displays detailed information about VOLUME configuration
ghsList	Display information about GHS drives

Shell commands to display RDAC status

Command	Usage
arrayPrintSummary	Prints summary of array controller states, VOLUME ownership
arrayPrint	Prints detailed controller state information

Shell Commands to modify VOLUME/Drive Status

Note (1) the controller will spawn a task to execute the shell command with isp prefix

(2) devnum is specified as 0xC0000I, where C is the 0-relative channel number and I is the id

Command	Usage
isp cfgFailDrive,0x<devnum>	fails drive specified by devnum
isp cfgPrepareDrive,0x<phydev>	Spins up a drive but will not make drive operational
isp cfgReplaceDrive,0x<devnum>	Replaces drive specified by devnum
isp cfgSetDevOper,0x<devnum>	sets drive status for drive specified by devnum to optimal (no reconstruct)
isp cfgDelVdisk,<volume>	Deletes a volume

Shell Commands to modify RDAC status

Command	Usage
isp rdacMgrSetModeActivePassive***	Sets controller mode to active and alternate controller mode to passive
isp rdacMgrSetModeDualActive***	Sets array controller mode to dual active
isp rdacMgrAltCtlFail	Fails alternate controller (holds in reset) and takes ownership of VOLUMES
isp rdacMgrAltCtlResetRelease	Releases failed controller from being held in reset

***WARNING: These commands do not modify the controller cache setup, only the controller states. This may be accomplished by issuing the following command:

isp ccmEventNotify,0x0f

Other Useful Shell Commands:

Command	Usage
showEnclosures	Displays information about enclosure devices
ld < /Debug	loads debug symbols (Use moduleShow to determine if debug is loaded)
unld "Debug"	Unloads debug symbols (Use moduleShow to determine if debug is unloaded)
printBatteryAge	prints current, installation, expiration and warning time, both in number of seconds since UNIX time zero - 1Jan1970
rpaGetBatteryAge	prints the life of the battery in number of 90-day increments in decimal, hex, and ASCII. This is the format (in hex) that the NVSRAM UserCfg Region uses to set the life of the battery (e.g. 2 yrs. = 0x08).
i	list summary task information
I	list detailed task information, memory usage
sysWipe	*** WARNING: deletes arrays volume configuration information including volumes, volume groups, volume-to-LUN mappings, hot spare assignments and array name.
sysWipeZero	*** WARNING: similar to sysWipe but also wipes net information.
safeSysWipe	*** WARNING: wipes the security region which contains Enabler ID numbers. After running this command any premium features will show up as "Out Of Compliance" and will require new keys.
reboot (or ^x or ^X)	reboots controller (like host bus reset)
sysReboot	reboots controller (like power on reset, via Boot Menu)

Dumping Global User Config Region Data on Bridge Controllers only
d 0xc1180,80,1

Dumping NVSRAM FA Log Region Data
 NVSRAM FA Log Region

05.xx code and earlier **d 0xc1250,200,1** (Bridge controllers only)
 06.xx code and later **excLogShow** (Works on all controllers)

3.2.2 Drive/VOLUME Status Commands

3.2.2.01 **cfgPh <ch,id>**

This command displays piece header structure from dacstore and update time stamp that is read directly from the dacstore on the drive at ch,id. The drive must be spun up in order to read this information.

To read the cfgPh of all of the disk drives in the storage system use the command: **isp cfgPhydevAll,cfgPh**

```

-> cfgPh 1,12
pt_magicnum      = 56445054
serialnum        = 427100c5
pt_timestamp     = 4271081e
update_timestamp = 4271365d
numDescPieces    = 1
vd_unit=5  offset=0  vd_update_timestamp=0000365d timestamp=4271365d
```

3.2.2.02 **cfgPbDev <ch,id,volume>**

This command displays volume definition stored in dacstore on spun up drive at ch,id (similar to the output of the command **cfgUnit**).

Piece Service State of the drive, not the drives state or status
 3 = in-service
 4 = out-of-service

```

-> cfgPbDev 2,2,3
vd_serialnum = 41221e45
vd_timestamp = 41221e08
vd_state = 0
vd_status = 0
vd_flags = 7270f
vd_capacity = 31f8ba00
vd_unit = 3
vd_type = 7
vd_pieces = 4
vd_lun_type = 1
vd_blocksize = 512
vd_recon_freq= 0
vd_recon_amt = 1024
vd_cluster = 128
vd_piecenum = 0
vd_cfgFlags = 310000
vd_largeio = 400
vd_pref_mgr = 2
vd_prefetch_cutoff = ffff
vd_prefetch_min = 1
vd_prefetch_max = 0
vd_prefetch_limit = ffff
vucache_control_flags = 1
vucache_read_cache_alg = 1
vucache_write_cache_alg = 1
vucache_cache_flush_alg = 1
vucache_cache_flush_mod = 8
vucache_TMW_flush_alg = 1
vucache_TMW_flush_mod = 8
vucache_cache_block_size = 32
vucache_large_io_size = 1024
update_timestamp = 41221e45
cmdHandlerInfo = 0 0 60 a b 80 0 12 71 10 0 0 0 41 41 21 d3 8f 0 0 0 0 0 0 0 0 0 0 0 0
vpdCreationControllerSerNum = 31 54 33 33 39 34 39 37 34 35 0 0 0 0 0
vpdVolumeCreationNum = 41
User Label = train4
Pc Name Serial Offset Length State Stat Spared VpDevnum
0 100007 402a85bb c800000 10a83e00 3 0 ffffffff 100007
1 200000 402a85c9 c800000 10a83e00 3 0 ffffffff 200000
2 200001 402a85c8 c800000 10a83e00 3 0 ffffffff 200001
3 200002 402a85c7 c800000 10a83e00 3 0 ffffffff 200002
    
```

3.2.2.03 cfgPhy <ch,id>

This command displays detailed data about the drive structure stored in the memory of the controller. To read the cfgPhy of all of the disk drives in the storage system use the command: **isp cfgPhydevAll,cfgPhy**

-> cfgPhy 4,3					0-relative logical channel number; ID
DACSTORE Layout - 40MB					
Region name	sector	length	offset		
Legacy Dir_PTH	71132952	8	8		
Dacstore Directory	71132950	1	10		DACStore Directory region
Region Index	71132621	3	339		Host Index region
SPM Area	71132320	300	640		Storage Partition Manager region
Checkpoint Log	71132264	2	696		DACStore Checkpoint log region
Sundry RDAC Store	71132258	5	702		DACStore RDAC Store region
Sundry GHS Drive	71132253	4	707		Sundry Global Hot Spare Drive Store region
Sundry Fail Drive	71132248	4	712		Sundry Failed Drive Store region
Sundry Symbol Store	71132245	2	715		Sundry SYMBOL Store region
Sundry SES Store	71132243	1	717		Sundry SES Data Store region
Sundry Cache Store	71132241	1	719		Sundry Cache Store region
Sundry Mode Page	71132239	1	721		Sundry Mode Page region
Runtime Diagnostics	71132174	64	786		DACStore Maintenance region
Symbol Store Hi	71132165	8	795		
Symbol Store Lo	71132156	8	804		
SAFE Store	71132147	8	813		DACStore SAFE region (security)
MEL Drive Header	71132145	1	815		DACStore MEL Drive Header region
MEL System Header	71132143	1	817		DACStore MEL System Header region
UTM Header	71132141	1	819		DACStore UTM Header region

Maintenance	71132139	1	821	DACstore Maintenance region
MEL Drive Data	71131626	512	1334	DACstore MEL Drive Data region
Data/Parity Log	71128864	2050	4096	DACstore Data/Parity Log region
Reconfiguration Log	71113504	10240	19456	DACstore Reconfiguration Log region
MEL System Data	71109407	4096	23553	DACstore MEL System Data region
UTM Data	71105310	4096	27650	DACstore UTM Data region
Piece Table	71084829	10240	48131	DACstore Piece Table region
Piece Table Header	71084803	25	48157	DACstore Piece Table Header region
NVSRAM Store	71084671	131	48289	DACstore NVSRAM Store region
Stable Storage	71051106	20480	81854	Stable Storage region
Fail Piece Store	71051041	64	81919	DACstore Failed Piece Storage region
phydev address	= 47c82348	Memory location in controller		
nextphy	= 47c84bd8	Next drive in the list		
d state	= 0000	Drive State		
d status	= 0000	Drive Status		
d flags	= 00200000 =	Drive Flags		
d timestamp	= 3f5c8b86	Timestamp of last update		
drive group seq #	= 2	Volume group number		
brd_serialnum	= 31543330323237333130000000000000	Serial Number of controller at the higher drive-side SCSI ID		
abrd_serialnum	= 31543235303136353635000000000000	Serial Number of controller at the lower drive-side SCSI ID		
dacstore_name	= 00100003	Physical location of drive when DACStore was created (the same as the drive identifier, if the drive has not been moved within the subsystem)		
dacstore_serialnum	= 3f5c9cc3	Timestamp when DACStore was created		
dacstore_major/min	= 3,0			
dacstore_update	= 0			
devnum	= 00100003	Drive identifier(ch,id in hex mode)		
tray,slot	= 0,11	Drives physical location		
d_blksize	= 512	Drive block size (typically 512)		
numDescPieces	= 5	Number of VOLUMES configured on drive		
offset	= 00000028	Offset of first VOLUME piece on drive		
pIndTab	= 00000000			
ckptLog	= 00000000			
dkpc[0]=447a44fc dkpc[1]=447a3ff8 dkpc[2]=447a3cc8 dkpc[3]=447a383c dkpc[4]=447ae174		phyDev address of each volume piece on a drive		
d_capacity	= 71132960	0x043d6720	Drive Capacity in hex blocks	
d_data_start	= 0	Start of user data area on drive		
d_data_end	= 71051039	0x043c271f	End of user data area on drive	
dacstore_start	= 71051040	0x043c2720	Start block number of DACStore 1 + End of user data area on drive	
Number phydevs = 1	Number of phydev definitions (should always be 1. If value is 2 suspect dirty dacstore.)			

DRIVE STATE Values:

0	Optimal	5	Removed - optimal	pg2A = 0
1	Non-existent drive	6	Removed - replaced	pg2A = 4
2	Unassigned, w/DACSTORE	7	Removed - failed	pg2A = 3
3	Failed	8	Unassigned, no DACSTOR	
4	Replaced			

DRIVE STATUS Values:

0x0000	Optimal	0x00A4	Reconstruction failed
0x0001	Unknown Channel	0x00A5	Drive failed at Read Capacity
0x0002	Unknown Drive SCSI ID	0x00A6	Drive failed for internal reason
0x0003	Unknown Channel and Drive SCSI ID	0x00B0	No information available
0x0080	Format in progress	0x00B1	Wrong sector size
0x0081	Reconstruction in progress	0x00B2	Wrong capacity
0x0082	Copy-back in progress	0x00B3	Incorrect Mode parameters
0x0083	Reconstruction initiated but no GHS is integrated	0x00B4	Wrong controller serial number
0x0090	Mismatched controller serial number	0x00B5	Channel Mismatch
0x0091	Wrong vendor - lock out	0x00B6	Drive Id mismatch
0x0092	Unassigned drive locked out	0x00B7	DACStore inconsistent

0x00A0	Format failed	0x00B8	Drive needs to have a 2MB DACStore
0x00A1	Write failed	0x00C0	Wrong drive replaced
0x00A2	Start of Day failed	0x00C1	Drive not found
0x00A3	User failed via Mode Select	0x00C2	Drive offline, internal reasons

DRIVE FLAGS (d flags) Values:

0x00000100	Drive is locked for diagnostics
0x00000200	Drive contains config. sundry
0x00000400	Drive is marked deleted by Raid Mgr.
0x00000800	Defined drive without drive
0x00001000	Drive is spinning or accessible
0x00002000	Drive contains a format or accessible
0x00004000	Drive is designated as HOT SPARE
0x00008000	Drive has been removed
0x00010000	Drive has an ADP93 Dacstore
0x00020000	Dacstore update failed
0x00040000	Subvolume consistency checked during SOD
0x00080000	Drive is part of a foreign rank (cold added).
0x00100000	Change vdunit number
0x00200000	Expanded Dacstore parameters
0x00400000	Reconfiguration performed in reverse VOLUME order
0x00800000	Copy operation is active (not queued).

3.2.2.04 cfgPhyList

Displays drive list giving devnum, tray/slot, phydev address, state and status

```

-> cfgPhyList
Ch Devnum Phydev State/Status Flags #Pcs Dg# T/S
0 000007 47c79550 OPTIMAL/NULL 00200200 0005 2 0/7
0 000006 47c7bde0 UNASSIGN/NULL 00200200 0000 0 0/6
0 000005 47c7e670 UNASSIGN/NULL 00200000 0000 0 0/5
0 000004 47c80f00 OPTIMAL/NULL 00200000 0005 2 0/4
0 000003 47c83790 UNASSIGN/NULL 00200000 0000 0 0/3
0 000002 47c86020 UNASSIGN/NULL 00200000 0000 0 0/2
0 000001 47c888b0 OPTIMAL/NULL 00200000 0005 2 0/1
1 100006 47c7a998 REPLACED/RESTORE 00204000 0005 2 0/14
1 100005 47c7d228 UNASSIGN/NULL 00200000 0000 0 0/13
1 100004 47c7fab8 UNASSIGN/NULL 00200000 0000 0 0/12
1 100003 47c82348 REPLACED/COPY 01200000 0000 2 0/11
1 100002 47c84bd8 UNASSIGN/NULL 00200000 0000 0 0/10
1 100001 47c87468 UNASSIGN/NULL 00200000 0000 0 0/9
1 100000 47c89f48 OPTIMAL/NULL 01200200 0001 1 0/8
    
```

3.2.2.05 cfgUnit <volume>

This command displays detailed information about the volume.

-> **cfgUnit <volume>**

Displayed:	Explanation:
vd_unit = 2	VOLUME Number (SSID in decimal format)
vd_flags = 0003272f	VOLUME Flags (See following Table for values)
vd_suspendcnt = 0	Suspension count
vd_active = 0	Vd I/O count
vd_type = 7	VOLUME Type 3 = RAID 0, 4 = RAID 1, 5 = RAID 3, 7 = RAID 5
vd_pieces = 5	VOLUME Number of Pieces = Number of drives in VOLUME
vd_data_pieces= 4	VOLUME Number of Data Pieces. Doesn't include parity/mirror disk(s)
vd_cluster = 128	VOLUME Cluster Size = VOLUME Segment Size in blocks
vd_stripe = 512	vd data pieces x vd cluster
vd_piece = 187ccfb8	First piece address
vd_dev = 10000002	Virtual disk Major/Minor device number
vd_serialnum = 43bedf12	Timestamp when VOLUME was created
vd_timestamp = 43bedf0e	Timestamp of last update
vd_state = 0001	VOLUME State (See following Table for values)
vd_status = 0000	VOLUME Status (See following Table for values)
vd_new = 00000000	New configuration (reconfiguration)
vd_cfgFlags = 00010000	VOLUME Configuration Flags (See following Table for values)
vd_scrub_flags= 0	Data scrub flags (See following Table for values)

vd_capacity = 20971520	VOLUME capacity in blocks
vd_capacity2 = 20971520	Reconfiguration capacity
vd_boundary = 0	Restore/Copy/Reconfiguration boundary
vd_oos = 2	First piece number that is out of service (-1 = none)
vd_oos2 = -1	Second piece number that is out of service (-1 = none)
vd_ooscnt = 1	Number of pieces out of service
vd_op = 00000010	Exclusive operation (See following Table for values)
vd_cache_gran = 8	Cache Block Size (blocks)
vd_cache_blksize = 4096	Cache Block Size in Bytes (4K or 16K)
vd_pref_mgr = 1	Slot number of desired owning controller
vd_creation# = 6343	Incremental count of volume creation
vd_blocksize = 0200	Block size used
vd_edc = 0	Non-zero if EDC is used
vd_520B = 0	EDC size in bytes
vd_cmd_info = 00 00 60 0a 0b 80 00 11 15 46 00 00 63 43 43 70 e6 8c 00 00 00 00 00 00 00 00 00 00 00 00 00 00	World wide name of volume
vd_creation_serial# = 31 54 35 30 37 35 39 30 37 35 00 00 00 00 00 00	Serial number of controller that created the volume
User Label = Eng	User assigned name for the Volume
Pc	Piece Order listing of the VOLUME (similar to vdShow output)
Vp	Piece Pointer
vd_dev	Devnum of physical drive
vp_phydev	Pointer to the PhyDev
vp_dev	Drive identifier where piece is located
state	Piece State: 0x0000 = does not exist, 0x0001 = known to exist but not found, 0x0003 = in service, 0x0004 = out of service, 0x0005 = data/parity mismatch on piece(s), 0x0006 = being reconstructed
vp_spared = ffffffff	Devnum of drive currently sparing this piece
vp_org = 00000000	Pointer to original piece during reconfiguration

VOLUME State (vd_state)

These flags are bit values, and the following flags are valid:

0x0000	optimal
0x0001	degraded
0x0002	reconstructing
0x0003	formatting
0x0004	dead
0x0005	quiescent
0x0006	non-existent
0x0007	dead, awaiting format
0x0008	not spun up yet
0x0009	unconfigured
0x000a	LUN is in process of ADP93 upgrade
0x000b	Optimal state and reconfig
0x000c	Degraded state and reconfig
0x000d	Dead state and reconfig

VOLUME Status (vd_status)

These flags are bit values, and the following flags are valid:

0x0000	No sub-state/status available
0x0020	Parity scan in progress
0x0022	Copy operation in progress
0x0023	Restore operation in progress
0x0025	Host parity scan in progress
0x0044	Format in progress on virtual disk
0x0045	Replaced wrong drive
0x0046	Deferred error

VOLUME Flags (vd_flags)

These flags are bit values, and the following flags are valid:

0x00000001	Configured
0x00000002	Open

0x00000004	On-Line
0x00000008	Not Suspended
0x00000010	Resources available
0x00000020	Degraded
0x00000040	Spare piece - VOLUME has Global Hot Spare drive in use
0x00000080	RAID 1 ping-pong state
0x00000100	RAID 5 left asymmetric mapping
0x00000200	Write-back caching enabled
0x00000400	Read caching enabled
0x00000800	Suspension in progress while switching Global Hot Spare drive
0x00001000	Quiescence has been aborted or stopped
0x00010000	Prefetch enabled
0x00020000	Prefetch multiplier enabled
0x00040000	IAF not yet started, don't restart yet
0x00100000	Data scrubbing is enabled on this unit
0x00200000	Parity check is enabled on this unit
0x00400000	Reconstruction read failed
0x01000000	Reconstruction in progress
0x02000000	Data initialization in progress
0x04000000	Reconfiguration in progress
0x08000000	Global Hot Spare copy-back in progress
0x90000000	VOLUME halted; awaiting graceful termination of any reconstruction, verify, or copy-back

VOLUME Configuration Flags (vd_cfgFlags)

These flags are bit values, and the following flags are valid:

0x00000002	Disable auto replacement/reconstruction
0x00000000	Use default drive mode page values
0x00000100	Use current drive mode page values
0x00000200	Use saved drive mode page values
0x00010000	Mode pages are valid
0x00020000	VOLUME may use a Global Hot Spare Drive
0x80000000	Copy-back from Global Hot Spare drive is in progress

VOLUME Scrub Flags (vd_scrub_flags)

0x01	VD_SCRUB_HIGH_PRI	scrub at highest priority
0x02	VD_SCRUB_LOW_PRI	scrub at lowest priority
0x04	VD_SCRUB_BYTE_RATE	scrub rate is in bytes/s rather than blocks/s
0x10	VD_SCRUB_EXCL_HALTED	scrubbing halted on this lun by and exclusive op.
0x20	VD_SCRUB_IO_HALTED	scrubbing halted on this lun by quiescence
0x40	VD_SCRUB_DAC_COMPLETE	dacstore scrubbing finished on whole drive group

VOLUME Exclusive Operations Flags (vd_op)

4	MAX_OPS	total concurrent operations
7	NUM_OPS	number of operations managed
0x00000001	INTERRUPTED	
0x00000002	NEW	
0x00000010	DG_AVAILABLE	
0x00004000	VD_HOST_PARSCN	host requested parity scan
0x00008000	VD_PARITY_SCAN	parity scan needed
0x00800000	VD_IAF	an IAF reconstruction
0x01000000	VD_RESTORE	restore operation
0x02000000	VD_FORMAT	wipe operation
0x04000000	VD_RECONFIG	reconfig operation
0x08000000	VD_COPY	spare copy operation
0x0f80c000	OP_MASK	a mask of all pertinent operations in vd_flags
0xffffffff	NO_OP	used in cfgDebugCheckForIntOps and cfgDebugCheckForNewOps

3.2.2.06 **cfgUnitList**

This command displays a list on known volume(s) and state of the volume(s)
(4.x version)

```
-> cfgUnitList
The following LUNs exist:
LUN Number 0, state = 0
LUN Number 1, state = 0
LUN Number 2, state = 0
LUN Number 3, state = 0
LUN Number 4, state = 0
LUN Number 5, state = 2
LUN Number 6, state = 0
LUN Number 7, state = 0
LUN Number 8, state = 1
LUN Number 9, state = 0
LUN Number 10, state = 0
LUN Number 11, state = 0
```

(5.x & 6.x versions - see column breakdown below)

```
-> cfgUnitList
Vol#   vdUnit State/Stat vdFlags cfgFlags Pcs vdPiece Owner
  0 44d9f860 0000/0000 0023260f 00110000 4 44d9fa1c prim
  1 44da00e0 0000/0000 0023270f 00110000 4 44da029c alt
  2 44d9fb20 0000/0000 0053260f 00110000 4 44d9fcdc prim
  3 44d9fe00 0000/0000 0003260f 00110000 4 44d9ffbc alt
  4 44d9f5a0 0000/0000 0003270f 00010000 3 44d9f75c alt
  5 44da03a0 0000/0000 0023270f 00110000 4 44da055c alt
  6 44da4720 0000/0000 0053270f 00110000 4 44da48dc prim
128 47eb41d0 0000/0000 0000000f 00000004 0 00000000 alt
1024 44d3720c 0000/0000 0000000f 00000000 2 44d373c8 alt
```

Vol # = Volume / Unit / SSID number of the unit **vdUnit** = Logical address of volume
State/Stat = State and status of the volume **vdFlags** = See cfgUnit – Volume Flags (vd_flags)
Pcs = Number of devices in the volume **Owner** = Owning controller of the volume
cfgFlags = See cfgUnit – Volume Configuration (vd_cfgFlags)
vdPiece = Virtual Disk Piece information in the controllers memory

3.2.2.07 **ghsList**

This command displays information about Global Hot Spare drives. State 3, status 0 indicates failed.
(4.x version)

```
-> ghslist
GHS ENTRY 0
  dev pointer=0x35c73a0
  devnum=300004
  state=2
  status=0
  flags=204000
GHS ENTRY 1
  dev pointer=0x35c8f18
  devnum=100004
  state=4
  status=81
  flags=204000
  PIECE POINTER 0 = 35ac1c4
    spared dev=100003
    phydev=35c8f18
    vp_dev=100004
```

(5.x & 6.x versions)

```
-> ghsList          (GHS is not sparing for any drives)
GHS 0 (100006) dev=0x0x47c7a998 state=2 stat=0 flags=204000

-> ghsList          (GHS is sparing for a drive)
GHS 0 (100006) dev=0x0x47c7a998 state=4 stat=81 flags=1204000
    dkpc[0]=0x454818e4 spared=100003 phydev=0x47c7a998 vp_dev=100006 unit=1
    dkpc[1]=0x454814d0 spared=100003 phydev=0x47c7a998 vp_dev=100006 unit=2
    dkpc[2]=0x45480ffc spared=100003 phydev=0x47c7a998 vp_dev=100006 unit=3
    dkpc[3]=0x45480ccc spared=100003 phydev=0x47c7a998 vp_dev=100006 unit=4
    dkpc[4]=0x447b0308 spared=100003 phydev=0x47c7a998 vp_dev=100006 unit=5
```

3.2.2.08 vdAll <cmd>

This command will perform the *cmd* for all existing volumes, i.e. **vdAll vdShow**. (Requires Debug)

3.2.2.09 vdShow <volume>

This command displays detailed information about VOLUME configuration. When no number is given, volume 0 is assumed. (Requires Debug)

(4.x version)

```
-> vdShow 0
Virtual Disk Unit 0 Configuration
RAID5 5 pieces no spare 32 blocks/cluster 1331200 block capacity
512 bytes/block 128 blocks/stride 8 blocks/cache block
Write-back mode. Auto Sync Age 600
    • Auto Sync Age is age at which write-back cache is eligible for writing to disk. Value in 1/60th of a second.
    • No Auto Sync" means cache is not eligible for writing to disk based on age.
activity indicator 0 - IDLE
    • Idle = no IOs in progress
    • Active = 1 or more IOs in progress
    • Quiesced = New IOs are suspended with no IOs in progress
    • Quiescing = New IOs are suspended with 1 or more IOs still in progress
ON-LINE OPEN OPTIMAL
    • Overall state is either on-line or off-line
    • Open state is either open or closed
    • Operational state is optimal, degraded (parity out-of-date), degraded (piece n out-of-service)
    • If IOs are temporarily suspended, then SUSPENDED will be displayed
Large IO limit = 1024 blocks Large IO buffers = 3
    • Large IO limit is the maximum transfer size to/from host. IOs greater than this limit will have multiple data transfers.
    • Large IO buffers is the number of rotating buffers for large IO requests.
Prefetch disabled. Minimum = 0 Maximum = 0 (blocks)
    Limit = 65535 Cutoff = 65535 (blocks)
    • Shows prefetch control information including amount of data to prefetch. If (multiplier) is shown, then the prefetch multiplier is enabled. Otherwise (blocks) is used for min/max amount.
Reconstruction Amount = 256 blocks delay = 0.1 seconds
    • Amount each reconstruction IO will reconstruct at a time. Delay between subsequent reconstruction IOs.
RESTORE in progress at block 0 with 0% complete.
    • Shown only if in exclusive operating state with percentage complete. States are: restore - piece reconstruction or parity creation; wipe - zeroing of all pieces; copy - piece reconstruction from a Global Hot Spare; reconfig - reconfiguring.

ADP Compatible Mapping (Left Asymmetric)
# dev offset length reads writes flags
piece0 00000000 0 332800 33510 36619 IN-SERVICE
piece1 00100000 0 332800 27583 32203 IN-SERVICE
piece2 00200000 0 332800 30157 35383 IN-SERVICE
piece3 00300000 0 332800 29701 34812 IN-SERVICE
piece4 00400000 0 332800 25579 29972 IN-SERVICE
    • Reads/writes - number accomplished on this piece.
    • flags - show the state of the piece. Valid states are in-service, out-of-date, out-of-service, restore non-existent, not-found, parity
```

```

Virtual Disk Unit 0 Statistics
      small      small      large      large      cache
      reads     writes    reads     writes    total     hits
requests 22136    21882      0          0        44018    261
  blocks 177074   175056      0          0       352130  2088
avg blocks    7         8          0          0         7         8
IO pct.   50.28%    49.71%     0.00%     0.00%    100.00%   0.59%
  • requests = the count of requests
  • blocks = the count of blocks requested.
  • avg blocks = average request size in blocks (blocks/requests)
  • IO pct. = percentage of requests vs. total requests
  • small reads = read and verify requests less than the Large IO size
  • small writes = write and write & verify requests less than the Large IO size
  • large reads = read and verify requests equal or greater than the Large IO size
  • large writes = write and write & verify requests equal or greater than the
    Large IO size
  • total = combined statistics for all reads/writes.
  • cache hits = statistics for small read requests of which the data for the
    entire request was found in cache.
  • If avg blocks is greater than 32, consider changing cache block size to 32.

      IOs      stripes      /IO      clusters      /IO
reads    21875    21875      1.00    21875      1.00
writes   21882    21882      1.00    21882      1.00
  • RAID 5 IO alignment statistics to be used for tuning.
  • IOs = count of requests
  • stripes = count of stripes accessed
  • /IO = average stripes accessed per request
  • clusters = count of clusters (segments) accessed
  • /IO = average clusters accessed per request

write    Full      Partial      RMW No Parity      RMW2      -
algorithms 10      1497      18367      0          0          0
  • Full = Full stripe write. May require a read if entire stripe not in cache.
  • Partial = More than one "data" drive needed to update the stripe
  • RMW (WB) = "traditional read-modify-write". Data was cached if WB enabled
  • RMW2 (WT) = "traditional read-modify-write". Data was NOT cached. Suspect FUA
    being set on writes if WB enabled. Ignore FUA with User Config Byte 26, bit 6
    = 1.

Repair attempts 0 Successes 0 Failed Reads 0 Failed Writes 0
  • Read error handling statistics
  • Repair attempts = No. of repairs attempted
  • Successes = data successfully reconstructed and rewritten
  • Failed reads = data not reconstructed nor rewritten
  • Failed writes = data successfully reconstructed but not successfully written
    (drive taken out-of-service).

RPA requests 78720 width 320335 avg. 4.06 depth 932308 avg. 11.84
RPA XOR statistics:
  • RPA Requests = count of RPA XOR requests
  • width = total number of buffers
  • avg. = average buffers per request
  • depth = total block length of all requests
  • avg = average block length per request
    
```

(5.x version)

```

-> vdShow 1
Virtual Disk Unit 1 Configuration
Volume Type:      3+1 RAID 5
User Label:       1
WWN:              600a0b80000f5619000000243f5c486b
Address:          454816d4
Devnum:           10000001
Capacity:         31457280 blocks
Block Size:       512 bytes
Large IO:         4096 blocks (up to 3 concurrent parts)
Ownership:        Alternate controller
Segment Size:     128 blocks
Stripe Size:      384 blocks
    
```

```

LBA Mapping:      Left Asymmetric
Cache Block Size: 8 blocks (4096 bytes)
Cache Settings:   Write-back, Auto Sync Age 600 (10 seconds)
Prefetch Settings: Enabled.  Minimum = 1  Maximum = 0 (multiplier)
                  Limit = 65535  Cutoff = 65535 (blocks)

Ignore FUA:       Host type(s) - 0 1 7 8
State:            ON-LINE OPEN OPTIMAL
Activity indicator: 0 - IDLE
Background Task:  RECONSTRUCT at block 31457280 with 100% complete
Background Delay: 0.1 seconds per 2048 blocks
Stripe Information: 0 in-use, 0 dirty, 0 dirty full

Storage Information:
  piece  location      dev      offset  length  state
    0      0,1    00000001      0    10485760  IN-SERVICE
    1      0,4    00000004      0    10485760  IN-SERVICE
    2      0,7    00000007      0    10485760  IN-SERVICE
    3     0,14    00100006      0    10485760  IN-SERVICE

IO Statistics:
      small      small      large      large      total      cache
      reads     writes     reads     writes
requests      0         0         0         0         0         0
  blocks      0         0         0         0         0         0
avg blocks    0         0         0         0         0         0
IO pct.      0.00%    0.00%    0.00%    0.00%    0.00%    0.00%

      IOs      stripes      /IO      clusters      /IO
      reads     writes     reads     writes
reads         0         0         0.00        0         0.00
writes        0         0         0.00        0         0.00

      write      Full      Partial      RMW      No Parity      RMW2      -
algorithms    0         0         0         0         0         0

Repair attempts 0  Successes 0  Failed Reads 0  Failed Writes 0
RPA requests 0  width 0  avg. 0.00  depth 0  avg. 0.00

Volumes sharing Volume Group 2 with Volume 1
  1  2  3  4  5

```

(6.x version)

```

-> vdshow 1

Virtual Disk Unit 1 Configuration
Volume Type:      2+2 RAID 1
User Label:       2
WWN:              600a0b800013a4bb00000000426671f9
Address:          031bfa50
Devnum:           10000001
Capacity:         27262976 blocks
Block Size:       512 bytes
Large IO:         4096 blocks (up to 3 concurrent parts)
Ownership:        Alternate controller
Segment Size:     128 blocks
Stripe Size:      256 blocks
EDC:              Disabled
Cache Block Size:
  logical:        8 blocks (4096 bytes)
  physical:       8 blocks (4096 bytes)
Cache Settings:   Read-enabled, Write-back, Auto Sync Age 600 (10 seconds)
Prefetch Setting: Automatic Enabled.
MediaScan Settings: Storage Management Software Disabled.
                  Period = 0 day(s). Last rate = 0 blocks/sec.

Ignore FUA:       Host type(s) - 0 1 7 8
State:            ON-LINE OPEN OPTIMAL
Activity indicator: 0 - IDLE
Background Task:  none
Background Delay: 0.1 seconds per 2048 blocks
Stripe Information: 0 in-use, 0 dirty, 0 dirty full

Storage Information:
  piece  location      dev      offset  length  state
    0      1,4    00000004      0    13631488  IN-SERVICE
    1      1,5    00000005      0    13631488  IN-SERVICE
    2      1,6    00000006      0    13631488  IN-SERVICE
    3      1,7    00000007      0    13631488  IN-SERVICE

```



```

IO Statistics:
      small      small      large      large      total      cache
      reads     writes     reads     writes
requests      0         0         0         0         0         0
  blocks      0         0         0         0         0         0
avg blocks     0         0         0         0         0         0
IO pct.       0.00%    0.00%    0.00%    0.00%    0.00%    0.00%

      IOs      stripes      /IO      clusters      /IO
      reads     0         0         0.00         0         0.00
      writes     0         0         0.00         0         0.00

Repair attempts 0  Successes 0  Failed Reads 0  Failed Writes 0
RPA requests 0  width 0  avg. 0.00  depth 0  avg. 0.00

Prefetch Statistics:
  Requests Cache_Hits Cache_Miss MissExpHit HitExpMiss
           0         0         0         0         0

Prefetches  Blocks Avg_Blocks      -      -
           0         0         0         0         0

Streams  Active Deleted DelMisMtch Potential
         0         0         0         0         0

Volumes 1 is the only volume in Volume Group 2
    
```

3.2.2.10 cfgShow

Detailed view of piece information on a per drive basis.

```

-> cfgShow
  phydev  dev  pieces  state
0359bfac 0000000e 1  OPTIMAL Log Region 71128864 (1025)
  71128864 (1025)
      vpiece  unit  piece  offset  length  state
035870c4 4 2 0 35480704 IN-SERVICE
0359d5e0 0000000d 2  OPTIMAL Log Region 71128864 (1025)
  71128864 (1025)
      vpiece  unit  piece  offset  length  state
03587a3c 3 3 0 102400 IN-SERVICE
035aea08 5 3 102400 69981696 IN-SERVICE
0359ec14 0000000c 1  OPTIMAL Log Region 71128864 (1025)
  71128864 (1025)
      vpiece  unit  piece  offset  length  state
03587074 4 0 0 35480704 IN-SERVICE
035a0248 0000000b 2  OPTIMAL Log Region 71128864 (1025)
  71128864 (1025)
      vpiece  unit  piece  offset  length  state
03587a14 3 2 0 102400 IN-SERVICE
035ae9e0 5 2 102400 69981696 IN-SERVICE
035a187c 0000000a 2  OPTIMAL Log Region 71128864 (1025)
  71128864 (1025)
      vpiece  unit  piece  offset  length  state
035879c4 3 0 0 102400 IN-SERVICE
035ae990 5 0 102400 69981696 IN-SERVICE
    
```

3.2.2.11 cfgSundTab

This command determines the Sundry drives currently in use.

```

-> cfgSundTab
sundryDrive = 0000000f
sundryDrive = 0010000a
sundryDrive = 00100005
sundryDrive = 00100001
sundryDrive = 00200004
sundryDrive = 00200002
    
```

3.2.2.12 **cfgDd <ch,id>**

This command displays the dacstore directory contents.

```

-> cfgDd 0,15
dacstore_sign      = 44414353544f52454449524543544f5259424c4b
dacstore major rev = 3
dacstore minor rev = 0
brd_serialnum     = 31543530373539303735000000000000
abrd_serialnum    = 31543530373539323931000000000000
d_state           = 0002
d_status          = 0000
d_flags           = 00204200
dacstore_name     = 0000000f
dacstore_serialnum = 43664b53
d_timestamp       = 43664b5d
drive group seq. # = 0
drive group ID    = 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
d_capacity        = 143374738      0x088bb992
d_data_start      = 0
d_data_end        = 143292817      0x088a7991
dacstore_start    = 143292818      0x088a7992
dacstore_end      = 143374737      0x088bb991
regionIndexOffset = 339
regionIndexLength = 3
    
```

3.2.3 Drive/VOLUME Modify Commands

The **isp** means Independent Shell Process. It functions the same as using an ampersand (&) to run a program in the background in various Unix operating systems.

*** Note: The notation *devnum* is specified as 0xC0000I, where C is the 0-logical channel number, and I is the logical SCSI ID number.

*** Note: The commands listed below must be run from the owning controller.

3.2.3.01 **isp cfgPrepareDrive,0x<phydev>**

Spins the drive up but does not make the drive operational. Used for reading the DacStore of a drive.

*** Note: phyDev addresses must be used for this operation.

3.2.3.02 **isp cfgFailDrive,0x<devnum>**

This commands fails the drive specified by *devnum*.

3.2.3.03 **isp cfgReplaceDrive,0x<devnum>**

This command replaces the drive specified by *devnum*.

3.2.3.04 **isp cfgSetDevOper,0x<devnum>**

This command sets the drive status for drive specified by *devnum* to optimal with no reconstruct.

3.2.3.05 **isp cfgDelVdisk,<volume>**

***Caution: This command will delete the volume.

3.2.3.06 **isp cfgRefreshVdisk,<volume>,<devnum of optimal drive>,0**

This command will update the volume information on the alternate controller to match the current controller without a reboot.

3.2.3.05 **incrementCfgGenerationNumber**

This command will force an update of the“ObjectGraph” and the storage management client.

3.2.4 Controller/RDAC Status Commands

3.2.4.01 arrayPrint

This command can be used to determine detailed information of the operating dual controller mode.

arrayPrint Example on a Single Controller system

myValidState=1	0 = both controllers' state invalid 1 = both controllers' state valid
myDardacSwSupport=1	0 = no DARDAC support 1 = DARDAC support available
myRdacEnabled=1	0 = DARDAC feature disabled 1 = DARDAC feature enabled
myMode=0	0 = Active-Passive 1 = Dual-Active
myRdsUpdated=1	0 = RDACStore not yet updated 1 = RDACStore updated
myAltCtlReleaseWaitTime = 0x1e	Alternate Controller release wait time (in seconds)
myAltCtlReleaseWaitState = 0	Alternate Controller release wait state (True/False)
myAltCtlReleaseWaitDone = 3c99598	Semaphore Id for the job to notify Alternate Controller about release done

** Primary Controller **	
<i>This controller (Me)</i>	
myValidState=1	0 = State is invalid 1 = State is valid
myInitDone=1	0 = RDAC Manager not yet initialized 1 = RDAC Manager initialized
myRdsUpdated=1	0 = RDACStore not yet updated 1 = RDACStore updated
myMode=1	0 = Passive 1 = Active
myQuiesceState=0	0 = Normal 1 = Quiescence in progress 2 = Quiescent achieved
myForeignState=1	0 = Don't know 1 = Native controller 2 = Foreign Controller
myHighDriveSideScsiId=1	0 = Alternate is at higher drive-side SCSI ID 1 = I am at higher drive-side SCSI ID
myDriveSideScsiId=7	My drive-side SCSI ID
myHostScsiId=5	My host-side SCSI ID
mySwVersion=3 1 3	
myBoardSerialNumber=54 4e 23 30 30 30 31 54 34 32 37 31 30 30 34 33	TN#0001T42710043
myRdsBoardSerialNumber=54 4e 23 30 30 30 31 54 34 32 37 31 30 30 34 33	TN#0001T42710043
myNumberLuns=3	Number of VOLUMES I own
myLuns=11100000000000000000000000000000	Bit map of owned VOLUMES 0 = VOLUME not owned by me 1 = VOLUME owned by me
Qstate=00000000000000000000000000000000	Bit map of quiesced VOLUMES 0 = VOLUME Normal 1 = VOLUME is being quiesced 2 = VOLUME is quiescent
QCount=00000000000000000000000000000000	Bit map of suspended I/O count of all VOLUMES
*** Alternate Controller ***	
<i>My view of the alternate controller. Note that I still have a view of the alternate, even if it's not there</i>	
myValidState=1	
myInitDone=0	
myRdsUpdated=1	

myMode=0	
MyQuiesceState=0	
myUploadNeeded=0	S/W upload needed condition (True/False)
myForeignState=0	
myHighDriveSideScsiId=0	
myDriveSideScsiId=0	
myHostScsiId=0	
mySwVersion=0 0 0	
myBoardSerialNumber=0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	All 0s, because the alternate controller is not present
myRdsBoardSerialNumber=0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
myNumberLuns=0	
myLuns=000000000000000000000000000000000000	
Qstate=000000000000000000000000000000000000	
QCount=000000000000000000000000000000000000	
myAbsentState=1	0 = Alternate is present 1 = Alternate is absent
myFailedState=1	0 = Alternate is not failed 1 = Alternate is failed

3.2.4.02 arrayPrintSummary

This command prints a summary of array controller states and VOLUME ownership. It can be used to determine summary information about the dual controller mode of operation. Ensure that “controllers synchronized” is indicated. If not, the controllers won’t talk to one another. For Fibre Channel controllers see “fc 12”.

*** Note: To determine if logged into the A or B controller, look at the second line of the output. Locate “drive=”.

```

Drive Controller
7 A
6 B
    
```

arrayPrintSummary Example on a Single Controller System

```

-> arrayPrintSummary
04/26/05-02:16:04 (GMT) (tShell): NOTE: RDAC Mode is Active-Passive. Controllers
synchronized.
04/26/05-02:16:04 (GMT) (tShell): NOTE: Controller Mode Active. SCSI IDs (host 60, drive
6).
04/26/05-02:16:04 (GMT) (tShell): NOTE: 2 Volume Owned = {0,1}
04/26/05-02:16:04 (GMT) (tShell): NOTE: Alt. Ctrl. Mode Active (Absent/Not Failed). SCSI
IDs (host ff, drive ff).
04/26/05-02:16:04 (GMT) (tShell): NOTE: No Volume Owned
    
```

arrayPrintSummary Example on Dual-Active Controller System

```

-> arrayPrintSummary
04/26/05-02:16:04 (GMT) (tShell): NOTE: RDAC Mode is Dual-Active. Controllers
synchronized.
04/26/05-02:16:04 (GMT) (tShell): NOTE: Controller Mode Active. SCSI IDs (host 60, drive
6).
04/26/05-02:16:04 (GMT) (tShell): NOTE: 1 Volume Owned = {1}
04/26/05-02:16:04 (GMT) (tShell): NOTE: Alt. Ctrl. Mode Active (Present/Not Failed). SCSI
IDs (host 60, drive 7).
04/26/05-02:16:04 (GMT) (tShell): NOTE: 1 Volume Owned = {0}
    
```

arrayPrintSummary on Active/Passive Dual Controller System

```

-> arrayPrintSummary
04/26/05-02:16:04 (GMT) (tShell): NOTE: RDAC Mode is Active-Passive. Controllers
synchronized.
04/26/05-02:16:04 (GMT) (tShell): NOTE: Controller Mode Active. SCSI IDs (host 5, drive
6).
04/26/05-02:16:04 (GMT) (tShell): NOTE: 2 Volume Owned = {0,1}
04/26/05-02:16:04 (GMT) (tShell): NOTE: Alt. Ctrl. Mode Active (Present/Not Failed). SCSI
IDs (host4, drive 6).
04/26/05-02:16:04 (GMT) (tShell): NOTE: No Volume Owned
    
```

3.2.5 Controller/RDAC Modify Commands

3.2.5.01 `isp rdacMgrSetModeActivePassive`

This command sets the controller (that you are talking to) to active mode and the alternate controller mode to passive.

WARNING*** This command does not modify the controller cache setup, only the controller states. This may be accomplished by issuing the following command:

`isp ccmEventNotify,0x0f`

3.2.5.02 `isp rdacMgrSetModeDualActive`

This command sets both array controller modes to dual active.

WARNING*** This command does not modify the controller cache setup, only the controller states. This may be accomplished by issuing the following command:

`isp ccmEventNotify,0x0f`

3.2.5.03 `isp rdacMgrAltCtlFail`

Will fail the alternate controller and takes ownership of it's volumes.

NOTE: In order to fail a controller, it may be necessary to set the controller to a passive state first.

3.2.5.04 `isp rdacMgrAltCtlResetRelease`

Will release the alternate controller if it is being held in reset or failed.

3.2.5.05 `acsAutoCodeSync`

When a new (foreign) controller is inserted into a storage array, this command is automatically executed. This command will update the code level of the firmware, either up or down on revision level, to match the code level of the surviving controller. It is also possible to manually run this command from the controller that is to be updated.

3.2.5.06 `isp rdacMgrAltCtlReset`

This command will reboot the alternate controller.

3.2.6 Other Useful Shell Commands and Procedures

3.2.6.01 `cacheAnalyze`

Displays information about cache structures.

```
-> cacheAnalyze
Copy Jobs - 128 Free 128 High 0
*** CACHE MEMORY ANALYSIS ***

Raw Memory Pool at 0x80000210
Total Size 266240 (0x41000)
Total Free 70968 (0x11538)
1 nodes
Free List Head 0x80000210 Tail 0x80000210
node next prev addr size
0x80000210 0x00000000 0x00000000 0x80000210 0x00011538

Cache Memory Pool at 0x80008100
Total Size 16248832 (0xf7f000)
Total Free 16244736 (0xf7e000)
Dirty Limit 12050432 (0xb7e000)
Dirty High 0 (0x0)
Dirty Current 0 (0x0)
1 nodes
Free List Head 0x80008100 Tail 0x80008100
node next prev addr size
0x80008100 0x00000000 0x00000000 0x80008100 0x00f7e000
```

```

CCB Pool:
  Addr: 0x3bda4f8      Count: 8063
CCB Free List:
  Addr: 0x3bda54c      Count: 8062

Cache LRU:
  Head: 0x0           Tail: 0x0           Count: 0

Lun 0 Data Hash Table
  Hash Indices: 3989   Hash Entries: 0
  No Hash Table Entries
Lun 0 Parity Hash Table
  Hash Indices: 499   Hash Entries: 0
  No Hash Entries

*** VIRTUAL DISK 0 ***

Sector Size 512, Sectors/Cache Block 8, Cache Block Size 4096, Clean Min. 0
Dirty Cache Blocks: 0x000000      Dirty Cache High: 0x000000
Dirty Cache Threshold: 0xffffffff  Mirrored Cache Blocks: 0x000000
READ CACHE ENABLED , WRITE CACHE DISABLED, WRITE CACHE MIRROR DISABLED
    
```

3.2.6.02 ccmStateAnalyze

Summary controller information. This command can also be used to determine the state of the cache. *(single controller)*

```

-> ccmStateAnalyze 99

Controller: B      Array Mode: A/A
Controller Mode: Active      Alternate Controller Absent.
Controller Flags:

Battery Status: OK
Alternate Battery Status: UNKNOWN

CHECK-IN STATUS:
Mirror Device Closed

VOL 0:  Flags: 0x0472 RCA WCE WCA CWOB
VOL 1:  Flags: 0x0472 RCA WCE WCA CWOB
VOL 2:  Flags: 0x0472 RCA WCE WCA CWOB
VOL 3:  Flags: 0x0472 RCA WCE WCA CWOB

No Volumes Mirroring.

NO EVENT FLAGS ARE SET

Cache Store:  Mirroring Off
               Mirror Device Closed

Cache Block Size:  8

Controller A:
  Cache Reclaim State:  0
  Raw Pool Size:  0x00000000
  Cache Size :  0x00000000
  Not Partitioned for Mirroring.
  Memory:  Start = 0x00000000  Size = 0x00000000
  RCB :  Start = 0x00000000  Count = 0x00000000

Controller B:
  Cache Reclaim State:  0
  Raw Pool Size:  0x00800000
  Cache Size :  0x05800000
  Not Partitioned for Mirroring.
  Memory:  Start = 0xa319d000  Size = 0x04e63000
  RCB :  Start = 0xa3100210  Count = 0x00004e63

Page 2E mirror size:  0x007f  Current mirror size:  0x0000
Demand Flush Threshold:  0xcc  Demand Flush Amount :  0xff
    
```

(Dual controllers)

```

-> ccmStateAnalyze 99

Controller: B Array Mode: A/A
Controller Mode: Active          Alternate Controller Mode: Active
Controller Flags: ACMA

Battery Status: OK
Alternate Battery Status: OK

CHECK-IN STATUS: Local Checked In  Alternate Checked In
Mirror Device Open

VOL 0:  Flags: 0x0426 RCA WCE CME
        WRITE CACHE HAS BEEN INTERNALLY DISABLED
        CACHE MIRRORING HAS BEEN INTERNALLY DISABLED

VOL 1:  Flags: 0x0426 RCA WCE CME
        WRITE CACHE HAS BEEN INTERNALLY DISABLED
        CACHE MIRRORING HAS BEEN INTERNALLY DISABLED

VOL 2:  Flags: 0x0426 RCA WCE CME
        WRITE CACHE HAS BEEN INTERNALLY DISABLED
        CACHE MIRRORING HAS BEEN INTERNALLY DISABLED

VOL 3:  Flags: 0x0426 RCA WCE CME
        WRITE CACHE HAS BEEN INTERNALLY DISABLED
        CACHE MIRRORING HAS BEEN INTERNALLY DISABLED

# Volumes Mirroring: 4

NO EVENT FLAGS ARE SET

Cache Store:  Mirroring On
              Mirror Device Open

Cache Block Size: 8

Controller A:
  Cache Reclaim State: 0
  Raw Pool Size: 0x00800000
  Cache Size : 0x05800000
  Partitioned for Mirroring.
  Memory: Start = 0xa319d000 Size = 0x02263000
  RCB : Start = 0xa3100210 Count = 0x00002263

Controller B:
  Cache Reclaim State: 0
  Raw Pool Size: 0x00800000
  Cache Size : 0x05800000
  Partitioned for Mirroring.
  Memory: Start = 0xa5458000 Size = 0x02ba8000
  RCB : Start = 0xa5400000 Count = 0x00002c00

Page 2E mirror size: 0x007f Current mirror size: 0x007f
Demand Flush Threshold: 0xcc Demand Flush Amount : 0xff
    
```

Controller Flags

VOLUME Flags

BPR	Battery Present	RCA	Read Cache Active
BOK	Battery OK	FWT	Forced Write Through
ABPR	Alt. Battery Present	CWOB	Cache With out Battery
ABOK	Alt. Battery OK	WCE	Write Cache Enabled
		WCA	Write Cache Active
		CME	Cache Mirroring Enabled
		CMA	Cache Mirroring Active
		ACMA	Alt. Cache Mirroring Active

3.2.6.03 memShow & memoryShow

These commands displays the available and used memory. Both provide the same basic information. The key items to watch are the free bytes and blocks.

```

-> memShow      (Bridge controllers)
  status  bytes   blocks  avg block  max block
-----
current
  free  42847128      293    146235  28005696
  alloc 87995476    27510     3198      -
cumulative
  alloc 228953272  235522804      0      -

-> memoryShow

Free blocks:           270
Allocated blocks:      19730
Total blocks:          20000
Empty free blocks:     0
Empty allocated blocks: 1
End blocks:            1
Total free size:       42803480 (0x28d2118)
Total allocated size:  67704860 (0x409181c)
Overhead:              160000 (0x27100)

-> memShow      (SHV & RC controllers)
  status  bytes   blocks  avg block  max block
-----
current
  free  413337900      290    1425303  373852044
  alloc 117165052    36645     3197      -
cumulative
  alloc 3975214864  31645260      125      -

-> memoryShow

System Memory Statistics
-----
Pool Structure          0x608310
Pool Base               0x1ffd8f0
Pool Size               0x1e002710
Total blocks            36926
Free size               398744576
Allocated size          104581904
Overhead                295408
Free block counts:
  blksize 1 to 31      191
  blksize 32 to 127    33
  blksize 128 to 1023  31
  blksize>=1024       30
  total blocks         285
Alloc block counts:
  blksize 1 to 31      340
  blksize 32 to 127    32173
  blksize 128 to 1023  3687
  blksize>=1024       441
total blocks           36641
adjacent blocks        36355
  
```

3.2.6.04 moduleList

This command will display the versions of the loaded software modules. For Fibre Channel controllers see “fc 12”. (4.x versions)

```

-> moduleList
BootWare Package - Version 04.01.02.00 (Built 05/11/01 17:07:43)
RAID Controller Build Package - Version 04.01.02.07 (Built 06/01/01 11:32:21)

##  SNAME                COMPONENT NAME                VERSION      DATE        TIME
==  =====
1   .BW                    BootWare                      04.01.02.00 05/11/01    17:07:43
2   HDD                    Serial Destination Driver      04.01.02.07 06/01/01    11:34:16
3   IOP                    I/O Path                      04.01.02.07 06/01/01    11:45:01
4   DST                    Destination Driver             04.01.02.07 06/01/01    11:42:19
5   SRC                    Source Driver                  04.01.02.07 06/01/01    11:53:50
6   KWRP                   Kernel Wrapper                 04.01.02.07 06/01/01    11:59:13
7   VUS                    Virtual User Services          04.01.02.07 06/01/01    11:59:26
8   UTM                    Universal Transport Mechanism  04.01.02.07 06/01/01    11:58:42
9   SMBOL                  SYMBol Server                  04.01.02.07 06/01/01    11:57:42
  
```


10	SSM	Subsystem Monitor	04.01.02.07	06/01/01	11:55:07
11	SOD	Start of Day	04.01.02.07	06/01/01	11:51:44
12	SAFE	Storage Array Feature Enabling	04.01.02.07	06/01/01	11:50:45
13	RDM	RDAC Manager	04.01.02.07	06/01/01	11:49:19
14	PSV	Platform Service	04.01.02.07	06/01/01	11:47:10
15	MHM	Mini Hub Manager	04.01.02.07	06/01/01	11:46:03
16	Mel	Major Event Logger	04.01.02.07	06/01/01	11:45:35
17	EEL	Error/Event Logger	04.01.02.07	06/01/01	11:42:56
18	CMD	Command Handlers	04.01.02.07	06/01/01	11:41:34
19	CFG	Configuration Manager	04.01.02.07	06/01/01	11:37:51
20	NCM	Network Configuration Manager	04.01.02.07	06/01/01	12:07:58
21	FCL	Fibre Channel Lite	04.01.02.07	06/01/01	11:59:45
22	.AP	RAID Controller Build	04.01.02.07	06/01/01	11:32:21
23	CACH	I/O Caching	04.01.02.07	06/01/01	11:36:04
24	RTR	Router	04.01.02.07	06/01/01	11:50:12
25	RPA	Raid Parity Assist	04.01.02.07	06/01/01	11:49:53
26	SPM	Storage Pools Manager	04.01.02.07	06/01/01	11:52:39
27	CSP	Controller State Print	04.01.02.07	06/01/01	11:58:04
28	HSM	Hot Swap Monitor	04.01.02.07	06/01/01	11:43:10

(5.x version)

```

-> moduleList (Bridge controllers, i.e. 4774, 4884 & 5884)

BootWare Package - Version 05.30.01.00 (Built 09/05/03 09:55:19)
RAID Controller Build Package - Version 05.30.12.00 (Built 05/06/03 12:58:58)

## SNAME COMPONENT NAME VERSION DATE TIME
== =====
 1 .BW BootWare 05.30.01.00 09/05/03 09:55:19
 2 .AP RAID Controller Build 05.30.12.00 05/06/03 12:58:58

-> moduleList (SHV controllers, i.e. 2772, 288x & 282x)
=====
Title: Disk Array Controller for SHV XScale platform
       Copyright 2002-2003, LSI Logic Storage Systems, Inc.

Name: shv
Version: 05.40.03.00
Date: 08/05/2003
Time: 14:36:51
Models: 2882 2880
Manager: devmgr.v0840api09.Manager
    
```

(6.x version)

```

-> moduleList (Bridge controllers, i.e. 4774, 4884 & 5884)
PackageName="FW"
PackageVersion="06.10.05.00"
PackageDate="08/10/04"
PackageTime="12:11:39"

-> moduleList (SHV controllers, i.e. 2772, 288x & 282x)
=====
Title: Disk Array Controller for SHV XScale platform
       Copyright 2001-2004, Engenio Information Technologies, Inc.

Name: shv
Version: 06.10.11.00
Date: 11/08/2004
Time: 09:42:16
Models: 2880 2882
Manager: devmgr.v0910api01.Manager
=====

-> moduleList (RC controllers, i.e. 6091, 399x, 133x, 153x & 193x)
=====
Title: Disk Array Controller
       Copyright 2004-2005, Engenio Information Technologies, Inc.

Name: RC
Version: 06.14.15.00
Date: 04/06/2005
Time: 10:23:41
Models: 6091
Manager: devmgr.v0914api00.Manager
=====
    
```

3.2.6.05 moduleShow

This command will display the loaded software modules.

```
-> moduleShow (Bridge controllers)
-----
MODULE NAME      MODULE ID  GROUP #  TEXT START  DATA START  BSS START
-----
      FFApp1  0x7803518      2  0x7155378  0x7550278  0x772de60
      FcLite  0x7f58954      3  0x7e9e9cc  0x7edd23c  0x7ee5fcc
      Debug  0x7f51af8      4  0x3249ed0  0x32b9bc8  0x32ba890

-> moduleShow (SHV controllers)
-----
MODULE NAME      MODULE ID  GROUP #  TEXT START  DATA START  BSS START
-----
      PSVKI  0x454df56c      1  0x40fb6a58 0x40feeb80 0x40ff24a8
      RAID  0x454db11c      2  0x4077da20 0x40dd9fc8 0x40dfccb0
      Debug  0x444fe5c0      3  0x401ff9a8 0x40280c0c 0x40281790

-> moduleShow (RC controllers)
-----
MODULE NAME      MODULE ID  GROUP #  TEXT START  DATA START  BSS START
-----
      RAID  0x1ff38bbc      1  0x1c8c5120 0x1d16b400 0x1dac0f40
      Debug  0x18706998      2  0x185819a0 0x186181e0 0x18619100
```

3.2.6.06 spmShow

This command will display the volume to LUN mappings.

(06.10 to 06.15)

```
-> spmShow
SPM controllerRef=07000000000000000000000000000000
SAP SAPORT_REF  CONTROLLER_REF  PORT SAPRTGRP_REF (0x2000000)
SAP 800301000000 07000000000000000000000000000000 0 000000000000
SAP 800301000011 07000000000000000000000000000000 0 000000000000

SG SAPRTGRP_REF LABEL (0xa0ac1f6c)

Host Ports
HOSTPORT_REF TYPE NAME LABEL HOST_REF (0xa0ac24c4)
820306000000 8 0x210000E08B01573A tslab271 840303000001840303000001
HostControlled
820107000002 8 0x000000A0B80B1082 Runtime Diagnostics B 840101000000840101000000
HostControlled
820302000003 8 0x210000E08B00C9BA tslab272 840303000001840303000001
HostControlled
820302000004 8 0x210000E08B018D61 tslab281 840303000002840303000002
HostControlled
820302000005 8 0x210000E08B040734 tslab282 840303000002840303000002
HostControlled
820102000006 8 0x000000A0B80B1186 Runtime Diagnostics A 840101000000840101000000
HostControlled

Unlabeled Host Ports
HOSTPORT_REF TYPE NAME LABEL HOST_REF (0xa0ac5c74)
830101000000 CT 0x20FD006069202473 000000000000000000000000

Hosts
HOST_REF LABEL CLUSTER_REF (0xa0accbd4)
840101000000 Runtime Diagnostics 00000000000000000000000000000000 HostControlled
840303000001 tslab27 850303000000850303000000 HostControlled
840303000002 tslab28 850303000000850303000000 HostControlled

Clusters
CLUSTER_REF LABEL (0xa0acfd54)
850303000000 tslab-cluster HostControlled

HSC
HSACONN_REF SHID HOSTPORT_REF SAPORT ONLINE (0xa0ae4538)
860301000000 0 8201070000002820107000002 0 0
860301000001 3 8301010000000830101000000 0 0
860301000002 4 8203060000000820306000000 0 1
860301000003 5 820302000005820302000005 0 1

LUM
LUNMAPG_REF LUN SSID VOLUME_REF/(GV - WWN) PERMS MAP_REF MAP_REF_DESCRIPTION
(0xa0ad1350)
880301000000 0 0 02000000000000154090E376 0xf 850303000000850303000000 Cluster =tslab-cluster
880101000001 0 512 000000000000000000000000000000 0xf 840101000000840101000000 Host =Runtime
Diagnostics
880305000002 0 1 020000000000001B4090E56B 0xf 850303000000850303000000 Host =tslab27
```

880305000003	0	2	02000000000000164090E3B0	0xf	850303000000850303000000	Host =tslab28
880304000004	1	3	020000000000001D4090E59B	0xf	850303000000850303000000	Cluster =tslab-cluster
880304000005	-1	4	02000000000000174090E3DC	0xf	850303000000850303000000	None
880302000007	31	128	020000000000000000000000	0xf	000000000000000000000000	ALL
880301000008	31	128	020000000000000000000000	0xf	850303000000850303000000	Cluster =tslab-cluster

(06.16 and up)

```

-> spmShow
----- Database -----
rectype #records rectxsize KBytes
ITN      NA          0      NA          0
LT       x33          3      104         0
RT       x31          0      100         0
TP       x2f          16     100         1
LI       x32          0      100         0
RI       x30          1      108         0
IP       x2e          2      104         0
ITA      x34          1      72          0
SP       x36          4      108         0
LU       x35          8      48          0
----- Memory -----
#objects Bytes
I-T-Nexus (PORT)      10      440
Local Target DEVICE   3       384
Remote Target DEVICE  0         0
Target PORT           16     2112
Local Initiator DEVICE 0         0
Remote Initiator DEVICE 4       512
Initiator PORT        11     1496
I-T-Association (DEVICE) 4       240
Storage Partition     5       660
Logical Unit          9       468

---Local Target DEVICE Objects (LT)---
Label Security Type-Name Volatile refCnt POSC
-----
FC_Target_Am      no_security 8B-200000a0b8113bb4 persist 5 !posc
FC_Target_A&Bh   no_security 8B-200600a0b8113bb4 persist 10 !posc
FC_Target_Bm     no_security 8B-200000a0b8114418 persist 5 !posc

---Target PORT Objects (TP)---
Label OID Role STP SCSIPortName Device Label Volatile RefCnt POSC
-----
FC_TargetPort_Am_ch0 x0000 Am FCP 200100a0b8113bb4 FC_Target_Am persist 1 !posc
FC_TargetPort_Am_ch1 x0001 Am FCP 200200a0b8113bb4 FC_Target_Am persist 1 !posc
FC_TargetPort_Am_ch2 x0002 Am FCP 200300a0b8113bb4 FC_Target_Am persist 1 !posc
FC_TargetPort_Am_ch3 x0003 Am FCP 200400a0b8113bb4 FC_Target_Am persist 1 !posc
FC_TargetPort_Ah_ch4 x0004 Ah FCP 201600a0b8113bb4 FC_Target_A&Bh persist 1 !posc
FC_TargetPort_Ah_ch5 x0005 Ah FCP 202600a0b8113bb4 FC_Target_A&Bh persist 1 !posc
FC_TargetPort_Ah_ch6 x0006 Ah FCP 203600a0b8113bb4 FC_Target_A&Bh persist 1 !posc
FC_TargetPort_Ah_ch7 x0007 Ah FCP 204600a0b8113bb4 FC_Target_A&Bh persist 1 !posc
FC_TargetPort_Bm_ch0 x8000 Bm FCP 200100a0b8114418 FC_Target_Bm persist 1 !posc
FC_TargetPort_Bm_ch1 x8001 Bm FCP 200200a0b8114418 FC_Target_Bm persist 1 !posc
FC_TargetPort_Bm_ch2 x8002 Bm FCP 200300a0b8114418 FC_Target_Bm persist 1 !posc
FC_TargetPort_Bm_ch3 x8003 Bm FCP 200400a0b8114418 FC_Target_Bm persist 1 !posc
FC_TargetPort_Bh_ch4 x8004 Bh FCP 201700a0b8113bb4 FC_Target_A&Bh persist 1 !posc
FC_TargetPort_Bh_ch5 x8005 Bh FCP 202700a0b8113bb4 FC_Target_A&Bh persist 1 !posc
FC_TargetPort_Bh_ch6 x8006 Bh FCP 203700a0b8113bb4 FC_Target_A&Bh persist 1 !posc
FC_TargetPort_Bh_ch7 x8007 Bh FCP 204700a0b8113bb4 FC_Target_A&Bh persist 1 !posc

---Remote Initiator DEVICE Objects (RI)---
Label OSIndex Type-Name Volatile refCnt POSC
-----
Initiator_Am      0000016 8B-200000a0b8113bb4 volatile 0 !posc
Initiator_Bm      0000016 8B-200000a0b8114418 volatile 0 !posc
Initiator_Ah      0000016 8B-200600a0b8113bb4 volatile 0 !posc
tslab71           0000001 tslab71 persist 4 posc

---Initiator PORT Objects (IP)---
Label OID Role STP SCSIPortName Device Volatile RefCnt POSC
-----
InitiatorPort_Am_ch2 x0000 Am FCP 200300a0b8113bb4 Initiator_Am volatile 0 !posc
InitiatorPort_Am_ch3 x0001 Am FCP 200400a0b8113bb4 Initiator_Am volatile 0 !posc
InitiatorPort_Bm_ch2 x0002 Bm FCP 200300a0b8114418 Initiator_Bm volatile 0 !posc
InitiatorPort_Bm_ch3 x0003 Bm FCP 200400a0b8114418 Initiator_Bm volatile 0 !posc
InitiatorPort_Am_ch0 x0004 Am FCP 200100a0b8113bb4 Initiator_Am volatile 0 !posc
InitiatorPort_Am_ch1 x0005 Am FCP 200200a0b8113bb4 Initiator_Am volatile 0 !posc
InitiatorPort_Bm_ch1 x0006 Bm FCP 200200a0b8114418 Initiator_Bm volatile 0 !posc
InitiatorPort_Bm_ch0 x0007 Bm FCP 200100a0b8114418 Initiator_Bm volatile 0 !posc
InitiatorPort_Ah_ch7 x0008 Ah FCP 204600a0b8113bb4 Initiator_Ah volatile 0 !posc
tslab71-2         x0009 Host FCP 210000e08b80a60e tslab71 persist 0 posc
tslab71-1         x000a Host FCP 210000e08b80bd0e tslab71 persist 0 posc

---I-T-Nexus (PORT) Objects (ITN)---
ITNID InitiatorPort TargetPort Online
-----
x0001 InitiatorPort_Am_ch2 FC_TargetPort_Am_ch2 on
x0002 InitiatorPort_Am_ch3 FC_TargetPort_Am_ch3 on
x0003 InitiatorPort_Bm_ch2 FC_TargetPort_Am_ch2 on
x0004 InitiatorPort_Bm_ch3 FC_TargetPort_Am_ch3 on
x0005 InitiatorPort_Am_ch0 FC_TargetPort_Am_ch0 on
x0006 InitiatorPort_Am_ch1 FC_TargetPort_Am_ch1 on
x0007 InitiatorPort_Bm_ch1 FC_TargetPort_Am_ch1 on
x0008 InitiatorPort_Bm_ch0 FC_TargetPort_Am_ch0 on
x0009 InitiatorPort_Ah_ch7 FC_TargetPort_Ah_ch7 on
x000a tslab71-2 FC_TargetPort_Ah_ch7 on

---I-T-Association (DEVICE) Objects (ITA)---
InitiatorLabel TargetLabel SPLabel Auth Volatile refCnt POSC
-----
Initiator_Am      FC_Target_Am      Null      SKIP_AUTH volatile 0 !posc
Initiator_Bm      FC_Target_Am      Null      SKIP_AUTH volatile 0 !posc
Initiator_Ah      FC_Target_A&Bh    Initiator_Ah SKIP_AUTH volatile 0 !posc
tslab71          FC_Target_A&Bh    tslab71   SKIP_AUTH persist 0 posc

---Storage Partition Objects (SP)---
MapSet Label Sys Volatile level LUCCount totalLU parent RefCnt POSC
-----
000000 Null sys persist 3 0 0 none 1 !posc
000001 Default sys persist 3 1 1 none 2 !posc
000004 Windows usr persist 2 1 7 none 1 posc
000003 tslab71 usr persist 1 6 6 Windows 7 posc
000002 Initiator_Ah sys volatile 0 1 1 none 0 !posc

```

```

---Logical Unit Objects (LU)---
OID   LUN  SSID      Partition          Volatile RefCnt  TAS  POSC  WVN
-----
x0001 000 x00000800 Initiator_Ah      volatile  0  0  posc
x0002 000 x00000000 tslab71           persist   0  1  posc
x0004 001 x00000001 tslab71           persist   0  1  posc
x0005 002 x00000002 tslab71           persist   0  1  posc
x0006 003 x00000003 tslab71           persist   0  1  posc
x0007 004 x00000005 tslab71           persist   0  1  posc
x0008 005 x00000006 tslab71           persist   0  1  posc
x0003 031 x00000080 Windows           persist   0  1  posc
x0000 007 x00000080 Default          persist   0  0  posc
    
```

3.2.6.07 spmShowMaps

This command will display the volume mappings.

(SAS system)

```

-> spmShowMaps
Host 001 500a0b82fbc3d000 (controller/Bm): online osIndex 16
mapSet 0 maxLuns 256
NO LUNS MAPPED
Host 002 500a0b82fbc3d000 (controller/Bm): online osIndex 16
mapSet 0 maxLuns 256
NO LUNS MAPPED
Host 003 200400a0b82fc0f7 (controller/Ah): online osIndex 16
mapSet 2 maxLuns 32

T=TAS enabled, D=Descriptor Sense Format
LUN-> 0
-----
0|    DIAG
Host 004 200000062b06b6cc (host/Host): online osIndex 1
mapSet 3 maxLuns 256

T=TAS enabled, D=Descriptor Sense Format
LUN-> 0      1      2      3      4      5      6      7
-----
0|    0      1      5      3      128
    
```

(non-SAS system)

```

-> spmShowMaps
Host 001 200000a0b80f1557 (controller/Bm): online osIndex 16
mapSet 0 maxLuns 256
NO LUNS MAPPED
Host 002 200000a0b80f1557 (controller/Bm): online osIndex 16
mapSet 0 maxLuns 256
NO LUNS MAPPED
Host 003 200000a0b80f15b1 (controller/Am): online osIndex 16
mapSet 0 maxLuns 256
NO LUNS MAPPED
Host 004 200000a0b80f15b1 (controller/Am): online osIndex 16
mapSet 0 maxLuns 256
NO LUNS MAPPED
Host 005 200000e08b011cec (host/Host): online osIndex 1
mapSet 6 maxLuns 256

T=TAS enabled
LUN-> 0      1      2      3      4      5      6      7      8      9
-----
0| T  2 T  5
10|
20|
30|    T 128
Host 006 200600a0b80f1557 (controller/Bh): online osIndex 16
mapSet 2 maxLuns 256

T=TAS enabled
LUN-> 0
-----
0|    DIAG
Host 007 200600a0b80f1557 (controller/Bh): online osIndex 16
mapSet 2 maxLuns 256

T=TAS enabled
LUN-> 0
-----
0|    DIAG
Host 008 200000062b06b65c (host/Host): offline osIndex 1
mapSet 3 maxLuns 256
    
```

T=TAS enabled										
LUN->	0	1	2	3	4	5	6	7	8	9
0	0	1								
10										
20										
30		128								

3.2.6.08 getObjectGraph_MT 8

From the shell, this will display the status of the power supplies, fans, thermal sensors, ESM, GBICs, etc. (Bridge and SV controllers)

```
-> getObjectGraph_MT 8
OBJECT GRAPH - 0xa13a1b30
cfgGeneration : 0x21c
COMPONENT - 0xa265c924
type/status : PowerSupply(0x3)/Optimal(0x1)
tray/slot : 0/0
componentRef: 0a 00 00 00 00 00 00 00 00 00 01 00

COMPONENT - 0xa265c9b4
type/status : PowerSupply(0x3)/Optimal(0x1)
tray/slot : 0/0
componentRef: 0a 00 00 00 00 00 00 00 00 00 02 00

COMPONENT - 0xa265ca44
type/status : Fan(0x1)/Optimal(0x1)
tray/slot : 0/0
componentRef: 08 00 00 00 00 00 00 00 00 00 01 00

COMPONENT - 0xa265cad4
type/status : Fan(0x1)/Optimal(0x1)
tray/slot : 0/0
componentRef: 08 00 00 00 00 00 00 00 00 00 02 00

COMPONENT - 0xa265cb64
type/status : ThermalSens(0x4)/Optimal(0x1)
tray/slot : 0/0
componentRef: 0b 00 00 00 00 00 00 00 00 00 01 00
COMPONENT - 0xa265cbf4
type/status : ESM(0x5)/Optimal(0x1)
tray/slot : 2/1
componentRef: 0c 00 00 00 00 00 00 00 00 00 01 02
ESM Specific Data:
nonRedundantAccess : 0
partNumber :
manufactureDate : 0xa13a1f70
manufacturer : LSILOGIC
fruType :
software version : 9163
product ID : SYM2200-FC
interface type : Fibre
Port Information:

COMPONENT - 0xa265cc84
type/status : ESM(0x5)/Optimal(0x1)
tray/slot : 2/2
componentRef: 0c 00 00 00 00 00 00 00 00 00 02 02
ESM Specific Data:
nonRedundantAccess : 0
partNumber :
manufactureDate : 0xa13a1f70
manufacturer : LSILOGIC
fruType :
software version : 9163
product ID : SYM2200-FC
interface type : Fibre
Port Information:

COMPONENT - 0xa265cd14
type/status : PowerSupply(0x3)/Optimal(0x1)
tray/slot : 2/0
componentRef: 0a 00 00 00 00 00 00 00 00 00 01 02
```

```

COMPONENT - 0xa265cda4
type/status : PowerSupply(0x3)/Optimal(0x1)
tray/slot   : 2/0
componentRef: 0a 00 00 00 00 00 00 00 00 00 02 02

COMPONENT - 0xa265ce34
type/status : Fan(0x1)/Optimal(0x1)
tray/slot   : 2/0
componentRef: 08 00 00 00 00 00 00 00 00 00 01 02

COMPONENT - 0xa265cec4
type/status : Fan(0x1)/Optimal(0x1)
tray/slot   : 2/0
componentRef: 08 00 00 00 00 00 00 00 00 00 02 02

COMPONENT - 0xa265cf54
type/status : ThermalSens(0x4)/Optimal(0x1)
tray/slot   : 2/0
componentRef: 0b 00 00 00 00 00 00 00 00 00 01 02

COMPONENT - 0xa265cfe4
type/status : ThermalSens(0x4)/Optimal(0x1)
tray/slot   : 2/0
componentRef: 0b 00 00 00 00 00 00 00 00 00 02 02

COMPONENT - 0xa265d074
type/status : GBIC(0x8)/Optimal(0x1)
tray/slot   : 2/0
componentRef: 10 01 00 00 00 00 00 00 00 00 01 02
GBIC Specific Data:
type/port   : 0x0/0x1
parent type : Component
componentRef: 0c 00 00 00 00 00 00 00 00 00 01 02

COMPONENT - 0xa265d104
type/status : GBIC(0x8)/Optimal(0x1)
tray/slot   : 2/0
componentRef: 10 00 00 00 00 00 00 00 00 00 02 02
GBIC Specific Data:
type/port   : 0x0/0x1

parent type : Component
componentRef: 0c 00 00 00 00 00 00 00 00 00 02 02

COMPONENT - 0xa265d194
type/status : GBIC(0x8)/Optimal(0x1)
tray/slot   : 2/0
componentRef: 10 00 00 00 00 00 00 00 00 00 03 02
GBIC Specific Data:
type/port   : 0x0/0x2
parent type : Component
componentRef: 0c 00 00 00 00 00 00 00 00 00 02 02

COMPONENT - 0xa265d224
type/status : Battery(0x2)/Optimal(0x1)
tray/slot   : 0/0
componentRef: 09 00 00 00 00 00 00 00 00 01 00 00
batteryAge  : 0x119
life left   : 0x1b6
controllerRef: 07 00 00 00 00 00 00 00 00 00 00 01

COMPONENT - 0xa265d2b4
type/status : GBIC(0x8)/Optimal(0x1)
tray/slot   : 0/0
componentRef: 10 01 00 00 00 00 00 00 00 00 01 00
GBIC Specific Data:
type/port   : 0x2/0x1
parent type : Controller
channel     : Host - 1
controllerRef: 07 00 00 00 00 00 00 00 00 00 00 01

COMPONENT - 0xa265d344
type/status : GBIC(0x8)/Optimal(0x1)
tray/slot   : 0/0
componentRef: 10 00 00 00 00 00 00 00 00 00 02 00
GBIC Specific Data:
type/port   : 0x2/0x1

```

```

parent type      : Controller
channel         : Drive - 1
controllerRef   : 07 00 00 00 00 00 00 00 00 00 00 01

COMPONENT - 0xa265d3d4
type/status    : GBIC(0x8)/Optimal(0x1)
tray/slot     : 0/0
componentRef   : 10 00 00 00 00 00 00 00 00 00 03 00
GBIC Specific Data:
type/port     : 0x2/0x1
parent type   : Controller
channel      : Drive - 2
controllerRef : 07 00 00 00 00 00 00 00 00 00 00 02

COMPONENT - 0xa265d464
type/status    : Battery(0x2)/Optimal(0x1)
tray/slot     : 0/0
componentRef   : 09 00 00 00 00 00 00 00 00 02 00 00
batteryAge    : 0x119
life left     : 0x1b6
controllerRef  : 07 00 00 00 00 00 00 00 00 00 00 02

COMPONENT - 0xa265d4f4
type/status    : GBIC(0x8)/Optimal(0x1)
tray/slot     : 0/0
componentRef   : 10 02 00 00 00 00 00 00 00 00 01 00
GBIC Specific Data:
type/port     : 0x2/0x1
parent type   : Controller
channel      : Host - 1
controllerRef  : 07 00 00 00 00 00 00 00 00 00 00 02
    
```

(RC controllers)

```

-> getObjectGraph MT 8
OBJECT GRAPH - 0x1ffb4590
cfgGeneration : 0xa0
FAN - 0x18c13b8c
status      : Optimal(0x1)
tray/slot   : 55/1
trayRef     : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
fanRef      : 08 00 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00

FAN - 0x18c13bcc
status      : Optimal(0x1)
tray/slot   : 55/2
trayRef     : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
fanRef      : 08 00 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00

FAN - 0x18c13c0c
status      : Optimal(0x1)
tray/slot   : 2/1
trayRef     : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
fanRef      : 08 00 10 00 00 a0 b8 08 e5 af 01 00 00 00 00 00 00 00 00

FAN - 0x18c13c4c
status      : Optimal(0x1)
tray/slot   : 2/2
trayRef     : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
fanRef      : 08 00 10 00 00 a0 b8 08 e5 af 02 00 00 00 00 00 00 00 00

FAN - 0x18c13c8c
status      : Optimal(0x1)
tray/slot   : 1/1
trayRef     : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00
fanRef      : 08 00 10 00 00 a0 b8 14 4d 36 01 00 00 00 00 00 00 00 00

FAN - 0x18c13ccc
status      : Optimal(0x1)
tray/slot   : 1/2
trayRef     : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00
fanRef      : 08 00 10 00 00 a0 b8 14 4d 36 02 00 00 00 00 00 00 00 00

BATTERY - 0x18c13a94
status      : Optimal(0x1)
tray/slot   : 55/1
trayRef     : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
    
```

```

batteryRef      : 09 00 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00
batteryAge      : 0x9115
life left       : 0xffffffff

BATTERY - 0x18c13b04
status          : Optimal(0x1)
tray/slot       : 55/2
trayRef         : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
batteryRef      : 09 00 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00
batteryAge      : 0x9115
life left       : 0xffffffff

POWER SUPPLY - 0x18c1373c
status          : Optimal(0x1)
tray/slot       : 55/1
trayRef         : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
powerSupplyRef  : 0a 00 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00
partNumber      : PN 13534-01
serialNumber    : SN YRT045300822
vendorName      : VN ENGENIO
manufactureDate: 0x41ad0980
fruType         : FT CSM_AC

POWER SUPPLY - 0x18c13794
status          : Optimal(0x1)
tray/slot       : 55/2
trayRef         : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
powerSupplyRef  : 0a 00 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00
partNumber      : PN 13534-01
serialNumber    : SN YRT045301166
vendorName      : VN ENGENIO
manufactureDate: 0x41ad0980
fruType         : FT CSM_AC

POWER SUPPLY - 0x18c137ec
status          : Optimal(0x1)
tray/slot       : 2/1
trayRef         : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00 00
powerSupplyRef  : 0a 00 10 00 00 a0 b8 08 e5 af 01 00 00 00 00 00 00 00 00
partNumber      : PN 348-0049091
serialNumber    : SN A6845R023G0F
vendorName      : VN LSILOGIC
manufactureDate: 0x3f528c00
fruType         : FT PWRSUPPLY

POWER SUPPLY - 0x18c13844
status          : Optimal(0x1)
tray/slot       : 2/2
trayRef         : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00 00
powerSupplyRef  : 0a 00 10 00 00 a0 b8 08 e5 af 02 00 00 00 00 00 00 00 00
partNumber      : PN 348-0049091
serialNumber    : SN A6845R02410F
vendorName      : VN LSILOGIC
manufactureDate: 0x3f528c00
fruType         : FT PWRSUPPLY

POWER SUPPLY - 0x18c1389c
status          : Optimal(0x1)
tray/slot       : 1/1
trayRef         : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00 00
powerSupplyRef  : 0a 00 10 00 00 a0 b8 14 4d 36 01 00 00 00 00 00 00 00 00
partNumber      : PN 348-0049091
serialNumber    : SN A6846W00LJ0F
vendorName      : VN LSILOGIC
manufactureDate: 0x4092e880
fruType         : FT PWRSUPPLY

POWER SUPPLY - 0x18c138f4
status          : Optimal(0x1)
tray/slot       : 1/2
trayRef         : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00 00
powerSupplyRef  : 0a 00 10 00 00 a0 b8 14 4d 36 02 00 00 00 00 00 00 00 00
partNumber      : PN 348-0049091
serialNumber    : SN A6846W00K00F
vendorName      : VN LSILOGIC
manufactureDate: 0x4092e880
fruType         : FT PWRSUPPLY
    
```



```

THERMAL SENSOR - 0x18bfc6d0
status          : Optimal(0x1)
tray/slot      : 55/1
trayRef        : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
thermalSensorRef: 0b 00 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00

THERMAL SENSOR - 0x18bfc710
status          : Optimal(0x1)
tray/slot      : 55/2
trayRef        : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
thermalSensorRef: 0b 00 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00

THERMAL SENSOR - 0x18bfc750
status          : Optimal(0x1)
tray/slot      : 2/1
trayRef        : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
thermalSensorRef: 0b 00 10 00 00 a0 b8 08 e5 af 01 00 00 00 00 00 00 00 00

THERMAL SENSOR - 0x18bfc790
status          : Optimal(0x1)
tray/slot      : 2/2
trayRef        : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
thermalSensorRef: 0b 00 10 00 00 a0 b8 08 e5 af 02 00 00 00 00 00 00 00 00

THERMAL SENSOR - 0x18bfc7d0
status          : Optimal(0x1)
tray/slot      : 1/1
trayRef        : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00
thermalSensorRef: 0b 00 10 00 00 a0 b8 14 4d 36 01 00 00 00 00 00 00 00 00

THERMAL SENSOR - 0x18bfc810
status          : Optimal(0x1)
tray/slot      : 1/2
trayRef        : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00
thermalSensorRef: 0b 00 10 00 00 a0 b8 14 4d 36 02 00 00 00 00 00 00 00 00

ESM - 0x18bfc468
status          : Optimal(0x1)
tray/slot      : 2/1
trayRef        : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
esmRef         : 0c 00 10 00 00 a0 b8 08 e5 af 01 00 00 00 00 00 00 00 00
nonRedundantAccess: 0
partNumber     : PN 348-0045154
serialNumber   : SN 1T24386808
manufactureDate : 0x3d98e580
manufacturer   : LSILOGIC
fruType        : FT ESM_CARD
software version : 9326
product ID     : SYM2600-FC
esmPortRef    : 1a 02 00 02 00 08 00 00 00 00 00 00 00 00 00 00 00 00 00
loopID         : 114
interface type : Fibre
currentSpeed   : 2 Gb
maxSpeed       : Unknown

ESM - 0x18bfc4fc
status          : Optimal(0x1)
tray/slot      : 2/2
trayRef        : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
esmRef         : 0c 00 10 00 00 a0 b8 08 e5 af 02 00 00 00 00 00 00 00 00
nonRedundantAccess: 0
partNumber     : PN 348-0045154
serialNumber   : SN 1T24386606
manufactureDate : 0x3d98e580
manufacturer   : LSILOGIC
fruType        : FT ESM_CARD
software version : 9326
product ID     : SYM2600-FC
esmPortRef    : 1a 04 00 04 00 08 00 00 00 00 00 00 00 00 00 00 00 00 00
loopID         : 114
interface type : Fibre
currentSpeed   : 2 Gb
maxSpeed       : Unknown

ESM - 0x18bfc590
status          : Optimal(0x1)

```

```

tray/slot      : 1/1
trayRef       : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00
esmRef        : 0c 00 10 00 00 a0 b8 14 4d 36 01 00 00 00 00 00 00 00 00
nonRedundantAccess: 0
partNumber    : PN 348-0049694
serialNumber  : SN 1T34160625
manufactureDate : 0x3f7a1900
manufacturer  : LSILOGIC
fruType       : FT dSATA
software version : 9551
product ID    : SYM2655
esmPortRef    : 1a 02 00 02 00 08 00 00 00 00 00 00 00 00 00 00 00 00 00
loopID        : 113
interface type : Fibre
currentSpeed   : 2 Gb
maxSpeed       : Unknown

ESM - 0x18bfc624
status        : Optimal(0x1)
tray/slot     : 1/2
trayRef       : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00
esmRef        : 0c 00 10 00 00 a0 b8 14 4d 36 02 00 00 00 00 00 00 00 00
nonRedundantAccess: 0
partNumber    : PN 348-0049694
serialNumber  : SN 1T34160880
manufactureDate : 0x3f7a1900
manufacturer  : LSILOGIC
fruType       : FT dSATA
software version : 9551
product ID    : SYM2655
esmPortRef    : 1a 04 00 04 00 08 00 00 00 00 00 00 00 00 00 00 00 00 00
loopID        : 113
interface type : Fibre
currentSpeed   : 2 Gb
maxSpeed       : Unknown

SFP - 0x18bfb800
status        : Optimal(0x1)
tray/slot     : 2/1
trayRef       : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
sfpRef        : 13 01 10 00 00 a0 b8 08 e5 af 10 00 00 00 00 00 00 00 00
type/port     : 0x3/0x1
connector     : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName    : JDS UNIPHASE
vendorOUI     : 00 01 ffffff9c
vendorPN      : JSP-21S0AA1
vendorRev     :
vendorSN      : B33843501D7E
manufactureDate : 0x3f6cea00
parent type   : ESM
esmRef        : 0c 00 10 00 00 a0 b8 08 e5 af 01 00 00 00 00 00 00 00 00 00

SFP - 0x18bfb8b8
status        : Optimal(0x1)
tray/slot     : 2/2
trayRef       : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
sfpRef        : 13 01 10 00 00 a0 b8 08 e5 af 20 00 00 00 00 00 00 00 00
type/port     : 0x3/0x2
connector     : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName    : JDS UNIPHASE
vendorOUI     : 00 01 ffffff9c
vendorPN      : JSP-21S0AA1
vendorRev     :
vendorSN      : B339435000A6
manufactureDate : 0x3f6cea00
parent type   : ESM
esmRef        : 0c 00 10 00 00 a0 b8 08 e5 af 01 00 00 00 00 00 00 00 00 00

SFP - 0x18bfb970

```

```

status          : Optimal(0x1)
tray/slot      : 2/3
trayRef        : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
sfpRef         : 13 01 10 00 00 a0 b8 08 e5 af 30 00 00 00 00 00 00 00 00
type/port      : 0x3/0x1
connector      : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName     : IBM
vendorOUI      : 08 20 5a
vendorPN       : IBM42P21SNY
vendorRev      : AA10
vendorSN       : 21P533811E283
manufactureDate : 0x3a638f00
parent type    : ESM
esmRef         : 0c 00 10 00 00 a0 b8 08 e5 af 02 00 00 00 00 00 00 00 00

SFP - 0x18bfba28
status          : Optimal(0x1)
tray/slot      : 2/4
trayRef        : 0e 10 00 00 a0 b8 08 e5 af 00 00 02 00 00 00 00 00 00 00
sfpRef         : 13 01 10 00 00 a0 b8 08 e5 af 40 00 00 00 00 00 00 00 00
type/port      : 0x3/0x2
connector      : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName     : JDS UNIPHASE
vendorOUI      : 00 01 ffffffff9c
vendorPN       : JSP-21S0AA1
vendorRev      :
vendorSN       : B24036990C59
manufactureDate : 0x3e46eb80
parent type    : ESM
esmRef         : 0c 00 10 00 00 a0 b8 08 e5 af 02 00 00 00 00 00 00 00 00

SFP - 0x18bfbae0
status          : Optimal(0x1)
tray/slot      : 1/1
trayRef        : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00
sfpRef         : 13 01 10 00 00 a0 b8 14 4d 36 10 00 00 00 00 00 00 00
type/port      : 0x3/0x1
connector      : 0x7
link length type : 0x2
transmitter type : 0x4
speed capability : 1Gb 2Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName     : Infineon AG
vendorOUI      : 00 03 19
vendorPN       : V23818-M305-B57
vendorRev      : 2
vendorSN       : 25299323
manufactureDate : 0x3f777600
parent type    : ESM
esmRef         : 0c 00 10 00 00 a0 b8 14 4d 36 01 00 00 00 00 00 00 00 00

SFP - 0x18bfbb98
status          : Optimal(0x1)
tray/slot      : 1/2
trayRef        : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00
sfpRef         : 13 01 10 00 00 a0 b8 14 4d 36 20 00 00 00 00 00 00 00
type/port      : 0x3/0x2
connector      : 0x7
link length type : 0x2
transmitter type : 0x4
speed capability : 1Gb 2Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName     : Infineon AG
vendorOUI      : 00 03 19
vendorPN       : V23818-M305-B57
vendorRev      : 2
vendorSN       : 25299321
manufactureDate : 0x3f777600
parent type    : ESM
esmRef         :

```

```

esmRef      : 0c 00 10 00 00 a0 b8 14 4d 36 01 00 00 00 00 00 00 00
SFP - 0x18bfb50
status      : Optimal(0x1)
tray/slot   : 1/3
trayRef     : 0e 10 00 00 a0 b8 14 4d 36 00 00 01 00 00 00 00 00 00 00
sfpRef      : 13 01 10 00 00 a0 b8 14 4d 36 30 00 00 00 00 00 00 00 00
type/port   : 0x3/0x1
connector    : 0x7
link length type : 0x2
transmitter type : 0x4
speed capability : 1Gb 2Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName   : Infineon AG
vendorOUI    : 00 03 19
vendorPN     : V23818-M305-B57
vendorRev    : 2
vendorSN     : 25290657
manufactureDate : 0x3f70de80
parent type  : ESM
esmRef      : 0c 00 10 00 00 a0 b8 14 4d 36 02 00 00 00 00 00 00 00 00

SFP - 0x18bfbd08
status      : Optimal(0x1)
host channel : 0x3
sfpRef      : 13 01 00 00 00 00 00 00 00 00 11 00 00 00 00 00 00 00 00
type/port   : 0x3/0x1
connector    : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb 4Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName   : PICOLIGHT
vendorOUI    : 00 04 ffffff85
vendorPN     : PLXPLVCSG324N
vendorRev    : 1
vendorSN     : 438PQ0XF
manufactureDate : 0x4158a980
parent type  : Controller
channel      : Host - 3
controllerRef : 07 00 00 00 00 00 00 00 00 00 00 00 00 01

SFP - 0x18bfbd0c
status      : Optimal(0x1)
host channel : 0x4
sfpRef      : 13 01 00 00 00 00 00 00 00 00 21 00 00 00 00 00 00 00 00
type/port   : 0x3/0x1
connector    : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb 4Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName   : PICOLIGHT
vendorOUI    : 00 04 ffffff85
vendorPN     : PLXPLVCSG324N
vendorRev    : 1
vendorSN     : 438PQ0XG
manufactureDate : 0x4158a980
parent type  : Controller
channel      : Host - 4
controllerRef : 07 00 00 00 00 00 00 00 00 00 00 00 00 01

SFP - 0x18bfbe78
status      : Optimal(0x1)
drive channel : 0x2
sfpRef      : 13 01 00 00 00 00 00 00 00 00 32 00 00 00 00 00 00 00 00
type/port   : 0x3/0x1
connector    : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb 4Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName   : PICOLIGHT
vendorOUI    : 00 04 ffffff85
vendorPN     : PLXPLVCSG324N
vendorRev    : 1
vendorSN     : 438PQ0XU
    
```

```

manufactureDate : 0x4159fb00
parent type    : Controller
channel       : Drive - 2
controllerRef  : 07 00 00 00 00 00 00 00 00 00 00 01

SFP - 0x18bfbf30
status        : Optimal(0x1)
drive channel : 0x2
sfpRef       : 13 01 00 00 00 00 00 00 00 00 42 00 00 00 00 00 00 00 00
type/port    : 0x3/0x2
connector    : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb 4Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName   : PICOLIGHT
vendorOUI    : 00 04 ffffff85
vendorPN     : PLXPLVCSG324N
vendorRev    : 1
vendorSN     : 438PQ18R
manufactureDate : 0x4158a980
parent type   : Controller
channel      : Drive - 2
controllerRef : 07 00 00 00 00 00 00 00 00 00 00 01

SFP - 0x18bfbfe8
status        : Optimal(0x1)
host channel  : 0x3
sfpRef       : 13 02 00 00 00 00 00 00 00 00 11 00 00 00 00 00 00 00 00
type/port    : 0x3/0x1
connector    : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb 4Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName   : PICOLIGHT
vendorOUI    : 00 04 ffffff85
vendorPN     : PLXPLVCSG324N
vendorRev    : 1
vendorSN     : 438PQ0XJ
manufactureDate : 0x4158a980
parent type   : Controller
channel      : Host - 3
controllerRef : 07 00 00 00 00 00 00 00 00 00 00 02

SFP - 0x18bfc0a0
status        : Optimal(0x1)
host channel  : 0x4
sfpRef       : 13 02 00 00 00 00 00 00 00 00 21 00 00 00 00 00 00 00 00
type/port    : 0x3/0x1
connector    : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb 4Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName   : PICOLIGHT
vendorOUI    : 00 04 ffffff85
vendorPN     : PLXPLVCSG324N
vendorRev    : 1
vendorSN     : 438PQ18L
manufactureDate : 0x4158a980
parent type   : Controller
channel      : Host - 4
controllerRef : 07 00 00 00 00 00 00 00 00 00 00 02

SFP - 0x18bfc158
status        : Optimal(0x1)
drive channel : 0x4
sfpRef       : 13 02 00 00 00 00 00 00 00 00 32 00 00 00 00 00 00 00 00
type/port    : 0x3/0x1
connector    : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb 4Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName   : PICOLIGHT
vendorOUI    : 00 04 ffffff85

```

```

vendorPN      : PLXPLVCSG324N
vendorRev     : 1
vendorSN      : 438PQ0XK
manufactureDate : 0x4158a980
parent type   : Controller
channel       : Drive - 4
controllerRef : 07 00 00 00 00 00 00 00 00 00 00 02

SFP - 0x18bfc210
status        : Optimal(0x1)
drive channel : 0x4
sfpRef        : 13 02 00 00 00 00 00 00 00 00 42 00 00 00 00 00 00 00 00
type/port     : 0x3/0x2
connector     : 0x7
link length type : 0x3
transmitter type : 0x4
speed capability : 1Gb 2Gb 4Gb
transmission media: MULTI_MODE_M6 MULTI_MODE_M5
vendorName    : PICOLIGHT
vendorOUI     : 00 04 ffffff85
vendorPN      : PLXPLVCSG324N
vendorRev     : 1
vendorSN      : 438PQ0XN
manufactureDate : 0x41575800
parent type   : Controller
channel       : Drive - 4
controllerRef : 07 00 00 00 00 00 00 00 00 00 00 02

INTERCONNECT CRU - 0x18bfae2c
status        : Optimal(0x1)
tray/slot     : 55/1
trayRef       : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
interconnectCRURef: 1b 00 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00
partNumber    : PN 13476-02-B
serialNumber  : SN 1T50655103
vendorName    : VN ENGENIO
manufactureDate : 0x41fec680
readyToRemove : NO

SUPPORT MODULE CRU - 0x18bface4
status        : Optimal(0x1)
tray/slot     : 55/1
trayRef       : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
supportCRURef : 1c 00 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00
partNumber    : PN 13534-01
serialNumber  : SN YRT045300822
vendorName    : VN ENGENIO
manufactureDate : 0x41ad0980
readyToRemove : NO

SUPPORT MODULE CRU - 0x18bfad30
status        : Optimal(0x1)
tray/slot     : 55/2
trayRef       : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
supportCRURef : 1c 00 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00
partNumber    : PN 13534-01
serialNumber  : SN YRT045301166
vendorName    : VN ENGENIO
manufactureDate : 0x41ad0980
readyToRemove : NO

ALARM - 0x18bfab6c
status        : Disabled(0x2)
tray/slot     : 55/1
trayRef       : 0e 00 00 00 00 00 00 00 00 00 00 55 00 00 00 00 00 00 00
alarmRef      : 1d 00 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00

HOSTBOARD - 0x18bfab0c
partNumber    : PN 12380-03-B
serialNumber  : SN 1T50655940
vendorName    : VN ENGENIO
type          : FT HOST
manufactureDate : 0x41fec680
controllerRef : 07 00 00 00 00 00 00 00 00 00 00 01

HOSTBOARD - 0x18bfab30
partNumber    : PN 12380-03-B

```

```

serialNumber      : SN 1T50655698
vendorName        : VN ENGENIO
type              : FT HOST
manufactureDate   : 0x41fec680
controllerRef     : 07 00 00 00 00 00 00 00 00 00 02
    
```

3.2.6.09 mhmPrintPeanutStatus

This command is used to determine various states of the mini-hubs and ports. **Note:** Works on bridge controllers only

```

-> mhmPrintPeanutStatus
-----
          HOST 0  DRIVE0  HOST 1  DRIVE2  DRIVE1  DRIVE3
-----
LIPREQ      1      1      1      1      1      1
PIRXLOSS    0      1      1      1      1      0
PORXLOSS    1      1      1      0      1      1
PIFAULT     0      1      1      1      1      0
POFAULT     1      1      1      0      1      1
PIBYPASS*   1      0      0      0      0      1
POBYPASS*   0      0      0      1      0      0
BDPOS       0      4      2      6      5      7
BDID        0      0      0      0      0      0
PIMDEF      6      7      7      7      7      6
POMDEF      7      7      7      6      7      7
ALTGPIO     1      1      1      1      1      1
ALTP1ODIS*  1      1      1      1      1      1
ALTPOODIS*  1      1      1      1      1      1
BRDRECOG*   0      0      0      0      0      0
GP I/O      1      1      1      1      1      1
P1ODIS*     1      1      1      1      1      1
POODIS*     1      1      1      1      1      1
FCBYPASS*   1      1      1      1      1      1
AltCtlRst*  1      1      1      1      1      1

* - Active low signal
NOTE - A value of 0xf indicates the device is not present.

p1/p0 RXLOSS      - If the value is 0 there is a signal present.  1 there is no signal present.
P1/P0 FAULT       - Value of 0 shows good.  Value of 1 shows faulted or no SFP present.
P1/P0 Bypass      - Value of 0 shows bypassed.  Value of 1 shows not bypassed.
P1/P0 MDEF Def.   - For the SFP Value of 7 means no SFP in slot.  Any other value is a def.  For the SFP.
P0/P1 ODIS        - Value of 0 means laser is off.  Value of 1 laser is on.  ( should always be 1 in SFP is in.)
    
```

3.2.6.10 mhmPrintFredStatus

This command is used to read the indicators on the mini-hubs. **Note:** Works on bridge controllers only

```

-> mhmPrintFredStatus
-----
          LIP_GNT  TST_BY_P  FAULT  LOOPGD  BRDPRES
-----
host 0  :  OFF      OFF      OFF      ON      ON
dest 0  :  OFF      OFF      OFF      ON      ON
host 1  :  OFF      OFF      OFF      OFF     ON
dest 2  :  OFF      OFF      OFF      ON      ON
dest 1  :  OFF      OFF      OFF      ON      ON
dest 3  :  OFF      OFF      OFF      ON      ON

Fault - Should be OFF
LOOPGD - Should be on is something is plugged in.
BRDPRES - Should be on, if there's a minihub plugged in.
    
```

3.2.6.11 svlShow

System Volume Lock Statistics

Used for determining volume transfers between controllers.

```

-> svlShow
Usage: svlShow level, clear
       level  description
       0      this message
    
```

```

1      vol xfer stats
clear = 0 save statistics, 1 clear statistics

-> svlShow 1
System Volume Lock Statistics

Total Volume Xfers:          0
Forced Volume Xfer Count:    0

Volume Transfer History:
Vol      Take      Give
  0         0         0
  1         0         0
  2         0         0
  3         0         0
  4         0         0
  5         0         0
  6         0         0

Max Xfer Cache Flush Time:    0 (ticks) for 0 volume(s)
Max Xfer Time:                0 (ticks) for 0 volume(s)

Cache Flush for Xfer Histogram:      Vol Xfer Histogram:
  ET                                  ET
secs      events      percent      secs      events      percent

Detailed view of piece information on a per drive basis

```

3.2.6.12 avtHostShow

Used to determine which is the controlling device for failover.

```

-> avtHostShow
Host Type          AVT      RDAC

WNTNCLSP5          X
W2KNETNCL          X
SOL                 X
HPX                 X
AIX                 X
IRX                 X
LNX                 X
WNTCLSP5           X
W2KNETCL           X
AIXAVT             X
PTX                 X
NWRFO              X
SOLAVT             X
W2KNETNCLDMP       X
W2KNETCLDMP        X

```

3.2.7 netCfgShow and netCfgSet

These commands displays and set the networking information that the controllers use to communicate via the Ethernet port. These commands will need to be used if the arrays are not going to be managed by the Host/Agent in SANtricity. This will also permit shell access using an **rlogin** session. (A **telnet** session is NOT supported on ENGENIO controllers.)

Note: Some of the information about networking has been made obsolete as of 05.4x code. These changes will be indicated.

If a UNIX or DHCP BOOTP Server is not available on the network that a RAID Module is connected to, or static addressing is preferred, it is possible to configure the RAID Module's network settings via the RS232 serial port(s) for the module. If a RAID Module contains two controllers, then each controller must have its network settings configured, including a unique IP Address, before the host RAID management software will work correctly.

The first step in manually configuring the network software on a controller is to make sure the controller is loading its network software. This software is loaded if the network option bit is set in NVSRAM. The network option bit is bit 3 in byte 0x28 of the User Configurable region of NVSRAM

You can determine if the network software has been loaded by typing **netCfgShow** at the controller shell prompt. If the return output states: undefined symbol: netCfgShow, then the network software has not been loaded.

If the network software has not been loaded, then the network option bit previously described should be turned on (set to one). This NVSRAM bit can be changed either via the controller Boot Operations Menu in the controller shell or by using a script in SANtricity. (**NOTE:** using the Boot Operations Menu to modify settings will affect I/O from the host, and should not be done with the host running I/O, file systems mounted, and/or active RDAC running on the host)

Once the network software has been successfully loaded, the network settings can be entered into the controller network configuration table via the **netCfgSet** command in the controller shell. To view the current network settings, enter **netCfgShow** at the controller shell command prompt. This will dump something similar to the following:

```
-> netCfgShow

==== NETWORK CONFIGURATION: ALL INTERFACES ====
Network Init Flags      : 0x00
Network Mgmt Timeout   : 30
Startup Script         :
Shell Password         :

==== NETWORK CONFIGURATION: dse0 ====
Interface Name         : dse0
My MAC Address         : 00:a0:b8:0c:c7:fa
My Host Name           : tslab020
My IP Address          : 172.22.192.20
Server Host Name      :
Server IP Address     : 0.0.0.0
Gateway IP Address    : 172.22.192.1
Subnet Mask           : 255.255.255.0
User Name             : guest
User Password         : *****
NFS Root Path         :
NFS Group ID Number   : 0
NFS User ID Number    : 0
```

To setup the controllers for Ethernet access run **netCfgSet** and answers the four questions indicated below. All other items can be skipped by simply pressing the Enter key.

```
-> netCfgSet

'.' = clear field; '-' = to previous field;
'+' = next interface; ^D = quit (keep changes)

==== NETWORK CONFIGURATION: ALL INTERFACES ====
Network Init Flags      : 0x00
Network Mgmt Timeout   : 30
Network Route #1       : dest=0.0.0.0
RAIDMGR Server #1     : 0.0.0.0
Network Manager #1    : 0.0.0.0
Startup Script         :
Shell Password         :

==== NETWORK CONFIGURATION: dse0 ====
My MAC Address         : 00:a0:b8:0c:c7:fa
My Host Name           : tslab020
My IP Address          : 172.22.192.20 ← The address of the controller.
Server Host Name      :
Server IP Address     : 0.0.0.0
Gateway IP Address    : 172.22.192.1 ← The gateway address (router, DNS server, etc.).
Subnet Mask           : 255.255.255.0 ← The network subnet mask.
User Name             : guest
User Password         : *****
NFS Root Path         :
NFS Group ID Number   : 0
NFS User ID Number    : 0
```

The controller must have three of the above fields as non-default values in order to grant a management access to a controller. These fields are titled: My IP Address, Gateway IP Address, and Subnet Mask in the above table. In

addition, some functional requirements require that the Network Init Flags be modified once a module has been successfully added to a RAID management station. For this reason, a table is included in the troubleshooting section of this document that lists those flags an end user might need to alter.

Descriptions of the three required fields are given below:

My IP Address

This field should contain the static IP Address that has been reserved on the network for the controller. Each controller in a dual controller RAID Module must have a unique static IP address reserved for it on the network.

Gateway IP Address

This field should contain the IP Address of the gateway for the subnetwork to which the RAID Module is connected. If there is no gateway on the subnetwork, e.g., a standalone network is being used or the RAID Manager Server is connected directly to the module via a crossover cable, then use the IP Address of the RAID Manager station in this field. This field cannot be left zeroed out or the network software may not work correctly.

Subnet Mask

This field should contain the subnet mask of the subnetwork to which the RAID Module is connected.

The values in the fields shown above can be modified via the **netCfgSet** command. This command will display each field listed in the **netCfgShow** output shown above, one field at a time. When each field is displayed, the cursor will be placed to the right of the current value waiting for user input. Entering a 'Carriage Return' at the cursor will cause the current field to be skipped with no changes being made to its value. Entering a period (.) at the prompt will cause the value of the current field to be reset to the factory default. A hyphen (-) in a field displays the previous parameter, an asterisk (*) in a field causes the default value to be used (which may be null), a plus (+) sign causes the set operation to skip to the next interface, and a control-D causes the function to terminate. Finally, to change the value of a field, simply enter the new value at the cursor.

IT IS STRONGLY RECOMMENDED that during an initial configuration that all values be set to their default values using an '*', except for the three required settings described in the preceding paragraph.

After the **netCfgSet** command has exited, a message should be displayed which states:

```
Network Configuration successfully written to NVSRAM.  
Reboot to use these changes.
```

The controller should now be rebooted by entering **sysReboot** at the controller shell prompt (**NOTE**: this command will affect I/O from the host, and should not be done with the host running I/O, file systems mounted, and/or RDAC actively running on the host). After the controller has finished its boot process, it should be able to **ping** the IP address of a RAID Manager station. The troubleshooting section of this document contains more detailed information on how to use the **ping** command in the controller shell.

When the **ping** command is running successfully, perform the previous steps on the other controller if the RAID Module contains dual controllers. Otherwise, refer to the section on troubleshooting in this document.

Network Init Flags

The Network Init Flags are used to control the initialization of the network interfaces of a controller. The one-byte field displayed next to the Network Init Flags title when the **netCfgSet** command is run, can be used to modify these flags. Each bit in this one-byte field corresponds to a flag. The function of each of these flags is listed below:

bit 0	=1: Do not use BOOTP for any reason	(Obsolete as of 05.4x)
	=0: Use BOOTP as needed	
bit 1	=1: Use BOOTP unconditionally	(Obsolete as of 05.4x)
	=0: Use BOOTP only as necessary	
bit 2	=0: Start NFS services	
	=1: Do not start NFS services	

bit 3	=0: Use "0.0.0.0" default route =1: Do not use "0.0.0.0" default route	
bit 4:	=0: Do not mount all NFS volumes =1: Mount all NFS volumes	
bit 5:	=0: Allow remote login to shell =1: Disable remote login to shell	(Obsolete as of 05.4x)
bit 6:	=0: Use remote access authorization =1: Do not require authorization	
bit 7:	=0: Enable NCF remote login =1: Disable NCF remote login	

Note: If the flags are set incorrectly but the IP gateway and subnet are not set then the controllers networking will revert to BOOTP.

The preceding bits can be hex-added in order to enable more than one flag. For example, a Network Init Flags value of 0x21 would set bits 5 and 0, disabling remote login to the shell and causing the controller software to not broadcast to a BOOTP server.

While all of the flags available in the network software are listed in the above table, the only flags which the end user should ever need to modify are 0x01, 0x02, and 0x20. If the controller network interface is being manually configured via the controller shell, then bit 0 should be set to 1. Changes to any of these flags can lead to network connection problems.

The 0x20 flag can be used for added protection if network security is an issue. If this flag is not set, then anyone can access the controller shell if they know the IP address of a controller, and the controller shell password. On the other hand, leaving this flag unset can be useful for debugging purposes since it enables access to a controller shell via **rlogin**.

3.2.7.1 Troubleshooting

3.2.7.1.1 Testing a Network Connection

The **ping** command is used to test whether a particular system is accessible over the network. The **ping** may be issued from the controller to reference itself, another Series 3 controller or any other system on the network. **ping** sends one or more ICMP packets to the specified system and waits for a response. Because ICMP protocol packets can traverse networks, the **ping** command is useful for testing the routing tables and internetwork connectivity.

The **ping** command has three parameters, the first is the double-quoted host name or quoted IP address of the target, and the second is the number of times to receive valid responses to pinging packets. If the second parameter is not specified, **ping** continues until a control-C is entered on the keyboard or until 5 failures to receive responses. **CAUTION:** there have been instances where <Control-C> has not succeed in 'killing' the **ping** command. In extreme cases, it has even been necessary to reboot or power-cycle the controller to regain serial access to the controller. Thus, IT IS STRONGLY RECOMMENDED that the second parameter in the **ping** command be used.

If 1 is specified for the ping count, **ping** displays either "no answer" or "... is alive", as in the following examples:

```
ping "53.79.14.48",1
no answer from 53.0.0.123
```

```
ping "53.79.14.48",1
53.79.14.48 is alive
```

When more than one ping packet is issued, **ping** displays detailed information about each packet as well as summary statistics. The following example issues 5 packets to the remote system with IP address 53.0.0.123 (the IP address output by the **ping** is reversed):

```
ping "53.0.0.123", 5
PING elvis (53.0.0.123): 56 data bytes
64 bytes from 123.0.0.53: icmp_seq=0, time=176. ms
```

```
64 bytes from 123.0.0.53: icmp_seq=1, time=0. ms
64 bytes from 123.0.0.53: icmp_seq=2, time=64. ms
64 bytes from 123.0.0.53: icmp_seq=5, time=64. ms
64 bytes from 123.0.0.53: icmp_seq=6, time=80. ms

----53.0.0.53 PING Statistics----
7 packets transmitted, 5 packets received, 28% packet loss
round-trip (ms) min/avg/max = 0/76/176
```

The third parameter, ordinarily not specified, controls the action of the pinging. If bit 0 is set in the third parameter, **ping** suppresses displayed output, the resulting value of **ping** indicates the success of the **ping** operation. If bit 1 is set, pinging is limited to the local network; packets will not be forwarded through the gateway. If bit 2 is set, then information about packets without responses is also displayed.

If the output which results from running the **ping** command states: ‘no answer from...,’ either something is not configured correctly, or there is a hardware problem. Try the **netCfgSet** command again and verify the settings listed above. If after this change, the desired RAID Manager station still cannot be ‘pinged’, check that one of the following pitfalls has not occurred:

- No gateway address included
- Improper subnet mask
- Network Init Flags set improperly (See section below)

If the controller still cannot **ping** the RAID Manager Server, first check the “**Troubleshooting Section**” below, and then the remaining items in this section.

3.2.7.1.2 Network Statistics

VxNet provides detailed statistics for most network components. This data can be quite useful in isolating network problems. All of the statistics for these components may be dumped to the console using the one **netShow** command, or data for individual components may be shown with their respective "show" functions:

Component	Show Command	UNIX Counterpart
ELC Ethernet Driver	elcShow	xxxstat (where xxx is the name of the network driver)
ENE Ethernet Driver	eneShow	xxxstat
Network Interface control	ifShow	ifconfig -a
ICMP	icmpstatShow	netstat -s
UDP	udpstatShow	netstat -s
IP	ipstatShow	netstat -s
TCP	tcpstatShow	netstat -s
Routing	routestatShow	netstat -r -s
Port mapping	inetstatShow	netstat

With respect to isolating a network problem, some of the more important statistics found from these commands are:

Command	Statistic	If ...	Consider ...
ifShow	Subnetmask	The subnet mask does not match that defined by the network administrator for the network	Change the subnet mask parameter in the Network Configuration
eneShow or elcShow	recv interrupts	Zero interrupts	Check the Ethernet cable, AIU connector, etc. A physical problem is evident.
	xmit interrupts	Zero interrupts	Check the physical connection. The Ethernet chip on the controller may be faulty.
	r-error	Nonzero error count	Examine the other error statistics (collisions, crcs, aligns, missed, etc.) These will indicate a physical connection problem, or another device is on the network is misbehaving.

Command	Statistic	If ...	Consider ...
	t-error	Nonzero error count	Examine the other statistics.
	recv drops, collisions	Large count relative to "r-no-error" (> 10%)	The network is straining under excessive load, but is still working.
udpstatS how	Bad data length	nonzero	Internal software failure
	Bad checksum	nonzero	Internal software failure

3.2.7.2 Common Network Problems

A common problem with network configurations is where two network devices have the same IP address (someone did not enter the correct values in **netCfgSet**). Unfortunately, this situation is also quite difficult to diagnose. Some symptoms of the duplicate IP address problem are:

A functioning networked computer stops responding, or responses are not as expected, when another network device is started.

An **rlogin** session or file access activity is terminated without an apparent reason.

rlogin into a system or controller shows the wrong system or controller name.

To attempt to discover this problem, on some of the network nodes use the UNIX **arp -a** command or the VxNet **arptabShow** command to list the IP address to physical address associations. Examine the data for any discrepancies (all controllers must have the 00:A0:B8 value in the physical address).

To correct the problem, first change the IP address on the offending system or turn off that system. Then flush the ARP tables in each node. For some systems that do not have an ARP flush capability, they may need to be reset to clear out the bogus association. Another method that might be tried is to restart the offending system after its IP address has been changed, and then attempt to ping it from all of the other nodes, thereby forcing corrections to the ARP tables on each system.

3.2.8 writeZerosFlag

This command can be used to repair or rebuild part or all of the DacStore region without affecting the user data on the disks.

3.2.8.01 Turning writeZerosFlag On

By turning on the **writeZerosFlag**, any changes to the dacstore region will prevent writing zero's (restripping) the data area.

The first part of this procedure, **VKI_EDIT_OPTIONS**, works like an rc script in Unix or an autorun in Windows. In the event the controller reboots while trying to repair the DacStore, this will automatically load to protect the data area.

***NOTE: On dual controller systems you must perform these procedures on both controllers.

-> **VKI_EDIT_OPTIONS** ← Type command, press <ENTER>

EDIT APPLICATION SCRIPTS (disabled)

Enter 'I' to insert statement; 'D' to delete statement;

'C' to clear all options; '+' to enable debug options; 'Q' to quit **I** ← Type "I" and press <ENTER>

Enter statements to insert (exit insert mode with newline only):

writeZerosFlag=1

← Type command, press <ENTER>

← Press <ENTER> again

EDIT APPLICATION SCRIPTS (disabled)

1) writeZerosFlag=1

Enter 'I' to insert statement; 'D' to delete statement;
 'C' to clear all options; '+' to enable debug options; 'Q' to quit + **← Type a Plus sign and press <ENTER>**

EDIT APPLICATION SCRIPTS (enabled)

1) writeZerosFlag=1

Enter 'I' to insert statement; 'D' to delete statement;
 'C' to clear all options; '+' to enable debug options; 'Q' to quit **q ← Type “Q” and press <ENTER>**
 Commit changes to NVSRAM? (y/n) **y ← Type “y” and press <ENTER>**
 value = 12589824 = 0xc01b00

The second part of this procedure is actually issuing the **writeZerosFlag** command itself. By running the command from the shell it is not necessary to reboot the controllers in order for the flag to be turned on.

-> **writeZerosFlag=1** **← Type command, press <ENTER>**

It is recommended that you do this last step to ensure that the **writeZerosFlag** is properly set.

-> **writeZerosFlag** **← Type command, press <ENTER>**

Make sure that the value that is returned matches what you entered, in this case a value of 1.

3.2.8.02 Turning writeZerosFlag Off

Use this procedure to turn the **writeZerosFlag** off so that normal functionality is restored, in other words to allow writing zero's to data area.

-> **VKI_EDIT_OPTIONS** **← Type command, press <ENTER>**

EDIT APPLICATION SCRIPTS (enabled)

1) writeZerosFlag=1

Enter 'I' to insert statement; 'D' to delete statement;
 'C' to clear all options; '-' to disable debug options; 'Q' to quit **C ← Type “C” and press <ENTER>**
 Clear all options? (y/n) **y ← Type “y” and press <ENTER>**

EDIT APPLICATION SCRIPTS (enabled)

Enter 'I' to insert statement; 'D' to delete statement;
 'C' to clear all options; '-' to disable debug options; 'Q' to quit - **← Type Minus sign and press <ENTER>**

EDIT APPLICATION SCRIPTS (disabled)

Enter 'I' to insert statement; 'D' to delete statement;
 'C' to clear all options; '+' to enable debug options; 'Q' to quit **Q ← Type “Q” and press <ENTER>**

Commit changes to NVSRAM? (y/n) **y ← Type “y” and press <ENTER>**
 value = 12589824 = 0xc01b00

-> **writeZerosFlag=0** ← Type command, press <ENTER>

It is recommended that you do this last step to ensure that the **writeZerosFlag** is properly set.

-> **writeZerosFlag** ← Type command, press <ENTER>

Make sure that the value that is returned matches what you entered, in this case a value of 0.

3.2.9 Reviving a Dead Volume

1. Determine the order of failure of the drives. There are several different ways to determine the order of drive failures. For best results use two of the three to confirm order.
 - **cfgPbDev**
 - Check the state of the volume (vd_state) as seen by each failed drive. The drive that shows a different state than the, i.e. volume optimal vs. volume degraded is the first failed drive.
 - If the drive's last view of the LUN was an optimal LUN, then it was the first to fail. The second drive to fail would show a state and status of degraded. All subsequent failing drives will show a dead LUN state and status.
 - **cfgPh**
 - Look for the drive update time stamp of each of the failed drives.
 - Check the Major Event Log
 - Remember that these drive locations are physical not logical.
 - *** Caution: if drive failures occur close together, then the MEL may not be reliable.
 - Do Not use “oos” from **cfgUnit**
 - “oos” means Out Of Service
 - The “oos” order may not reflect the order that the drives failed.
2. Fail any hot spares that are not in use. This is to prevent unwanted reconstruction to the hot spares during repair.
3. Spin up all failed drives to check for fail order
 - **isp cfgPrepareDrive,0x<phyDev Address>**
 - **isp cfgPrepareDrive,0x4cdd468** (the leading 0 in the address can be dropped)
4. Revive all but the first failed drive(s).
 - **isp cfgSetDevOper,0xc0000i**
 - c = channel i = ID
5. Reconstruct the first failed drive last.
 - **isp cfgReplaceDrive,0xc0000i**
 - or
 - Remove the first failed drive, wait 60 seconds, then reinsert drive. This will power cycle the drive plus perform the **cfgPrepareDrive** & **cfgReplaceDrive** commands automatically.
6. Revive the hot spares once reconstruction has begun.

3.2.10 Deleting a Host Port from the Shell

Symptoms

Host port does not show up in available host ports list in SANtricity
Cannot map a host port

Fix

```
-> spmShow
SPM controllerRef=070000000000000000000001 ssidMax=129 lunMax=10
SAP SAPORT_REF CONTROLLER_REF PORT SAPRTGRP_REF (0x3e3b5a8)
SAP 800300010000 0700000000000000000000002 0 000000000000
SAP 800300011000 0700000000000000000000001 0 000000000000
HP HOSTPORT_REF TYPE NAME LABEL HOST_REF (0x3e35c44)
```

```
HP 820300020000 2 0x20000001738119BA fcaw1-20 840300020000 HostControlled
HP 820300020001 2 0x20000001730119BA fcaw0-20 840300020000 HostControlled
HP 820300030006 2 0x200000017301199A hbaA_17 000000000000
HP 820300030007 2 0x20000001730119AE hba0-17 840300030005 HostControlled
```

To delete the host port of label hbaA-17 run the command:

```
-> deleteHostPort_MT 0x00030006
```

where 0x00030006 is the host hostport_ref value that you want to delete. The "0x00030006" above is the rightmost 8 digits of the hostportref value for the hostport to be deleted.

Note

The controller has a mapping for this host port that does not show up in SANtricity.

3.2.11 Volume is not accessible from the host

Facts

Array and volumes are all optimal.
No pieces are out of service.
State and status of LUN are optimal.
vd_oos = -1
vd_oos2 = -1
vd_ooscnt = 0
All drives must be Optimal/Null

Symptoms

Volume is not accessible from the host.
vdShow lists volume as 'offline closed suspended'

Fix

From the shell prompt, type the following command:

```
-> cfgConfigVdisk X
```

Where X is the LUN number that will be changed back to 'online open optimal'.

3.2.12 Drive path redundancy lost

Fact

It may be possible to recover the path by running a command to poll the chip for the path that is failed
Notice that the path that is failed above is 1

Symptom

You may see something like this output from fcDevs 4:
Disk 00a00009 5,1 a7 Cur:0 Fail:1
Disk 00a0000a 5,2 a6 Cur:0 Fail:1
Disk 00a0000b 5,3 a5 Cur:0 Fail:1
Disk 00a0000c 5,4 a3 Cur:0 Fail:1
Disk 00a0000d 5,5 9f Cur:0 Alt:1

Fix

```
-> fcChip=x
```

where x = the chip relating to the path that is failed, i.e. 1 in the above example (Sets this as the active chip)

```
-> fcSendPrim 5
```

5 is the option to poll the path

Note

This may not always work, but is an easy solution to try first.

3.2.13 How to retrieve the Major Event Log (MEL) from the shell

To display a summary of all MEL event entries:

```
-> showMajorEvents -1,-1,0
current 0x1621 critical 0x1611 max 0x2000 timeStamp 40e1e484 start 0x0 0x0

      Event          Seq Num    id          time          dev    lun
      .
      .
2117 CCM_ERR_CLEARE 000003eb 0048210a 02/17/04 15:30:30 00000000 0
2114 ALT_CACHE_BATT 000003ec 00000000 02/17/04 15:30:30 00000000 0
2024 SCRUB_RESUME   000003ed 00000000 02/17/04 15:31:33 10000001 1
      .
      .
0000 Unknown Event 00000000 00000000 01/01/70 00:00:00 00000000 0
```

To display a specific event or group of events starting at a given point with more detail:

```
-> showMajorEvents 1004,1,4
current 0x1621 critical 0x1611 max 0x2000 timeStamp 40e1e484 start 0x0 0x0

      Event          Seq Num    id          time          dev    lun org ctl evd len
00492114 ALT_CACHE_BATT_ 000003ec 00000000 02/17/04 15:30:30 00000000 0 00 1 00 0
```

In the above example, the commands first parameter is the event sequence number expressed in decimal format (not hex as in the example to display all events). The second parameter is how many events are to be listed, including the beginning event. The last parameter is setting the level of detail. Usually the number that should be used is four (4).

3.2.14 Adding drives that have a previous DacStor on them

There are three different methods to allow adding drives that have a previous DacStor on them so that this information does not create a condition known as “dirty DacStor” from occurring.

Method #1

```
-> isp cfgWipe1,0xc0000i ( this would be for a drive at c,i)
-> isp rdacMgrAltCtlReset (this will do a quick reboot of the alternate controller)
-> reboot (this will do a quick reboot of the controller currently logged into)
```

Now look at the drive in **cfgPhy c,i** it should be:

```
d_state=2
d_status=0
```

If the drive is to be moved from one storage array system to a different one, then the two reboots are not required as the drive will see the insertion into the foreign array the same as if the controllers had been rebooted.

Method #2

Disable Drive Migration by turning on bit 1 in Offset 35 of the Global NVSRAM region. This can be done using the Script Editor using the following script:

```
// Turn drive migration off by setting bit 1 offset 0x35
set controller[a] Globalnvsrambyte[0x35]=0x02,0x02;
set controller[b] Globalnvsrambyte[0x35]=0x02,0x02;
show controller[a] Globalnvsrambyte[0x35];
show controller[b] Globalnvsrambyte[0x35];
show "Drive migration is now disabled.";

// Reboot controllers one at a time for NVSRAM changes to take effect
show "Rebooting A controller.";
```

```

reset controller[a];
show "A controller has rebooted.";
show "Rebooting B controller.";
reset controller[b];
show "B controller has rebooted.";

```

By disabling the drive migration feature, any drive that is inserted into a slot that the drive did not previously occupy will cause the array to write new DacStor to the drive. This would include not only foreign drives, but also drives from the same array that had been in a previously different slot so caution is advised.

Method #3

Using the Global Hot Spare slot will also clear DacStor

3.2.15 Changing the modification priority

Establish a shell connection to the controller that owns the lun/volume. At the prompt type:

```
-> isp cfgSetReconParams,x,0xffff
```

X=lun to be reconstructed

ffff= 100%

bfff=75% (This is the default value in the GUI)

7fff=50%

3fff=25%

NOTE: While the value is set to ffff, any storage system access will be impacted. After the reconstruction/modification is complete, the default value will have to be reset using the same command with the default value of bfff or lower.

3.2.16 How to identify a drive from the shell

*** Note: These commands use *id,ch* not *ch,id* as most commands are.

To identify a drive use the following command:

```
-> setDriveIdentify id,ch
```

This will flash the fault light on the drive in question.

To turn the light off.

```
-> resetDriveIdentify id,ch
```

3.2.17 How to create and delete a Global Hot Spare from the shell

Create Hot Spare

```
-> isp cfgMarkDriveHotSpare,0xc0000i,0
```

Remove Hot Spare

```
-> isp cfgRemoveHotSpare,0xc0000i,0
```

3.2.18 Monitoring and Stopping Media Scan from the shell

Use the **mon** command to determine the progress of any media scans that are currently running. This command can only be stopped with a **CTRL-C**. The middle parameter represents the intervals in seconds between each reading taken.

```

-> mon 7,10,1
Monitoring Virtual Disk Background Operations at 10 second intervals
20:50:23
  Scrub    0    96% | Scrub    1    5% | Scrub    2    96% | Scrub    3    17%
  block 2822283264 | block 210599936 | block 1885282304 | block 170801152

```

This command must be run from the owning controller.

```
-> getVolumeActionProgress_MT 0
Percent Complete           : 96
Estimated Time to Completion: -1
```

To stop all media scans.

```
-> setSAMediaScanPeriod_MT 0
```

To stop media scan on a specific volume.

```
-> setVolumeMediaScanParams_MT <vol#>,0,0
```

*** Note: Stopping a media scan either from the shell or in the Array Management software will not stop media scans instantly. The media scans will continue until completed. Stopping media scan only prevents the queuing up of any additional scans of the data region. Only used areas of drives are scanned, unused (unconfigured space) is not scanned nor are Global Hot Spares that are currently unassigned. Media scans of the DacStor region of all disks will continue and cannot be stopped.

3.2.19 hdd 90

This command is the same as using the **fcAll 90** plus this clears the hdd statistics. **Note:** This command, like all of the other hdd commands does not exist as of 6.16 firmware code.

3.2.20 Turning tracing on and repairing bad blocks

Turning Trace On and Off

```
-> eelPrintfs=1 (pre 05.40)
-> eelPrintfs 1 (05.40 and later)
-> dstEnablePrintDriveSense=1 (for SCSI)
-> hddEnablePrintDriveSense=1 (for Fibre)
```

* NOTE: To turn off the above commands replace the one (1) with a zero (0)

Repairing a bad block - Prior to 05.30.05 code. The following is the procedure to reassign a bad block. (Shell procedure in **RED** comments in **BLUE**). For this example we are using LBA **0x01181359** and devnum **0x200000**.

```
-> VKI_KMZALLOC 220
value= = 0xa2654214 (This is the 1st memory address)
```

This will return a hex value called a CDB. (Example 0x01181359) Using the above value enter:

```
-> m 0xa2654214,1 (Here we modify the 1st memory address)
a2654214: 00-07
a2654215: 00-.
```

```
value = 1 = 0x1
```

```
-> VKI_KMZALLOC 200
value = 0xa26291e4 (This is the 2nd memory address)
```

```
-> m 0xa26291e4,1 (Here we modify the 2nd memory address)
```

```
a26291e4: 00-00
a26291e5: 00-00
a26291e6: 00-00
a26291e7: 00-04
a26291e8: 00-01 (The next 4 bytes here contain the LBA: 0x01181359)
a26291e9: 00-18
```

a26291fa: 00-13
a26291fb: 00-59
a26291fc: 00-

value = 1 = 0x1

(The format of this command is 'dstDebugExecCDB devnum,1st_memory,2,2nd_memory,8,0').
-> dstDebugExecCDB 0x200000,0xa2654214,2,0xa26291e4,8,0

Dev:00200000 CDB:070000000000000000000000 dataBuf:a26291e4 stat=0
value = 31 = 0x1f (should display a non-negative value if it succeeded.)

dstDebugExecCDB

drive devnum, 0x200000
CDB pointer 0xa2654214
direction (2=write, 3=read),
buffer pointer CDB+12 (0xa26291e4)
buffer length (this must match the value in the above example this is in bytes) 8
display (0=no display, 1=display) 0

***** WARNING: Care must be taken when using this procedure as controller memory locations are being changed. If care is not taken, serious problems could arise. Use this procedure only under supervision of someone that has been trained and is adept in this process. Do NOT attempt this procedure if you have never done this before.**

Repairing a bad block - after 05.30.05 code

-> **vdReconFixURE=1**

To turn off the above command replace the one (1) with a zero (0)

*** Note: This command will not work for 05.36 and 05.37

*** Note: This is built into the firmware and is enabled automatically as of 06.xx code and later.

3.2.21 Clearing the Storage Partition Management Region

To clear the Storage Partition Management (SPM) region

-> **isp spmClearDatabase**

This will clear all mappings, host ports, hosts and host groups.

4. Fibre Channel Driver Commands

All the commands from the previous section can be used for the Fibre Channel Controllers.

This portion of the debug guide contains commands that are only useful for the Fibre Channel controllers utilizing the Shell Command interface on ENGENIO Series 4 Fibre Channel RAID Controllers.

4.1 Overview

4.1.1 Cables

Anyone handling the optic cables needs to be aware that the glass fibers inside the insulation are brittle and susceptible to handling damage. When handling these cables, do not bend them or pinch them. The recommended handling method is to coil the cables in a circle with a diameter of 4" or greater. Please insure that you handle, store, and install these cables within this guideline.

4.1.2 Watchdog Timer

The watchdog timer is enabled for fibre channel because there is no equivalent of a scsi-bus-reset. The watchdog timer will reset the controller if there is no fibre channel interrupt serviced for about 5-10 seconds. The array controller generates its own interrupts to cover times when the host is inactive. You can check if the watchdog is enabled by invoking: "fc 5"

4.2 Debugging Problems with the Fibre Channel Interface

POWER

- Is everything powered on (hosts, targets, hubs, switches, etc)? If the controller won't boot and you've got many lights on and some flashing, ensure that your power is good. Sometimes the 3622 will boot by itself, or the 3622/81E will boot by themselves, but when the GLM is added, the power dips down to where the controller will not boot.

CABLES

- Ensure that all cables are attached. The "transmit port" of each device must be connected to the "receive port" of the next device. Normally (looking down the barrel of the connector) the "receive port" of a GLM is on the left, and the "transmit port" is on the right (if a copper GLM, longer edge of D-shell on top; if an optical GLM, keyed side on the bottom).

- There should be no sharp bends in the cable, the optics cable may be broken.

SOFTWARE

- Ensure that the drivers are loaded on both the host and target (array). If the driver is loaded on the array, the "fc" command will work.

CONTROLLER HARDWARE

ETHERNET (IP) ADDRESS ON CONTROLLER

- Ensure that the Ethernet address has been set on the controller (this should have been done at the factory). You can check "fc 1" for a WWN (World-Wide-Number) of "1000 0000 -0000 0000" (which means it's not set), or check the "bootMenu" network option or run "netCfgSet" from the shell, checking for "My MAC adrs = 0" (which means it's not set). The array will not attempt to go online without a valid WWN.

IF ARRAY IS ATTACHED TO A HUB (loop)

- Look at "fc 20", and see which device issued a "link failure LIP" (designated at "LIPF ALPA"). Normally the device upstream from it (i.e., the device just prior to it on the hub) has failed. Data travels in different directions depending on which hub you are using.

- Second option: Start unplugging devices until the loop comes up.

IF ARRAY IS CONNECTED TO A LOOP

POWER CYCLE EVERYTHING

- a. Power cycle the hub
- b. Power cycle all devices at the same time

CHECK THE DATA PATH ON ANY ARRAY WHICH YOU SUSPECT MAY BE BAD

IF LINK IS UP, SEE WHICH DEVICES YOU CAN TALK TO

Warning* Only do this when the system is quiescent, as it may cause things to hang!**

- **sendEchoAll** (sends Echo to every AL_PA on loop)

IF YOU SUSPECT COMPONENT PROBLEMS (GLM/GBIC), CHECK BIT-ERROR STATISTICS

IF ALL ELSE FAILS

- Call ENGENIO analysts. Our fast and friendly staff will be glad to help you. Be prepared to take a trace (“setSfcTrace 1,-1” and “fc 99”).

4.3 The fc commands

The **fc** commands are used to diagnose a fibre channel interface. To show information on all channels at one, use the command **fcAll** followed by the number of the **fc** command requested (see section 4.3.1.17).

fcChip=<channel #>

Used to set a controller software variable to a specific value for debug purposes. Determines which internal fibre loop channel that will be displaying information for the **fc** commands (viewed from which chip in the controller). To select the channel for an **fc** command, use the **fcChip** command.

```
-> fcChip=4
fcChip = 0x7ed5768: value = 4 = 0x4
```

To determine which channel is currently selected, use the **fcChip** command without a channel number. In the example below the value is channel two (2).

```
-> fcChip
fcChip = 0xa15cff30: value = 2 = 0x2
```

4.3.1 fc <Usage>

(4.x version)

```
-> fc

(Tick 0021143519) ==> 04/08/02-16:31:56 (GMT)

USAGE: fc (startFunc, endFunc, Level, ElementAdrs, maxElements)
      (Level->(0=default,1=min,2=med,3=max))

Status  ( 1) Tunes  ( 2) Hist   ( 3) Exch   ( 4) TGV    ( 5) Overview
Logs    ( 6) Fmgr   ( 7) Error  ( 8) Event (14) Io
Logs    (15) BufErr (16) HddErr
Misc    (10) Ports (11) Luns   (12) Ap-Inf (13) Qcheck
TachStat (20) TacReg (21) PciReg (22) Revs
TachQ   (30) IMQ   (31) ERQ    (33) SFQ
System  (42) Hist
Indiv   (50) FrmHdr (51) HstOp  (52) Port   (53) Xcb    (54) Sest
Indiv   (55) Iov
Special (90) ClrHis (91) ClrAll (92) DgRst
Channels (100) Wwn   (101) More  (102) ChanFlags
Ports   (110) Ports (111) Hosts (112) PortFlags
```

(5.x version)

```
-> fc

(Tick 0114589954) ==> 04/28/05-19:13:30 (GMT)

USAGE: fc (startFunc, endFunc, Level, ElementAdrs, maxElements)
      (Level->(0=default,1=min,2=med,3=max))

Status  ( 1) Tunes  ( 2) Hist  ( 3) Exch  ( 4) TGV
Logs    ( 6) Fmgr  ( 7) Error ( 8) Event (14) Io
Logs    (15) BufErr (16) HddErr
Misc    (10) Ports (11) Luns  (12) Ap-Inf (13) Qcheck
TachStat (20) TacReg (21) PciReg (22) Revs
TachQ   (30) IMQ  (31) ERQ  (33) SFQ
System  (42) Hist
Indiv   (50) FrmHdr (51) HstOp (52) Port  (53) Xcb  (54) Sest
Indiv   (55) Iov
Special (90) ClrHis (91) ClrAll (92) DqRst
Channels (100) Wwn  (101) More  (102) ChanFlags
Ports   (110) Ports (111) Hosts (112) PortFlags
```

(6.x version)

```
-> fc

USAGE: fc (startFunc, endFunc, Level, ElementAdrs, maxElements)
      (Level->(0=default,1=min,2=med,3=max))

Status  ( 1) Tunes  ( 2) Hist  ( 3) Exch  ( 4) TGV
Misc    (10) Ports (12) Ap-Inf (13) Qcheck
TachStat (20) TacReg (21) PciReg (22) Revs
TachQ   (30) IMQ  (31) ERQ  (33) SFQ
System  (42) Hist  (43) Exch  (49) Memory
Indiv   (50) FrmHdr (52) Port  (53) Xcb  (54) Sest
Indiv   (55) Iov
Special (90) ClrHis
Channels (100) Wwn  (101) More  (102) ChanFlags (103) LoopMaps
Ports   (110) Ports (112) PortFlags

Logs    Use dqprint function with filters
```

4.3.1.01 fc 2 (Fibre Channel History)

Statistics kept on Fibre Activity: ****Note that “fc 90” will clear these counts back to zero.**
 Total commands should increment every time you enter "fc 2". If not, someone's stuck or the system is inactive.
 Statistical counts are displayed only if they are non-zero. The first section represents a count of the various types of SCSI commands received. The “RetStat” section represents a breakdown of the various types of SCSI check conditions returned. The “IsrStat” section represents a count of each type of Tachyon interrupt the Controller processed. The “FrmSent” section represents a count of each of the types of frames the Controller sent. The “FrmRecv” section represents a count of each of the types of frames the Controller received. The “Misc” section represents miscellaneous counts. There are many other counts you will receive, some of which are documented here.

```
-> fc 2

fc 2 CHIP: 0 Dst chan: 0 (Tick 0275934835) ==> 07/21/36-16:36:41 (GMT)

RECEIVED COMMANDS
Op [ trans] Count      Op [ trans] Count      Op [ trans] Count
01 [ ScCon] 52567      c8 [ MirRd]   14      ca [ MirWr] 62221
da [ CacIn] 46534

SENT COMMANDS
Op [ trans] Count      Op [ trans] Count      Op [ trans] Count
01 [ ScCon] 52558      c8 [ MirRd]   17      ca [ MirWr] 22198
da [ CacIn] 61777

IsrStat==> (OutCmp      797715) (ErrIdle      1) (InCmp      685632)
            (FmInt       3) (InExCmp     966216)

FmStat ==> (LnkDwn      2) (LnkUp        2) (LIPF        1)
```

FrmSent==>	(Nop	2)	(Acc	1)	(Plogi	1)
	(Adisc	1)	(Prli	1)		
FrmRecv==>	(Cmd	685624)	(Nop	2)	(Acc	3)
	(Adisc	1)	(Test	2)		
Misc ==>	(Online	1)	(WdogChk	1674419)	(LdwnObs	1)
	(HdReset	1)	(SelfChk	2)	(XidScan	436221)
LipReas==>	(ChipRst	1)				

 This list identifies how many of each different type of SCSI command have been received.

RetStat -- These are counts of the SCSI return statuses categorized by sense key:

CHECK CONDITIONS

- (1) Recov – Recovered errors
- (2) NotRdy – Not Ready errors
- (3) Media – Media errors
- (4) HwErr – Hardware errors
- (5) Illreq – Illegal requests
- (6) UA – Unit Attentions
- (b) AbtCmd – Aborted commands
- (e) MisCpr – Mismatches
- () LnkErr – Link errors (sense key is 0x0b asc 0x47 ascq 0x00)
- () Passiv -- Passive lun status (sense key is 0x05 asc 0x94 ascq 0x01)
- () AltRst -- Alternate controller reset (sense key 0x06 asc 0x95 ascq 0x02)

RESERVATION CONFLICTS

RsvCnf -- Reservation conflicts

QUEUE FULLS

Qfull – Queue fulls

OTHER ERRORS

Other -- Other errors

IsrStat -- These are counts of the Tachyon inbound queue entry types

OutCmp -- Outbound completions

OutCmpH -- Hi priority outbound completions

InMfSeq – Inbound multi-frame sequences

OooFrm -- Out of order sequences (rare)

InSfSeq – Inbound single-frame sequences

Cls1TO – Class 1 timeout (should never see)

SfWarn – Single frame buffer queue warnings

MfWarn – Multi frame buffer queue warnings

ImqWarn – Inbound message queue warnings

RdStat – Read status requests (increment while idle)

InData – Inbound data completions

InCmnd – Inbound commands

BadScsi – Bad Scsi frames (these may or may not be bad)

InStat – Inbound SCSI statuses (should never see in target mode)

BadScsi -- These are the classifications of why a frame is declared “badScsi”

ScsData – SCSI data (normally for Mode Select or Write Buffer) (normal)

Discard – Frame was discarded (this is an error condition)

BadRxid – Frame’s RXID was invalid (this is an error condition)

Logo – Logout frame was received (this is OK)

Status – Frame was a SCSI status frame (OK in initiator mode; rare for target mode)

Misrout – Frame was sent to another port, but was received by us (error condition)

FmStat – These are counts of Frame Manager statuses.

LnkDwn – Link Down

LnkUp – Link Up

LnkFail – Link Failure

LIPF – Link Failure Lip received (LIP-F8)

NosOls – NOS or OLS primitive received

Elastic – Elastic store error

NonPart – Non participating on loop

CredErr – BB credit error

FlogReq – Flogi required

BadAlpa – Bad ALPA on frame we sent

Troubleshooting and Technical Reference Guide - Volume 1

ArbTO – Arbitration timeout on frame we sent

FrmSent (Frames we sent)

FrmRecv (Frames we received)

These are frame counts. They normally do not include SCSI frames, however.

The mnemonics are self-explanatory to someone who is familiar with fibre channel.

OXR – These are counts of the types of outbound exchange recovery that we did.

PrgErr – Programming error (indicates a driver bug)

RtyExc – Retries exceeded

Reject – Prjt or Frjt received

FrmTO – Frame timeouts

AckTO – Ack timeouts

AbtReq – Abort requested in the F_CTL of the header

LnkDwn – Link down during frame transmission

ClErr – Class 1 error

Misc -- These are counts of miscellaneous events of interest

Online – Number of times we sent LIP

LipF7 -- Number of times we sent LIP-F7

HstCtl – Number of times we went into Host Control mode

Offline – Number of times we went offline

Flush – Number of sequences we flushed

EarlyFr – Early free of exchange (common on ABTS)

Qdepth – Maximum queue depth observed

DlenMM—Data length mismatch (indicates host error on data transfer)

InvLun – Invalid lun field in FCP-CMND frame (indicates host error)

OcqWait – Number of times OCQ was full, and we had frames waiting to be sent

BlkFifo – Blocked outbound fifo

ParErr – Parity error (this is a very critical error, indicating a bad Tachyon)

MWrtTag – Number of write commands tagged as being slow to finish

Ignore – Frames ignored due to SOFF or “waiting for FAN”

RatovTO – Response timeouts due to RATO time expiring

LsRjtTO – Response timeouts due to LS-RJT received

WdogChk – Number of times watchdog idle check was made

LdwnObs – Number of “link downs” we observed.....ie we did not cause them

Misrout – Number of misrouted frames received (ones not addressed to us)

LnkRst – Number of times we sent LINK-RESET

HdReset – Number of times we initiated a hard reset of Tachyon

ElasAct – Number of times we took action to curb a flood of elastic store errors

SelfChk – Number of times we sent a “self check ECHO” to ensure BB-credit

Fatal-E – Number of fatal errors (you should never see this since we’ll reboot)

HiPri – Number of hi-priority frames we sent

Stuck – Number of times link was stuck in a failed condition more more than a second.

MwrtErr – Number of writes aborted with “link errors” due to not receiving host data

HpShort – Number of times we were out of Hi priority structures (normally a problem)

ImqFull – Number of times IMQ was full when our idle timer expired

ImqSvc – Number of times timer serviced IMQ, instead of interrupt doing it (should not see this)

Logout – These are reasons why we logged out a port.

Unk – Unknown

Prjt – Logout due to PRJT received

PortRtry – Logout due to port retry failure (we could not talk to this port)

Logo – Logout due to LOGO frame received

Prlo – Logout due to PRLO frame received

DupWwn – Logout due to duplicate worldwide name received on a PLOGI

Plogi – Logout due to another PLOGI from the same port

PlogLru – Logout due to more than our max number of ports supported exceeded (The least recently used port is logged out)

Logo3p – Logout due to TPRLO (third party logout)

NmSrvr – Logout of name server

EchoTst – Logout of port whom we sent ECHO to (temporary login)

Quiesce – Logout due to quiescence during “link down”

LupChg – Logout due to “link up” with change in connection topology (switch from loop to fabric or point-to-point, or any other combination)

NewFab – Logout due to attachment to a new fabric

PlogPtp – Logout due to point-to-point PLOGI received

Iogen – Logout due to IOGEN (debug only)

DiscTO – Logout due to discovery timeout after LIP

FabPort – Logout due to attachment to different port on same fabric

FlogFai – Logout due to FLOGI failure

LipReas – These are reasons why we issued LIP.

- Unk – Unknown
- BbCred – LIP since we don't think we're advertising BB credit (self-check failed)
- OwnFlog – We received our own FLOGI.
- IniFail – Initialization failed
- Force – LIP forced by “goFix” command
- LipHc – LIP due to LIP received while we were in host control mode
- Reconf – LIP due to reconfiguration (probably for EDTOV)
- FlgFail – LIP due to FLOGI failure
- PtpFail – LIP due to Point-to-point failure
- TgtRst – LIP due to Target reset
- NonPart – LIP to go non-participating
- Reboot – LIP due to reboot
- ChgAlpa – LIP due to us changing ALPA
- ExitFla – LIP due to us exiting Fabric loop (entering Private loop)
- Flush – LIP due to SEST flush
- ChReset – LIP due to Tachyon chip reset
- BlkFifo – LIP due to Blocked outbound Fifo (host has run out of BB credit)
- NOS – LIP due to NOS received
- Fatal – LIP due to fatal error
- Elastic – LIP due to elastic store error
- LnkFail – LIP due to link failure
- LnkStuk – LIP due to link stuck for more than one second

Discard – These are reasons for discarding frames.

- Xid – Discard due to invalid RXID
- Ratov – Discard due to exchange in error
- Other – Discard due to other reasons
- UnData – Discard due to unexpected data
- InvRO – Discard due to invalid relative offset received
- SestVal – Discard due to SEST entry invalidated
- NoFhRO – Discard due to relative offset bit not set in the F_CTL of data frame

4.3.1.02 fc 3 (list of open exchanges)

```

-> fc 3

Open Exchanges
ID: 001b 4002 da (op: 2a - 1e775ac) t: 016e80eb Hld [ in]
ID: 00a3 400c da (op: 2a - 1e7631c) t: 016e80c8 Hld [ in]
ID: 008d 4010 da (op: 2a - 1e75194) t: 016e807a DataC [ in]

NOTES:

ID: xxxx yyyy zz
xxxx = other port's exchange ID; yyyy=our exchange ID; zz = other port's ID

op: xx -: zzzzzzzz
xx = SCSI opcode of the cmd (28 = read, 2a = write, also others); zzzzzzzz = hostOp
pointer

t:yyyyy
yyyyy = time stamp when command received

ExcStage: how far along cmd is: ex➔ DataC=data xfer complete
    
```

4.3.1.03 fc 5 (Quick Status)

This is a quick and short overall status of the fibre channel interface. It is similar to “fc 1”, except that it is brief, and should not scroll off the screen. **Note:** As of SANtricity 8.30 use fcAll instead.

```

-> fc 5

fc 5 CHIP: 0 Dst chan: 0 (Tick 0279447647) ==> 07/22/36-08:52:28 (GMT ← 1.

State      : Normal (Link is Up) <Watchdog is On> CurrentLogins: 1      ← 2.
Our ID     : 2 <Loop ID 124>                               ← 3.
Our WWN    : Port: 200100a0-b80c09f6 Node: 200000a0-b80c09f6      ← 4.
Exchanges  : Current: 0 Subtotal: 0 Overall: 0                   ← 5.
    
```

```

ScsiErrs : Major:      0 Minor: 0 NoFcpResp: 0      ← 6.
LinkErrs : BadChar:   0 BadFrame: 0              ← 7.
SndRcvErrs: OXR:      0 Discards: 0             ← 8.
LinkRecov : Ldown:    2 Lfail:  0 Lip:          1 LipF7:  0      ← 9.
           : ChipRst:  0 BufWarn: 0 HostCtl:  0 Lstuck:  0
LIPFfrom  : First:    0xf7 Last: 0xf7           ← 10.
Other     : MaxQDepth: 3 BigDblock: 92832       ← 11.
TachStat  : FmgrStat: 80000000 TachStat: 3000017f ← 12.

TGV flags: (20100420) UpLoop FrmRecv LnkUp Lport ← 13.
TGV extraFlags: (00000340) OutComp FmDef Online ← 14.

```

1. Current time (tick count); Time at last debugSync (tick count)
2. Overall status; link status; watchdog on/off; number of hosts logged in
3. Our ALPA; our loop ID
4. Our worldwide name
5. Current open exchanges
6. Major check conditions; UAs and recov errs; aborted exchanges
7. Link errors detected with link up; count of bad characters received
8. Count of outbound exc recov; number of frames discarded
9. Link downs; link failures; LIPs sent; LIP-F7s sent; Tachyon resets; Tach buf warnings; elastic stores; host controls; link stuck count
10. First LIPF from this ALPA; last LIPF from this ALPA
11. SCBs in use; max queue depth seen; biggest available buffer
12. Current Frame Mgr status; current Tachyon status
13. Driver status flags
14. More driver status flags

4.3.1.04 fc 6 (Frame Mgr Status Log)

This is a log of the Tachyon Frame Manager statuses which have been read from the chip. If you are very familiar with Tachyon and the driver it will be useful in debugging “link-down-up” error recovery.

(4.x version)

```

-> fc 6

CurTime: (Actual: 016e8275) - (SyncAt: 0000256b) = (SyncTime: 016e5d0a)

Entry  SyncTime  TimeDiff  FmgrStat  Tach  ....TgvFlags.....  Count
  0      27      650 ms   98000000  1014  20100420  00000240  70466
  1  16e5ceb   111 hr   98000010  0014  20100420  00000240  0001
  2  16e5cf7   200 ms   98000030  0014  20100420  00000240  0001
  3  16e5d03   200 ms   98000000  1014  20100420  00000240  0001
  4  16e5d24   550 ms

```

(5.x version)

```

-> fc 6

fc 6 CHIP: 0 Dst chan: 0 (Tick 0027123891) ==> 05/08/02-21:13:50 (GMT)

LABEL      DESC      SIZE      ELEMENTS FULL FIRST      LAST
trace.1    fc          250000    436 005% 05/03/02-15:39:37 05/08/02-20:45:31

FILTERS: "wl=fc(0)", "wi=0(0)", "fc=fmgr(0)"

15:39:37.133 c0000 FmgrChange <<FMGRSTAT>>:0x300000e0 SmLoopOffline SmPortOffline Bypass
NonPart
                                tachStat:0x3c00015f InLinkEmpty OutLinkEmpty InFifoEmpty
OutFifoEmpty
                                tFlags:0x00880840 FlogiReq LipRecv HrdRst RstIni
                                tFlags2:0x10000400 FrzAchv GbicTogl
15:39:37.150 c0000 FmgrChange <<FMGRSTAT>>:0x80000200 SmLoopMonitor SmPortOffline LnkUp
LoopEstab
                                tachStat:0x3c00015f InLinkEmpty OutLinkEmpty InFifoEmpty
OutFifoEmpty
                                tFlags:0x00890000 FlogiReq BasLinkUp LipRecv
                                tFlags2:0x10000400 FrzAchv GbicTogl
15:39:37.533 c0000 FmgrChange <<FMGRSTAT>>:0x80000000 SmLoopMonitor SmPortOffline
LoopEstab

```

```

OutFifoEmpty          tachStat:0x3c00015f InLinkEmpty OutLinkEmpty InFifoEmpty
                        tFlags:0x20110420 LoopPort LinkUp BasLinkUp FrmRcv
LnkUpLoop             tFlags2:0x00000050 TdPending OutComp
15:39:37.667 c0000 FmgrChange <<FMGRSTAT>>:0x80000300 SmLoopMonitor SmPortOffline
LnkDown LnkUp LoopEstab
                        tachStat:0x2c07015f ErqFrozen InFcpFrozen OutFcpFrozen
InLinkEmpty OutLinkEmpty OutFifoEmpty
                        tFlags:0x20110420 LoopPort LinkUp BasLinkUp FrmRcv
LnkUpLoop             tFlags2:0x00000050 TdPending OutComp
15:39:37.900 c0000 FmgrChange <<FMGRSTAT>>:0x80000000 SmLoopMonitor SmPortOffline
LoopEstab
                        tachStat:0x3c00015f InLinkEmpty OutLinkEmpty InFifoEmpty
OutFifoEmpty          tFlags:0x20110420 LoopPort LinkUp BasLinkUp FrmRcv
LnkUpLoop             tFlags2:0x00000850 TdPending OutComp TdRestart
    
```

4.3.1.05 fc 7 (Check Condition Log)

This is a log of SCSI check conditions which the Controller has returned to the host.
(4.x version)

```

-> fc 7

CurTime: (Actual: 008fe72f) - (SyncAt: 00000000) = (SyncTime: 008fe72f)

Entry  SyncTime  TimeDiff  St (sk-asc-q)  Cmd  Lun  Host (FcId)  Oxid
  0      119    4683 ms    02 (06-29-00)  5a   00   000001(00)  56c1
  1      137     500 ms    02 (02-04-01)  5a   00   000001(00)  56c2
  2      280    5483 ms    02 (02-04-01)  5a   00   000001(00)  56c3
    
```

(5.x version)

```

-> fc 7

fc 7 CHIP: 0 Dst chan: 0 (Tick 0027106191) ==> 05/08/02-21:08:55 (GMT)

LABEL      DESC      SIZE      ELEMENTS FULL FIRST      LAST
trace.1    fc        250000    436 005% 05/03/02-15:39:37 05/08/02-20:45:31

FILTERS: "wl=fc(0)", "wi=0(0)", "fc=retcc(0)"
    
```

4.3.1.06 fc 8 (Event Log)

This is a log of events, which are deemed to be of some significance during debug.
(4.x version)

```

-> fc 8

CurTime: (Actual: 008fe7c5) - (SyncAt: 00000000) = (SyncTime: 008fe7c5)

Entry  SyncTime  TimeDiff  Event
  0      d1    3483 ms  ChipReset
  1      d1         0 ms  LinkInit (cfg:e4000100)
  2      d6     83 ms  LinkUpLoop fmCfg: e4000200
  3      d6         0 ms  Send Flogi
  4      d6         0 ms  Flogi failed (send)
  5      112   1000 ms  Plogi wwn:6940061b id:1

  5      8fe7c5   43 hr
    
```

(5.x version)

```

-> fc 8

fc 8 CHIP: 0 Dst chan: 0 (Tick 0027113743) ==> 05/08/02-21:11:01 (GMT)

LABEL      DESC      SIZE      ELEMENTS FULL FIRST      LAST
trace.1    fc        250000    436 005% 05/03/02-15:39:37 05/08/02-20:45:31

FILTERS: "wl=fc(0)", "wi=0(0)", "fd=1(1)"

15:39:37.083 c0000 CauseLinkDown
15:39:37.133 c0000 LnkInit(LIP) fmCfg:x01000100 <reason:SodInit>
15:39:37.150 c0000 TrialUpLoop AcqAlpa:x01
15:39:37.150 c0000 FinalLinkUp
    
```

```

15:39:37.667 c0000 ObserveLinkDown
15:39:37.667 c0000 TrialUpLoop   AcqAlpa:x01
15:39:37.667 c0000 FinalLinkUp
15:39:38.200 c0000 TD Start      devs(loopMap:2 previous:0)
15:39:38.200 c0000 LnkInit(LIP)  fmCfg:x01000200 <reason:TdCount>
15:39:38.200 c0000 CauseLinkDown
15:39:38.200 c0000 TrialUpLoop   AcqAlpa:x01
15:39:38.200 c0000 FinalLinkUp
15:39:38.733 c0000 TD Start      devs(loopMap:2 previous:2)
15:39:38.750 c0000 ObserveLinkDown
15:39:38.750 c0000 TrialUpLoop   AcqAlpa:x01
15:39:38.750 c0000 FinalLinkUp
15:39:38.950 c0000 LnkInit(LIP)  fmCfg:x01000200 <reason:SodInit>
15:39:38.950 c0000 CauseLinkDown
15:39:38.950 c0000 TrialUpLoop   AcqAlpa:x01
15:39:38.950 c0000 FinalLinkUp
15:39:39.483 c0000 TD Start      devs(loopMap:2 previous:2)
15:39:39.483 c0000 TD Done
    
```

4.3.1.07 fc 10 (host login list)

List of Hosts who have performed login.
(4.x version)

```

-> fc 10

Active dstNPort Q

Port: 0xfffffe (0x01e6d7a4):    active | FCP: no | WWN: 00000000-00000000
Port: 0x0000dc (0x01e6d86c):    active | FCP: yes | WWN: 100000a0-b8028003
Port: 0x0000da (0x01e6d934):    active | FCP: yes | WWN: 100000a0-b802116b
  (Count = 3)
    
```

NOTES: a. Port 0xfffffe is not a host. It is used to talk to the fabric.
 b. "active" means that we are free to send frames to that port.
 c. "FCP yes" means that port has performed a SCSI login (PRLI)
 d. "WWN" is the worldwide name used by that port.

(5.x & 6.x versions)

```

-> fc 10

fc 10 CHIP: 0 Dst chan: 0 (Tick 0027150337) ==> 05/08/02-21:21:11 (GMT)

LAST VALID LOOP MAP:
      02 02 01 ff

LAST DISCOVERY LIST:
<Index: 0>
07c3f930: 00000001 00000002          *.....*

Role  Chip  PortId      PortWwn          NodeWwn          DstNPort
Dflt   0  fffffe  00000000-00000000  00000000-00000000  07bf21d8
This   0  000001  000000a0-b80cc7fa  000000a0-b80cc7fa  07bf2254
Lmir   0  000002  200100a0-b80c80a5  200000a0-b80c80a5  07bf22d0

Role  Chip  PortId  Flags
Dflt   0  fffffe  PRMT: 0x00000010 AbDsReq FLG: 0x00001000 Analyze
This   0  000001  PRMT: 0x1fd5e832 HddPort AbDsReq ShtSns FLG: 0x00001006 Plogi Prli
Analyze
Lmir   0  000002  PRMT: 0x0000003b LogiIni HddPort HsdPort AbDsReq ShtSns FLG:
0x00001006 Plogi Prli Analyze
    
```

4.3.1.08 fc 10,10,3 (detailed host login list)

(4.x version only)

```

-> fc 10,10,3

Active dstNPort Q
-----

dstNPort: 1e6d7a4 portID: 0xfffffe alpa: 0x0 ourID: 0x0 (FABRIC)
Port flags: (4001) ACTIVE NO_EXLOGI
SeqId (C2/3: a)
ACK0 (C1: 0) (C2: 0)
ScbQ: 1e6d830 SuspQ: 1e6d83c
RNC Capability: Flags: 0 docId: 0 loRev: 0 hiRev: 0
FcpLogin--Type: 0800 Flags: 2100 PA: 0000000000000000 Svc: 00000012

Port Login ParmS
Ver: 2009 BbCred: 0000 ComFeat: 0800 BbRcvSz: 0080
TotConSeq: 0000 RoCat: 0000 EdTov: 00000000
WWN: 0000000000000000 NN : 0000000000000000
C1 SvcOpt: 0000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0000
   ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000
C2 SvcOpt: 8000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0080
   ConSeq: 0000 EeCred: 0001 SeqExc: 0000 Resv : 0000
C3 SvcOpt: 8000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0080
   ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000

Received Fabric Login ParmS
Ver: 0000 BbCred: 0000 ComFeat: 0000 BbRcvSz: 0000
RaTov: 00000000 EdTov: 00000000
WWN: 0000000000000000 NN : 0000000000000000
C1 SvcOpt: 0000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0000
   ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000
C2 SvcOpt: 0000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0000
   ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000
C3 SvcOpt: 0000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0000
   ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000

Received Fabric Service
Svc: 00000000

Our Fabric Login ParmS
Ver: 2009 BbCred: 0000 ComFeat: 0800 BbRcvSz: 0800
RaTov: 00000000 EdTov: 00000000
WWN: 100000a0b80391d1 NN : 100000a0b80391d1
C1 SvcOpt: 0000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0000
   ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000
C2 SvcOpt: 8800 IniCtl: 0000 RcpCtl: 0000 FldSz: 0800
   ConSeq: 0000 EeCred: 0004 SeqExc: 0000 Resv : 0000
C3 SvcOpt: 8800 IniCtl: 0000 RcpCtl: 0000 FldSz: 0800
   ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000

Our Port Login ParmS
Ver: 2009 BbCred: 0000 ComFeat: 8800 BbRcvSz: 0800
TotConSeq: 00ff RoCat: 0002 EdTov: 000007d0
WWN: 100000a0b80391d1 NN : 100000a0b80391d1
C1 SvcOpt: 0000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0000
   ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000
C2 SvcOpt: 8000 IniCtl: 0800 RcpCtl: 2000 FldSz: 0800
   ConSeq: 00ff EeCred: 0004 SeqExc: 0001 Resv : 0000
C3 SvcOpt: 8000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0800
   ConSeq: 00ff EeCred: 0000 SeqExc: 0001 Resv : 0000
-----

dstNPort: 1e6d86c portID: 0xdc alpa: 0xdc ourID: 0xe1 host: 0x10
Port flags: (4011) ACTIVE PRLI NO_EXLOGI
SeqId (C2/3: e6)
ACK0 (C1: 0) (C2: 0)
ScbQ: 1e6d8f8 SuspQ: 1e6d904

RNC Capability: Flags: 0 docId: 0 loRev: 0 hiRev: 0
FcpLogin--Type: 0800 Flags: 2000 PA: 0000000000000000 Svc: 00000022

Port Login ParmS

```

```

Ver: 2009 BbCred: 0000 ComFeat: 8800 BbRcvSz: 0800
TotConSeq: 00ff RoCat: 0002 EdTov: 000007d0
WWN: 100000a0b8028003 NN : 100000a0b8028003
C1 SvcOpt: 0000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0000
  ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000
C2 SvcOpt: 8000 IniCtl: 0800 RcpCtl: 2000 FldSz: 0800
  ConSeq: 00ff EeCred: 0004 SeqExc: 0001 Resv : 0000
C3 SvcOpt: 8000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0800
  ConSeq: 00ff EeCred: 0000 SeqExc: 0001 Resv : 0000
-----
dstNPort: 1e6d934 portID: 0xda alpa: 0xda ourID: 0xe1 host: 0x11
Port flags: (4011) ACTIVE PRLI NO_EXLOGI
SeqId (C2/3: ae)
ACK0 (C1: 0) (C2: 0)
ScbQ: 1e6d9c0 SuspQ: 1e6d9cc
RNC Capability: Flags: 0 docId: 0 loRev: 0 hiRev: 0
FcpLogin--Type: 0800 Flags: 2000 PA: 0000000000000000 Svc: 00000022

Port Login ParmS
Ver: 2009 BbCred: 0000 ComFeat: 8800 BbRcvSz: 0800
TotConSeq: 00ff RoCat: 0002 EdTov: 000007d0
WWN: 100000a0b802116b NN : 100000a0b802116b
C1 SvcOpt: 0000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0000
  ConSeq: 0000 EeCred: 0000 SeqExc: 0000 Resv : 0000
C2 SvcOpt: 8000 IniCtl: 0800 RcpCtl: 2000 FldSz: 0800
  ConSeq: 00ff EeCred: 0004 SeqExc: 0001 Resv : 0000
C3 SvcOpt: 8000 IniCtl: 0000 RcpCtl: 0000 FldSz: 0800
  ConSeq: 00ff EeCred: 0000 SeqExc: 0001 Resv : 0000
(Count = 3)
    
```

(5.x version)

```

-> fc 10,10,3

fc 10 CHIP: 0 Dst chan: 0 (Tick 0114549057) ==> 04/28/05-19:02:09 (GMT)

LAST VALID LOOP MAP:
      0f 01 ef e8 - e4 e2 e1 e0 - dc da 55 3a - 72 4b 2e 02

LAST DISCOVERY LIST:
<Index: 0>
a164c0f0: 0000000e 00000002 000000ef 000000e8 *.....*
a164c100: 000000e4 000000e2 000000e1 000000e0 *.....*
a164c110: 000000dc 000000da 00000055 0000003a *.....U.....*
a164c120: 00000072 0000004b 0000002e *r...K.....*

Role  Chip  PortId      PortWwn      NodeWwn      DstNPort
Dflt  0  fffffe  00000000-00000000  00000000-00000000  a16347f0
This  0  000001  000000a0-b80b1e3e  000000a0-b80b1e3e  a163486c
Disk  0  0000e4  21000020-37a54afa  20000020-37a54afa  a1634eb8
Disk  0  0000e0  21000020-37f2b760  20000020-37f2b760  a1634d44
Disk  0  0000ef  21000020-37f2b770  20000020-37f2b770  a1634fb0
Disk  0  00003a  21000020-37f2b780  20000020-37f2b780  a1634b54
Disk  0  0000e1  21000020-37f2b781  20000020-37f2b781  a1634dc0
Disk  0  00004b  21000020-37f2b7ff  20000020-37f2b7ff  a16349e0
Disk  0  00002e  21000020-37f2e576  20000020-37f2e576  a1634964
Disk  0  0000da  21000020-37f2e5fb  20000020-37f2e5fb  a1634c4c
Disk  0  000072  21000020-37f2e637  20000020-37f2e637  a1634ad8
Disk  0  000055  21000020-37f2e6a3  20000020-37f2e6a3  a1634bd0
Disk  0  0000e2  21000020-37f2e6b9  20000020-37f2e6b9  a1634e3c
Disk  0  0000e8  21000020-37f2e6f1  20000020-37f2e6f1  a1634f34
Disk  0  0000dc  21000020-37f2e6f2  20000020-37f2e6f2  a1634cc8
Lmir  0  000002  200100a0-b80b5e06  200000a0-b80b5e06  a16348e8

Role  Chip  PortId  Flags
Dflt  0  fffffe  PRMT: 0x00000010 AbDsReq FLG: 0x00001000 Analyze
This  0  000001  PRMT: 0x00000032 HddPort AbDsReq ShtSns FLG: 0x00001006 Plogi Prli
Analyze
Disk  0  0000e4  PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk  0  0000e0  PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
    
```

```
Analyze
Disk 0 0000ef PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 00003a PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 0000e1 PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 00004b PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 00002e PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 0000da PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 000072 PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 000055 PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 0000e2 PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 0000e8 PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Disk 0 0000dc PRMT: 0x00000013 LogiIni HddPort AbDsReq FLG: 0x00001006 Plogi Prli
Analyze
Lmir 0 000002 PRMT: 0x0000003b LogiIni HddPort HsdPort AbDsReq ShtSns FLG:
0x00001006 Plogi Prli Analyze
```

(6.x version)

```
-> fc 10,10,3

fc 10 CHIP: 0 Dst chan: 0 (Tick 0001055401) ==> 04/29/05-00:08:30 (GMT)

LAST VALID LOOP MAP:
      02 01 02 ff

LAST DISCOVERY LIST:
<Index: 0>
1c431520: 00000001 00000002 *.....*

Role  Chip  PortId      PortWwn          NodeWwn          DstNPort
Dflt   0  fffffe  00000000-00000000  00000000-00000000  1c062d94
This   0  000001  200100a0-b8111546  200000a0-b8111546  1c0326f0
Lmir   0  000002  200100a0-b81116de  200000a0-b81116de  1af24718

Role  Chip  PortId  Flags
Dflt   0  fffffe  PRMT: 0x00000010 AbDsReq FLG: 0x00001000 Analyze
This   0  000001  PRMT: 0x0000003a HddPort HsdPort AbDsReq ShtSns FLG: 0x00001006 Plogi
Prli Analyze
Lmir   0  000002  PRMT: 0x0000003b LogiIni HddPort HsdPort AbDsReq ShtSns FLG:
0x00001006 Plogi Prli Analyze
```

4.3.1.09 fc 12 (firmware versions)

This is the same as a “moduleList” and an “arrayPrintSummary” combined.

4.3.1.10 fc 20 (Tachyon Line-level Statistics)

(4.x version)

```
-> fc 20

FMGR status: 0x98000000
GLM speed: 1062 Mb/s
Loop machine: MONITOR
Nport machine: OFFLINE
* Loop estab

Tachyon status: 0x1014
Inbound data FIFO is empty
Outbound FIFO is empty
```



```

Link Err Stat Counts:
  Link fail:          0
  Loss of signal:    0
  Loss of sync:      0

BAD CHARACTERS
  Recv Bad Char:     0

BAD FRAMES
  Recv EOFa:         0
  Recv-FmGen EOFa:  0
  Recv Bad CRC:      0
  Protocol err:      0

MISC REGISTERS
  P_BSY sent:        0x0
  TACH_CFG:          0x40002b46
  FM_CFG:            0xe4000200
  RTTOV/ALTIME:     15 (0xf) ms
  EDTOV:             2000 (0x7d0) ms
  BB-CRED:           0 (0x0)
  Bad Alpa:          0x00
    
```

(5.x & 6.x versions)

```

-> fc 20

fc 20 CHIP: 0 Dst chan: 0 (Tick 0027180962) ==> 05/08/02-21:29:41 (GMT)

-----
FmgrStat: 0x80000000 SmLoopMonitor SmPortOffline LoopEstab

TachStat: 0x3c00f15f InLinkEmpty OutLinkEmpty InFifoEmpty OutFifoEmpty StopCount=15

-----
CHIP LINK ERROR STATUS COUNTS
  LinkFail:          0 LossSignal:    1 LossSync:    0
  Bad Char:          0
  Bad Frames:        EOFa:            0 Discard:      0
  BadCrc:            0 Expire:        0

-----
TachBase: 0x40300000 LinkList: 0xffffffff
TachCfg:  0x18000086 TachCfg2: 0x000001ff
FmCfg:    0x01000200 FmCfg2:  0x80800108 FmCfg3: 0x80332041
InRstat:  0x00000000 InRstat2: 0x00000000
RecvAlpa: 0x00010000 Acq:01 Bad:00 Lipf:00
BbCredTmr:0x00000000 ScatPgLcn: 4 ScatAlign: 32
RTTOV: 100 ms EDTOV: 2000 ms LPTOV: 2000 ms ALTIME: 15 ms

-----
TACHLITE QUEUES
SFQ 07c18000 P:Tach (Indx) P:110 C:110 Avail:127 Max:128
IMQ 07c1a000 PI 07c084c0 P:Tach (Indx) P: 59 C: 59 Avail:127 Max:128
ERQ 07c1b000 CI 07c084c4 P:Drvr (Indx) P: 30 C: 30 Avail: 31 Max: 32

SEST: 07c10000 SFQ PI (Obs:110 Proc:110) SFQ CI (Written:110)

-----
PciIntPend: 0x0000
PciIntEnable: 0x0007 PciErr DmaErr ImqInt
PciIntStatus: 0x0000
PciRomCtl: 00
PciMasCtl: 04
PciResetCtl: 00
LastIntSet (Tick 0027180952) ==> 05/08/02-21:29:41 (GMT)
LastTmrSet (Tick 0027180943) ==> 05/08/02-21:29:41 (GMT)
LastIntSvc (Tick 0027180952) ==> 05/08/02-21:29:41 (GMT)
    
```

NOTES:

Link err stat counts: Should be zero. They may be non-zero after a link failure caused by power-cycling or rebooting a machine on the loop. To get accurate information, zero these counts after all devices are up on the loop by entering “fc 90”.

LIPF alpa: Identifies the port which detected a break in the loop on its receiver side.

4.3.1.11 Clear Counters (fc90)

06.15 and lower

Clears all counters found in “fc 2 and fc 20” back to zero. Use **fcAll 90** to clear counters on all channels.

06.16 and higher

Use the command **iopPerfMonRestart**

4.3.1.12 Clearing the accumulated totals and the trace (fc 91)

06.15 and lower

In order to clear all trace information, as well as perform the functions of “fc 90” (for the chip defined by fcChip). To clear this data for all chips, enter use **fcAll 91**.

06.16 and higher

Use the command **iopPerfMonRestart**

4.3.1.13 fc 100 (World Wide Name change information)

This command displays the last time the WWN changed and calls the **fcNames** command at the end.

```
-> fc 100

Our Mac Name                000000a0-b80c09f6
Our Change Num              0002

Alt Saved Mac Name          000000a0-b807b492
Alt ChkIn Mac Name          000000a0-b807b492

Base Name                    002800a0-b807b492

Base Name Validation         SigMatch
Base Name Changed            01/01/70-00:00:00
Prev base name               00000000-00000000

System Signature             100000a0-b807076c
System Signature Changed     09/13/01-10:01:15

Source Channel Port ID History
Chan  CurrID  PrevID      Changed
0     000002  000000     09/13/01-10:01:15
1     000000  000000     01/01/70-00:00:00

WORLDWIDE NAMES
CHIP  PortName                NodeName                TGV Adrs
0-Dst 200100a0-b80c09f6      200000a0-b80c09f6      03bb438c
1-Dst 200200a0-b80c09f6      200000a0-b80c09f6      03b31e28
2-Dst 200300a0-b80c09f6      200000a0-b80c09f6      03adaa18
3-Dst 200400a0-b80c09f6      200000a0-b80c09f6      03a83608
4-Src 202900a0-b807b493      202800a0-b807b492      031575b8
5-Src 202900a0-b807b494      202800a0-b807b492      030dfcbc
```

4.3.1.14 fcNames (How to get worldwide names for all the channels)

This function provides a concise listing of all the port names and node names that the controller uses on the various fibre channels. It also provides a listing of all the TGV structure addresses. The TGV is the major driver data structure used to control each channel.

```
-> fcNames

CHIP  PortName                NodeName                TGV Adrs
0     200100a0-b8001356      200000a0-b8001356      03bdd77c
1     200200a0-b8001356      200000a0-b8001356      03baaf34
2     200300a0-b8001356      200000a0-b8001356      03b1a144
3     200400a0-b8001356      200000a0-b8001356      03ae4bc0
4     201a00a0-b8001357      201a00a0-b8001356      0386da54
5     201a00a0-b8001358      201a00a0-b8001356      03838a88
```

4.3.1.15 fc101

Displays the link speed of each of the fibre channel loops. On non-RC systems, the drive side channels should all be set to the same speed.

```
-> fc 101

(Tick 0067102070) ==> 10/28/03-18:39:56 (GMT)

Chip  Speed
0     2 GB   <-
1     2 GB   <- Channels 0 & 1 speed should match
2     1 GB   <- the speed on channels 2 & 3
3     1 GB   <-
4     2 GB
5     1 GB
```

4.3.1.16 fc111

06.15 and lower

Similar to fcNames.

```
-> fc 111

(Tick 0026837190) ==> 01/11/05-19:58:34 (GMT)

Hst-Role(Ch) PortId      PortWwn          NodeWwn          DstNPort      CmdRecv  Label
0-This( 4)  021700    200400a0-b80ce4d5 200400a0-b80ce4d4 075e0c14      0
1-This( 0)  000001    200100a0-b80ce4d4 200000a0-b80ce4d4 077e15b0      0
2-Lmir( 0)  000002    200100a0-b80fd827 200000a0-b80fd827 077e162c      0
3-This( 1)  000001    200200a0-b80ce4d4 200000a0-b80ce4d4 077a9c3c      0
4-This( 2)  000001    200300a0-b80ce4d4 200000a0-b80ce4d4 07777380      0
5-Lmir( 2)  000002    200300a0-b80fd827 200000a0-b80fd827 077773fc      0
6-This( 3)  000001    200400a0-b80ce4d4 200000a0-b80ce4d4 07744ac4      0
7-Lmir( 3)  000002    200400a0-b80fd827 200000a0-b80fd827 07744b40      0
8-This( 5)  000000    200400a0-b80ce4d6 200400a0-b80ce4d4 06d0830c      0
9-Lmir( 1)  000002    200200a0-b80fd827 200000a0-b80fd827 077a9cb8      0
10-Free( 4) fffc02    20fd0060-69c02706 10000060-69c02706 075e0c90      1
11-Host( 4) 021000    210000e0-8b0491ac 200000e0-8b0491ac 075e0d0c      2

Displays the link speed of each of the fibre channel loops
```

4.3.1.17 fcAll (How to get an overall status)

Chip: This field identifies the TachLite chip and what side it is connected to. Within the controller, there are 6 chips. There are 4 destination-side (Dst) chips (channels 0-3) and 2 source-side (Src) chips (channels 0-1). Depending upon the order in which the array initializes, the destination-side or the source-side chips may be listed first.

LinkStat: This field tells whether the link is “up” or “down” on this channel. Since the SYM 1200 employs minihubs, the link is normally up unless the minihub is absent, regardless of whether or not any cables are attached to the minihub. This field also lists the type of connection: “Loop”= private loop, “Fla”=public loop, “Fab”=direct fabric attach, or “Ptp”=point-to-point.

OurPortId: This field identifies what the controller’s port ID is on this channel. For private loop configurations, this is normally a one-byte field. For fabric or public loop configurations, this is normally a three-byte field.

Num Port Logins: This field identifies how many fibre channel devices have a valid login with us. A valid login means that we have at least completed PLOGI.

Exchanges: The next three fields deal with exchanges.

The “open exchanges” field tells how many exchanges we have open on this channel (ie unfinished exchanges). Typically, an exchange equates to a SCSI command. However, this is not necessarily the case, as PLOGIs, ECHOs, and other link services commands are also exchanges. From an internal viewpoint, for each open exchange, there is an XCB structure, and these may be viewed by using the “fc 3” function.

The “total exchanges” field tells how many exchanges we have processed on this channel. Most of these exchanges will probably be closed and no longer active. You can use this field to see how much activity we have had on this channel.

The “error exchanges” field tells how many exchanges were terminated abnormally. A check condition is not necessarily an abnormal termination. This field is incremented whenever an XCB is marked in error.

Link Down: This field tells how many times the link went down on this channel. Normally this tells you how many LIPs or Link Resets we observed or caused.

Bad Char: This field tells how many bad characters were detected by TachLite while the link was up.

Bad Frames: This field tells how many low-level transmission-reception errors were detected by TachLite on this channel while the link was up. This includes “CRC errors”, and “discarded frames”. If we show “Bad Frames”, then we probably have some component problems which will likely cause a “Link Down” shortly.

```
-> fcAll
fcAll (Tick 0280286690) ==> 07/22/36-12:45:32 (GMT)

4774-B      Our Num  :...Exchange Counts...: Num  ..Link Up..
Chip LinkStat Port Port  :
          ID Logi  ::Open   Total  Errors:: Down  Char Frame
0-Dst Up-Loop  2   1  :: 0      1815    0::  0   0   0
1-Dst Up-Loop  2   1  :: 0     1418210  0::  2   0   0
2-Dst Up-Loop  2  24  :: 0     4094541  9::  2   0   0
3-Dst Up-Loop  2  24  :: 0     9304507  11:: 2   0   0
4-Src Up-Loop  2   2  :: 0     842885   63:: 6   0   0
5-Src Down---  0   1  :: 0         0      0::  1   0   0
```

4.3.1.18 fcTail (Display last few entries of each log)

04.xx only

To display only the last few entries in a log, use the “fcTail” function:

fcTail <log id>, <number of entries to display>

For example, to display the last 20 lines of the event log, enter: **fcTail 8, 20**

To display the last 20 lines of all event logs, enter: **fcTailAll 8, 20**

4.3.1.19 fcHosts

Displays information about the host side login. Using the command by itself will give usage information. Each higher number of view gives more detail than the previous version. Functionally the same as **fc 111** and similar to **fcNames**.

```
-> fcHosts

fcHost <view>,<hostNum>
or for all hosts: fcHosts <view>
  1 = Name View
  2 = Flags View
  3 = Log View
  4 = Log Help View

-> fchosts 1

Hst-Role(Ch) PortId      PortWwn          NodeWwn          DstNPort  CmdRecv  Label
1-This( 0) 000002 200100a0-b80f1557 200000a0-b80f1557 44e520c0  0
InitiatorPort_Bm_ch0
2-This( 1) 000002 200200a0-b80f1557 200000a0-b80f1557 44e51b60  0
InitiatorPort_Bm_ch1
3-Lmir( 0) 000001 200100a0-b80f15b1 200000a0-b80f15b1 44e51720  0
InitiatorPort_Am_ch0
4-Lmir( 1) 000001 200200a0-b80f15b1 200000a0-b80f15b1 44e511a0  0
InitiatorPort_Am_ch1
5-Host( 3) 0000ef 210000e0-8b011cec 200000e0-8b011cec 44b43da0 1518726 tslab47-1
6-This( 3) 0000e2 200700a0-b80f1559 200600a0-b80f1557 44b434c0  0
InitiatorPort_Bh_ch3
```

```

-> fcHosts 2

===== HOST 1 =====
Hst-Role(Ch) PortId      PortWwn      NodeWwn      DstNPort    CmdRecv Label
  1-This( 0) 000002    200100a0-b80f1557  200000a0-b80f1557  44e520c0    0
InitiatorPort_Bm_ch0

PERMITS: 0x0000003a HddPort HsdPort AbDsReq ShtSns
FLAGS:   0x00000006 Plogi Prli
LastActivity: 04/12/09-06:33:13 (GMT)
RESERVATIONS HELD: 0

===== HOST 2 =====
Hst-Role(Ch) PortId      PortWwn      NodeWwn      DstNPort    CmdRecv Label
  2-This( 1) 000002    200200a0-b80f1557  200000a0-b80f1557  44e51b60    0
InitiatorPort_Bm_ch1

PERMITS: 0x0000003a HddPort HsdPort AbDsReq ShtSns
FLAGS:   0x00000006 Plogi Prli
LastActivity: 04/12/09-06:33:13 (GMT)
RESERVATIONS HELD: 0

===== HOST 3 =====
Hst-Role(Ch) PortId      PortWwn      NodeWwn      DstNPort    CmdRecv Label
  3-Lmir( 0) 000001    200100a0-b80f15b1  200000a0-b80f15b1  44e51720    0
InitiatorPort_Am_ch0

PERMITS: 0x0000003b LogiIni HddPort HsdPort AbDsReq ShtSns
FLAGS:   0x00000406 Plogi Prli LoginRcvd
LastActivity: 01/29/07-21:38:04 (GMT)
RESERVATIONS HELD: 0

===== HOST 4 =====
Hst-Role(Ch) PortId      PortWwn      NodeWwn      DstNPort    CmdRecv Label
  4-Lmir( 1) 000001    200200a0-b80f15b1  200000a0-b80f15b1  44e511a0    0
InitiatorPort_Am_ch1

PERMITS: 0x0000003b LogiIni HddPort HsdPort AbDsReq ShtSns
FLAGS:   0x00000406 Plogi Prli LoginRcvd
LastActivity: 01/29/07-21:38:04 (GMT)
RESERVATIONS HELD: 0

===== HOST 5 =====
Hst-Role(Ch) PortId      PortWwn      NodeWwn      DstNPort    CmdRecv Label
  5-Host( 3) 0000ef    210000e0-8b011cec  200000e0-8b011cec  44b43da0    1518741 tslab47-1

PERMITS: 0x00000008 HsdPort
FLAGS:   0x00000406 Plogi Prli LoginRcvd
LastActivity: 01/29/07-21:38:03 (GMT)
RESERVATIONS HELD: 0

===== HOST 6 =====
Hst-Role(Ch) PortId      PortWwn      NodeWwn      DstNPort    CmdRecv Label
  6-This( 3) 0000e2    200700a0-b80f1559  200600a0-b80f1557  44b434c0    0
InitiatorPort_Bh_ch3

PERMITS: 0x0000003a HddPort HsdPort AbDsReq ShtSns
FLAGS:   0x00000406 Plogi Prli LoginRcvd
LastActivity: 04/12/09-06:33:17 (GMT)
RESERVATIONS HELD: 0

-> fcHosts 3

===== HOST 1 =====
Hst-Role(Ch) PortId      PortWwn      NodeWwn      DstNPort    CmdRecv Label
  1-This( 0) 000002    200100a0-b80f1557  200000a0-b80f1557  44e520c0    0
InitiatorPort_Bm_ch0
    
```

```

PERMITS: 0x0000003a HddPort HsdPort AbDsReq ShtSns
FLAGS: 0x00000006 Plogi Prli
LastActivity: 04/12/09-06:33:13 (GMT)
RESERVATIONS HELD: 0

HOST LOG==> logCtl:44e51c04 logIndex: 9 goodIoCount:0
dstNPort:44e520c0 maxIndex: 10 logIoCount:2

RepeatCounts -- IO Types
(R=read,W=write,O=other,N=nonScsi)
Num Time LogCode Qualifier LogCode GoodIo Outstand
Cnt Type Cnt Type Cnt Type
1 06:33:13 First 00000000 1 ---- 1 ---- 1 ----
2 06:33:13 Login b80f1557 1 ---- 1 ---- 1 ----
3 06:33:14 LinkDown LpeAll <5 ---- 1 ---- 1 ----
4 18:27:18 LinkDown Observed 1 ---- 1 ---- 1 ----
5 18:27:18 LinkDown Mhm 1 ---- 1 ---- 1 ----
6 18:27:20 LinkDown Observed 1 ---- 1 ---- 1 ----
7 18:27:20 LinkDown Mhm 1 ---- 1 ---- 1 ----
8 18:27:29 LinkDown Observed 1 ---- 1 ---- 1 ----
9 18:27:29 LinkDown Mhm 1 ---- 1 ---- 1 ----
10 18:27:30 LinkDown Observed <5 ---- 1 ---- 1 ----

===== HOST 2 =====

Hst-Role(Ch) PortId PortWwn NodeWwn DstNPort CmdRecv Label
2-This( 1) 000002 200200a0-b80f1557 200000a0-b80f1557 44e51b60 0
InitiatorPort_Bm_ch1

PERMITS: 0x0000003a HddPort HsdPort AbDsReq ShtSns
FLAGS: 0x00000006 Plogi Prli
LastActivity: 04/12/09-06:33:13 (GMT)
RESERVATIONS HELD: 0

HOST LOG==> logCtl:44e517c8 logIndex: 9 goodIoCount:0
dstNPort:44e51b60 maxIndex: 10 logIoCount:2

RepeatCounts -- IO Types
(R=read,W=write,O=other,N=nonScsi)
Num Time LogCode Qualifier LogCode GoodIo Outstand
Cnt Type Cnt Type Cnt Type
1 06:33:13 First 00000000 1 ---- 1 ---- 1 ----
2 06:33:13 Login b80f1557 1 ---- 1 ---- 1 ----
3 06:33:14 LinkDown LpeAll <5 ---- 1 ---- 1 ----
4 18:27:18 LinkDown Observed 1 ---- 1 ---- 1 ----
5 18:27:18 LinkDown Mhm 1 ---- 1 ---- 1 ----
6 18:27:20 LinkDown Observed 1 ---- 1 ---- 1 ----
7 18:27:20 LinkDown Mhm 1 ---- 1 ---- 1 ----
8 18:27:29 LinkDown Observed 1 ---- 1 ---- 1 ----
9 18:27:29 LinkDown Mhm 1 ---- 1 ---- 1 ----
10 18:27:30 LinkDown Observed <5 ---- 1 ---- 1 ----

===== HOST 3 =====

Hst-Role(Ch) PortId PortWwn NodeWwn DstNPort CmdRecv Label
3-Lmir( 0) 000001 200100a0-b80f15b1 200000a0-b80f15b1 44e51720 0
InitiatorPort_Am_ch0

PERMITS: 0x0000003b LogiIni HddPort HsdPort AbDsReq ShtSns
FLAGS: 0x00000406 Plogi Prli LoginRcvd
LastActivity: 01/29/07-21:38:07 (GMT)
RESERVATIONS HELD: 0

HOST LOG==> logCtl:44e5125c logIndex: 2 goodIoCount:2475225
dstNPort:44e51720 maxIndex: 10 logIoCount:1

RepeatCounts -- IO Types
(R=read,W=write,O=other,N=nonScsi)
Num Time LogCode Qualifier LogCode GoodIo Outstand
Cnt Type Cnt Type Cnt Type
1 06:33:14 Login b80f15b1 <5 ---- <100 --O- 1 ----
2 18:27:01 GoodIo 00000000 1 ---- <1K --O- 1 ---N
3 18:27:18 LinkDown Observed 1 ---- 1 ---- 1 ----
4 18:27:18 LinkDown Mhm 1 ---- 1 ---- 1 ----
5 18:27:20 LinkDown Observed 1 ---- 1 ---- 1 ----
    
```

```

 6 18:27:20 LinkDown Mhm 1 ---- 1 ---- 1 ----
 7 18:27:20 Logout DevMiss 1 ---- 1 ---- 1 ----
 8 18:27:29 Login b80f15b1 1 ---- 1 ---- 1 ----
 9 18:27:30 LinkDown Observed <5 ---- 1 ---- 1 ----
10 18:27:30 Login b80f15b1 1 ---- >100K --O- 1 ----

===== HOST 4 =====

Hst-Role(Ch) PortId PortWwn NodeWwn DstNPort CmdRecv Label
4-Lmir( 1) 000001 200200a0-b80f15b1 200000a0-b80f15b1 44e511a0 0
InitiatorPort_Am_ch1

PERMITS: 0x0000003b LogiIni HddPort HsdPort AbDsReq ShtSns
FLAGS: 0x00000406 Plogi Prli LoginRcvd
LastActivity: 01/29/07-21:38:07 (GMT)
RESERVATIONS HELD: 0

HOST LOG==> logCtl:44e50e24 logIndex: 1 goodIoCount:2475228
dstNPort:44e511a0 maxIndex: 10 logIoCount:1

RepeatCounts -- IO Types
(R=read,W=write,O=other,N=nonScsi)
Num Time LogCode Qualifier LogCode GoodIo Outstand
Cnt Type Cnt Type Cnt Type
 1 06:33:14 LinkDown LpeAll <5 ---- 1 ---- 1 ----
 2 06:33:14 Login b80f15b1 1 ---- <1K --O- 1 ----
 3 18:27:18 LinkDown Observed 1 ---- 1 ---- 1 ----
 4 18:27:18 LinkDown Mhm 1 ---- 1 ---- 1 ----
 5 18:27:20 LinkDown Observed 1 ---- 1 ---- 1 ----
 6 18:27:20 LinkDown Mhm 1 ---- 1 ---- 1 ----
 7 18:27:20 Logout DevMiss 1 ---- 1 ---- 1 ----
 8 18:27:29 Login b80f15b1 1 ---- 1 ---- 1 ----
 9 18:27:30 LinkDown Observed <5 ---- 1 ---- 1 ----
10 18:27:30 Login b80f15b1 1 ---- >100K --O- 1 ----

===== HOST 5 =====

Hst-Role(Ch) PortId PortWwn NodeWwn DstNPort CmdRecv Label
5-Host( 3) 0000ef 210000e0-8b011cec 200000e0-8b011cec 44b43da0 1518746 tslab47-1

PERMITS: 0x00000008 HsdPort
FLAGS: 0x00000406 Plogi Prli LoginRcvd
LastActivity: 01/29/07-21:38:08 (GMT)
RESERVATIONS HELD: 0

HOST LOG==> logCtl:44b43568 logIndex: 14 goodIoCount:1480742
dstNPort:44b43da0 maxIndex: 50 logIoCount:1

RepeatCounts -- IO Types
(R=read,W=write,O=other,N=nonScsi)
Num Time LogCode Qualifier LogCode GoodIo Outstand
Cnt Type Cnt Type Cnt Type
 1 06:33:17 First 00000000 1 ---- 1 ---- 1 ----
 2 06:33:17 Login 8b011cec <5 ---- <100 --O- 1 ----
 3 18:27:02 ChkCond 060c0000 1 R--- 1 ---- 1 R---
 4 18:27:03 ChkCond 02040100 <5 R--- 1 ---- 1 R---
 5 18:27:04 ChkCond 06290000 1 R--- 1 ---- 1 R---
 6 18:27:04 ChkCond 02040100 <5 R--- <100 RW-- 1 R---
 7 18:27:18 LinkDown Observed 1 ---- 1 ---- 1 ----
 8 18:27:18 LinkDown Mhm 1 ---- 1 R--- 1 ----
 9 18:27:20 LinkDown Observed 1 ---- 1 ---- 1 ----
10 18:27:20 LinkDown Mhm 1 ---- <100 RW-- 1 ----
11 18:27:29 LinkDown Observed 1 ---- 1 ---- 1 ----
12 18:27:29 LinkDown Mhm 1 ---- 1 R--- 1 ----
13 18:27:30 LinkDown Observed <5 ---- <100 RW-- 1 ----
14 18:27:49 ChkCond 06290000 <5 -WO- <100K RWO- 1 --O-
15 23:12:33 GoodIo 00000000 1 ---- >100K RWO- 1 -W--

===== HOST 6 =====

Hst-Role(Ch) PortId PortWwn NodeWwn DstNPort CmdRecv Label
6-This( 3) 0000e2 200700a0-b80f1559 200600a0-b80f1557 44b434c0 0
InitiatorPort_Bh_ch3

```

```

PERMITS: 0x0000003a HddPort HsdPort AbDsReq ShtSns
FLAGS: 0x00000406 Plogi Prli LoginRcvd
LastActivity: 04/12/09-06:33:17 (GMT)
RESERVATIONS HELD: 0

HOST LOG==> logCtl:44b43038 logIndex: 8 goodIoCount:0
                dstNPort:44b434c0 maxIndex: 10 logIoCount:2

                RepeatCounts -- IO Types
                (R=read,W=write,O=other,N=nonScsi)
Num Time          LogCode  Qualifier  LogCode  GoodIo  Outstand
                Cnt Type    Cnt Type  Cnt Type
  1 06:33:17      First    00000000  1 ----  1 ----  1 ----
  2 06:33:17      Login    b80f1559  1 ----  1 ----  1 ----
  3 18:27:18      LinkDown Observed  1 ----  1 ----  1 ----
  4 18:27:18      LinkDown Mhm      1 ----  1 ----  1 ----
  5 18:27:20      LinkDown Observed  1 ----  1 ----  1 ----
  6 18:27:20      LinkDown Mhm      1 ----  1 ----  1 ----
  7 18:27:29      LinkDown Observed  1 ----  1 ----  1 ----
  8 18:27:29      LinkDown Mhm      1 ----  1 ----  1 ----
  9 18:27:30      LinkDown Observed  <5 ----  1 ----  1 ----

-> fcHosts 4

LogCode Cnt = Number of consecutive occurrences of this logCode event
LogCode Type = IO types which had these events: (Read Write Other NonScsi)
GoodIo Cnt = Number of IOs returned with good status after 1st occurrence
GoodIo Type = IO types of the IOs which returned good status
Outstand Cnt = Number of outstanding IOs when 1st occurrence logged
Outstand Type = IO types of the outstanding IOs
    
```

4.3.1.20 fcDump

Dumps detailed fc errors and statistics for all chips. Includes fcAll output for the following fc commands:

06.15 and lower

fc 1, fcAll 2, fcAll 3, fcAll 6, fcAll 8, fcAll 10, fcAll 20, fc 13, moduleList

06.16 and higher

fcAll, fcAll 2, fcAll 20, fcAll 13, fcAll 49, fc 1, fcAll 43, fc 100, fc 101, fc 102, fc 103, fc 110, fc 112.

4.3.2 fcDevs

All fcDevs commands are for 06.15 and lower firmware levels.

The **fcDevs** command provides most of the debug information gathered by the destination high level driver (HDD). This command provides information about all of the destination devices in terms of “views”. The general form of the **fcDevs** command is:

```

-> fcDevs
fcDevs <view>, <devNum (0=all)>
  1 = All views by view type (active)
  2 = Inquiry view
  3 = Names view
  4 = Path view
  5 = Common names view
  6 = Buf view
  7 = Detail view (All luns)
  8 = Detail view (Active luns only)
  9 = All views by lun device
 10 = All views by view type (detailed)
 11 = Rls view
 12 = Devices with any errors
 13 = Devices with Rw errors returned to VDD
 14 = Devices with major errors
    
```

Each view also provides a logical devNum to Tray/Slot to ALPA cross reference for each device.

4.3.2.01 fcDevs 1 - All Views by View Type (Active)

This view lists active devices by view type. See **fcDevs 10**.

4.3.2.02 fcDevs 2 - Inquiry View

This view provides the standard inquiry information returned from the devices. If the “state” is OPEN, then the drive is considered to be usable by VDD, whereas if the “state” is CLOSED, then the drive is considered to be unusable. This view is also useful in determining firmware levels of drives and ESMs.

(4.x version)

```
-> fcDevs 2
```

Standard Inquiry Data View

DevNum	Tray Slot	Cur Alpa	State	First 8 bytes	Vendor	Product	Rev
D 00000001	3,1	c3	Open	000002328b00700a	SEAGATE	ST318203FC	0003
D 00000002	3,2	bc	Open	000002328b00500a	SEAGATE	ST318203FC	0003
D 00000003	3,3	ba	Open	000002328b00700a	SEAGATE	ST318203FC	0003
D 00000004	3,4	b9	Open	000002328b00500a	SEAGATE	ST318203FC	0003
P 00f00011		02	Open	0300020220000000	SYMBIOS	INFINITI	1.00
E 00000010		1e	Open	0d0002021f004000	LSILOGIC	SYM2200-FC	9153
E 00000010		1e	altESM	0d0002021f004000	LSILOGIC	SYM2200-FC	9153

(5.x version)

```
-> fcDevs 2
```

Standard Inquiry Data View

DevNum	Tray Slot	Cur Alpa	State	First 8 bytes	Vendor	Product	Rev
Disk 00000001	0,1	ef	Open	000003128b00500a	SEAGATE	ST318452FC	MS07
Disk 00000002	0,2	e8	Open	000003128b00700a	SEAGATE	ST318452FC	MS07
Disk 00000003	0,3	e4	Open	000003128b00500a	SEAGATE	ST318452FC	MS07
Disk 0000000a	0,10	3a	Open	000003128b00700a	SEAGATE	ST318452FC	MS07
Disk 0000000b	0,11	72	Open	000003128b00500a	SEAGATE	ST318452FC	MS07
Disk 0000000c	0,12	67	Open	000003128b00700a	SEAGATE	ST318452FC	MS07
Encl 00000010	0,0	25	Open	0d0002021f004000	LSILOGIC	SYM2500-FC.....	9163
Encl 00000010	0,0	25	altESM	0d0002021f004000	LSILOGIC	SYM2500-FC.....	9163
Lmir 00f00011		02	Open	0300020220000000	SYMBIOS	INFINITI	1.00
This 00e00011		e8	Open	0300020220000000	SYMBIOS	INFINITI	1.00

(6.x version)

```
-> fcDevs 2
```

Standard Inquiry Data View

DevNum	Tray Slot	Cur Alpa	Alt Alpa	State	First 8 bytes	Vendor	Product	Rev
Disk 00000001	1,1	da	ef	Open	000003021f001002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 00000002	1,2	ef	da	Open	000003021f003002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 00000003	1,3	d9	e8	Open	000003021f001002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 00000004	1,4	e8	d9	Open	000003021f003002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 00000005	1,5	d6	e4	Open	000003021f001002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 00000006	1,6	e4	d6	Open	000003021f003002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 00000007	1,7	d5	e2	Open	000003021f001002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 00000008	1,8	e2	d5	Open	000003021f003002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 00000009	1,9	d4	e1	Open	000003021f001002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 0000000a	1,10	e1	d4	Open	000003021f003002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 0000000b	1,11	d3	e0	Open	000003021f001002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 0000000c	1,12	e0	d3	Open	000003021f003002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 0000000d	1,13	d2	dc	Open	000003021f001002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 0000000e	1,14	dc	d2	Open	000003021f003002	N/A	Maxtor 7Y250M0	YAR51HW0
Disk 0000000f	2,1	cd	cd	Open	000003128b00500a	SEAGATE	ST373405FC	MS11
Disk 00100000	2,2	cc	cc	Open	000003128b00700a	SEAGATE	ST373405FC	MS11
Disk 00100001	2,3	cb	cb	Open	000003128b00500a	SEAGATE	ST373405FC	MS11
Disk 00100002	2,4	ca	ca	Open	000003128b00700a	SEAGATE	ST373405FC	MS09
Disk 00100003	2,5	c9	c9	Open	000003128b00500a	SEAGATE	ST373405FC	MS11
Disk 00100004	2,6	c7	c7	Open	000003128b00700a	SEAGATE	ST373307FC	MS06
Disk 00100005	2,7	c6	c6	Open	000003128b00500a	SEAGATE	ST373405FC	MS09
Disk 00100006	2,8	c5	c5	Open	000003128b00700a	SEAGATE	ST373405FC	MS09
Disk 00100007	2,9	53	53	Open	000003128b00500a	SEAGATE	ST373405FC	MS11
Disk 00100008	2,10	36	36	Open	000003128b00700a	SEAGATE	ST373405FC	MS09
Disk 00100009	2,11	6e	6e	Open	000003128b00500a	SEAGATE	ST373405FC	MS09
Disk 0010000a	2,12	65	65	Open	000003128b00700a	SEAGATE	ST373405FC	MS11
Disk 0010000b	2,13	49	49	Open	000003128b00500a	SEAGATE	ST373405FC	MS09
Encl 00000010	1,1	23	23	Open	0d00030220004000	LSILOGIC	SYM2655.....	9551
Encl 00000010	1,2	23	23	altESM	0d00030220004000	LSILOGIC	SYM2655.....	9551
Encl 00100010	2,1	1f	1f	Open	0d00030220004000	LSILOGIC	SYM2600-FC.....	9326

Encl	00100010	2,2	1f	1f	altESM	0d00030220004000	LSILOGIC	SYM2600-FC.....	9326
Lmir	00f00011	CT,1	01	01	Open	0300020220000000	SYMBIOS	INFINITI	1.00
This	00e00011	CT,0	02	02	Open	0300020220000000	SYMBIOS	INFINITI	1.00

4.3.2.03 fcDevs 3 – Names View

This view provides the volume ID and the device name. The device name is the fibre channel node name for the device. For a disk device, the volume ID is either the serial number provided on Inquiry VPD Page 80 or Page 83, or it is the device name. For an enclosure device, the volume ID is the enclosure logical ID. For a processor device, the volume ID is “INFINITI”.

(4.x version)

```
-> fcDevs 3
```

Names View

DevNum	Tray Slot	Cur Alpha	Volume ID	Node Name (Device Name)
D 00000001	3,1	c3	LR20573400001003	0x20000020-0x3718729d
D 00000002	3,2	bc	LR20496000001004	0x20000020-0x3718777b
D 00000003	3,3	ba	LR20524500001003	0x20000020-0x37187307
D 00000004	3,4	b9	LR20627900001003	0x20000020-0x371872c6
P 00f00011		02	INFINITI	0x200000a0-0xb80015d6
E 00000010		1e	100000a0b8080104	0x100000a0-0xb80704f8
E 00000010		1e	100000a0b8080104	0x100000a0-0xb8070516

(5.x version)

```
-> fcDevs 3
```

Names View

DevNum	Tray Slot	Cur Alpha	Volume ID	Node Name (Device Name)
Disk 00000001	0,1	ef	3EV00MNP000072205MKD	20000004-cf4a7996
Disk 00000002	0,2	e8	3EV05MR500007217RGUW	20000004-cf4aa362
Disk 00000003	0,3	e4	3EV085710000722035MT	20000004-cf4a6d6c
Disk 0000000a	0,10	3a	3EV084YF0000722022PF	20000004-cf4a5d99
Disk 0000000b	0,11	72	3EV04GL3000072170B3U	20000004-cf43ce46
Disk 0000000c	0,12	67	3EV083Y50000722035FB	20000004-cf4a62f3
Encl 00000010	0,0	25	100000a0b8084b85	100000a0-b80d5300
Encl 00000010	0,0	25	100000a0b8084b85	100000a0-b80d55f8
Lmir 00f00011		02	INFINITI	200000a0-b80c80a5
This 00e00011		e8	INFINITI	000000a0-b80cc7fa

(6.x version)

```
-> fcDevs 3
```

Names View

DevNum	Tray Slot	Cur Alpha	Alt Alpha	Volume ID	Node Name (Device Name)
Disk 00000001	1,1	da	ef	Y64AMSPE	220c000a-330004bf
Disk 00000002	1,2	ef	da	Y64ANAME	220c000a-33000baa
Disk 00000003	1,3	d9	e8	Y64AMVFE	220c000a-33004573
Disk 00000004	1,4	e8	d9	Y64ANBEE	220c000a-330067ad
Disk 00000005	1,5	d6	e4	Y64ANJHE	220c000a-330004cb
Disk 00000006	1,6	e4	d6	Y64AMV4E	220c000a-33000d90
Disk 00000007	1,7	d5	e2	Y646G7YE	220c000a-33000bac
Disk 00000008	1,8	e2	d5	Y64AMTAE	220c000a-33000c41
Disk 00000009	1,9	d4	e1	Y646G02E	220c000a-33001a2a
Disk 0000000a	1,10	e1	d4	Y64ANADE	220c000a-33004d64
Disk 0000000b	1,11	d3	e0	Y64ANGZE	220c000a-33005e80
Disk 0000000c	1,12	e0	d3	Y643LELE	220c000a-330067a1
Disk 0000000d	1,13	d2	dc	Y64AN8EE	220c000a-33001aeb
Disk 0000000e	1,14	dc	d2	Y64AN4WE	220c000a-33005f29
Disk 0000000f	2,1	cd	cd	3EK15BAV00007232ZG47	20000004-cf76dbfd
Disk 00100000	2,2	cc	cc	3EK1KZQA00007243U1N4	20000004-cf94da87
Disk 00100001	2,3	cb	cb	3EK18ZL700007235L7C5	20000004-cf810fd7
Disk 00100002	2,4	ca	ca	3EK1HYAL00007242WAU7	20000004-cf945390
Disk 00100003	2,5	c9	c9	3EK185DL00007235NSZ7	20000004-cf810b96
Disk 00100004	2,6	c7	c7	3HZ72TKP000074118WSP	2000000c-50bd2ea3
Disk 00100005	2,7	c6	c6	3EK1JDAM00007242WBBQ	20000004-cf945958
Disk 00100006	2,8	c5	c5	3EK1K98A00007238QN51	20000004-cf948130
Disk 00100007	2,9	53	53	3EK1KTBJ00007242NDLJ	20000004-cf94ceac
Disk 00100008	2,10	36	36	3EK1JSW000007242HQ9U	20000004-cf945bfa
Disk 00100009	2,11	6e	6e	3EK1JJPJ300007242WBRR	20000004-cf94595d

Disk 0010000a	2,12	65	65	3EK15LDM00000723239EQ	20000004-cf76e7f9
Disk 0010000b	2,13	49	49	3EK1JY7B00007242XPE9	20000004-cf945b53
Encl 00000010	1,1	23	23	100000a0b8144d36	100000a0-b810987f
Encl 00000010	1,2	23	23	100000a0b8144d36	100000a0-b8109961
Encl 00100010	2,1	1f	1f	100000a0b808e5af	100000a0-b80de92b
Encl 00100010	2,2	1f	1f	100000a0b808e5af	100000a0-b80de886
Lmir 00f00011	CT,1	01	01	INFINITI	200000a0-b8111546
This 00e00011	CT,0	02	02	INFINITI	200000a0-b81116de

4.3.2.04 fcDevs 4 – Path View

This view tells what paths are available to each device and what the ALPAs, current loop IDs, and hard loop IDs are for each device. For example, in the “PathByChan” column, if you see a “C” under “c2”, then channel 2 is the current path for that device. Normally the ALPAs are the same for the same device on each channel, but that is not required. The “current loop ID” is the one-to-one translation of the “ALPA”. The “hard loop ID” is the loop ID which the device would like to have, provided there is no conflict with another device.

(4.x version)

```
-> fcDevs 4

Path View

D=disk,E=enclosure,P=processor      Paths: C=current,A=alternate,F=fail

   DevNum   Tray   Cur   AlpaByChan   PathByChan   CurLoopId   HardLoopId
           Slot   Alpa   c0 c1 c2 c3   c0 c1 c2 c3   c0 c1 c2 c3   c0 c1 c2 c3
D 00000001  3,1    c3   c3 -- c3 --   C - A -   18 -- 18 --   18 -- 18 --
D 00000002  3,2    bc   bc -- bc --   A - C -   19 -- 19 --   19 -- 19 --
D 00000003  3,3    ba   ba -- ba --   C - A -   1a -- 1a --   1a -- 1a --
D 00000004  3,4    b9   b9 -- b9 --   A - C -   1b -- 1b --   1b -- 1b --
P 00f00011          02   02 02 02 02   A C A A   7c 7c 7c 7c   7c 7c 7c 7c
E 00000010          1e   1e -- 1e --   C - A -   73 -- 73 --   73 -- 73 --
```

Note: c0 corresponds to the first chip with “Dst” in the fcAll display. This may not be “chip 0”, depending on the order in the fcAll display.

(5.x version)

```
-> fcDevs 4

Path View

   DevNum   Tray   Cur   Path
           Slot   Alpa   Channels
Disk 00000001  0,1    ef   Cur:2 Alt:3
Disk 00000002  0,2    e8   Cur:3 Alt:2
Disk 00000003  0,3    e4   Cur:2 Alt:3
Disk 0000000a  0,10   3a   Cur:3 Alt:2
Disk 0000000b  0,11   72   Cur:2 Alt:3
Disk 0000000c  0,12   67   Cur:3 Alt:2
Encl 00000010  0,0    25   Cur:2 Alt:3
Lmir 00f00011          02   Cur:2 Alt:3 Alt:0 Alt:1
This 00e00011          e8   Cur:5 Alt:0 Alt:1 Alt:2 Alt:3 Alt:4
```

(6.x version)

```
-> fcDevs 4

Path View

   DevNum   Tray   Cur   Alt   Path
           Slot   Alpa Alpa   Channels
Disk 00000001  1,1    da   ef   Pref:1 Cur:3 Alt:1
Disk 00000002  1,2    ef   da   Pref:3 Cur:3 Alt:1
Disk 00000003  1,3    d9   e8   Pref:1 Cur:3 Alt:1
Disk 00000004  1,4    e8   d9   Pref:3 Cur:3 Alt:1
Disk 00000005  1,5    d6   e4   Pref:1 Cur:3 Alt:1
Disk 00000006  1,6    e4   d6   Pref:3 Cur:3 Alt:1
Disk 00000007  1,7    d5   e2   Pref:1 Cur:3 Alt:1
Disk 00000008  1,8    e2   d5   Pref:3 Cur:3 Alt:1
Disk 00000009  1,9    d4   e1   Pref:1 Cur:3 Alt:1
Disk 0000000a  1,10   e1   d4   Pref:3 Cur:3 Alt:1
Disk 0000000b  1,11   d3   e0   Pref:1 Cur:3 Alt:1
Disk 0000000c  1,12   e0   d3   Pref:3 Cur:3 Alt:1
Disk 0000000d  1,13   d2   dc   Pref:1 Cur:3 Alt:1
Disk 0000000e  1,14   dc   d2   Pref:3 Cur:3 Alt:1
Disk 0000000f  2,1    cd   cd   Pref:1 Cur:1 Alt:3
Disk 00100000  2,2    cc   cc   Pref:3 Cur:3 Alt:1
```

Disk 00100001	2,3	cb	cb	Pref:1	Cur:1	Alt:3		
Disk 00100002	2,4	ca	ca	Pref:3	Cur:3	Alt:1		
Disk 00100003	2,5	c9	c9	Pref:1	Cur:1	Alt:3		
Disk 00100004	2,6	c7	c7	Pref:3	Cur:3	Alt:1		
Disk 00100005	2,7	c6	c6	Pref:1	Cur:1	Alt:3		
Disk 00100006	2,8	c5	c5	Pref:3	Cur:3	Alt:1		
Disk 00100007	2,9	53	53	Pref:1	Cur:1	Alt:3		
Disk 00100008	2,10	36	36	Pref:3	Cur:3	Alt:1		
Disk 00100009	2,11	6e	6e	Pref:1	Cur:1	Alt:3		
Disk 0010000a	2,12	65	65	Pref:3	Cur:3	Alt:1		
Disk 0010000b	2,13	49	49	Pref:1	Cur:1	Alt:3		
Encl 00000010	1	23	23	Pref:3	Cur:1	Alt:3		
Encl 00100010	2	1f	1f	Pref:3	Cur:1	Alt:3		
Lmir 00f00011	CT,1	01	01	Pref:0	Cur:1	Alt:3	Alt:0	Alt:2
This 00e00011	CT,0	02	02	Pref:0	Cur:3	Alt:0	Alt:2	Alt:1

4.3.2.05 fcDevs 5 – Common Names View

This view provides a way to translate drive Inquiry data to a common name for that device. For example, several types of Seagate Cheetah drives are commonly used, and rather than memorizing what an ST318203FC drive is, one can now easily see that it is a Cheetah-3 low-profile 18 gigabyte drive.

(4.x version)

```
-> fcDevs 5
```

Common Names View

DevNum	Tray Slot	Cur Alpha	Inquiry Name	Common Name
D 00000001	3,1	c3	SEAGATE ST318203FC	Cheetah-3 LP 18GB
D 00000002	3,2	bc	SEAGATE ST318203FC	Cheetah-3 LP 18GB
D 00000003	3,3	ba	SEAGATE ST318203FC	Cheetah-3 LP 18GB
D 00000004	3,4	b9	SEAGATE ST318203FC	Cheetah-3 LP 18GB

(5.x version)

```
-> fcDevs 5
```

Common Names View

DevNum	Tray Slot	Cur Alpha	Inquiry Name	Common Name
Disk 00000001	0,1	ef	SEAGATE ST318452FC	Cheetah-X15-2 18GB
Disk 00000002	0,2	e8	SEAGATE ST318452FC	Cheetah-X15-2 18GB
Disk 00000003	0,3	e4	SEAGATE ST318452FC	Cheetah-X15-2 18GB
Disk 0000000a	0,10	3a	SEAGATE ST318452FC	Cheetah-X15-2 18GB
Disk 0000000b	0,11	72	SEAGATE ST318452FC	Cheetah-X15-2 18GB
Disk 0000000c	0,12	67	SEAGATE ST318452FC	Cheetah-X15-2 18GB

(6.x version)

```
-> fcDevs 5
```

Common Names View

DevNum	Tray Slot	Cur Alpha	Alt Alpha	Inquiry Name	Common Name
Disk 00000001	1,1	da	ef	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 00000002	1,2	ef	da	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 00000003	1,3	d9	e8	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 00000004	1,4	e8	d9	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 00000005	1,5	d6	e4	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 00000006	1,6	e4	d6	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 00000007	1,7	d5	e2	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 00000008	1,8	e2	d5	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 00000009	1,9	d4	e1	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 0000000a	1,10	e1	d4	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 0000000b	1,11	d3	e0	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 0000000c	1,12	e0	d3	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 0000000d	1,13	d2	dc	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 0000000e	1,14	dc	d2	Maxtor 7Y250M0	Maxline Plus II 250GB
Disk 0000000f	2,1	cd	cd	SEAGATE ST373405FC	Cheetah-5 LP 73GB
Disk 00100000	2,2	cc	cc	SEAGATE ST373405FC	Cheetah-5 LP 73GB
Disk 00100001	2,3	cb	cb	SEAGATE ST373405FC	Cheetah-5 LP 73GB
Disk 00100002	2,4	ca	ca	SEAGATE ST373405FC	Cheetah-5 LP 73GB
Disk 00100003	2,5	c9	c9	SEAGATE ST373405FC	Cheetah-5 LP 73GB
Disk 00100004	2,6	c7	c7	SEAGATE ST373405FC	Cheetah-5 LP 73GB
Disk 00100005	2,7	c6	c6	SEAGATE ST373405FC	Cheetah-5 LP 73GB

Disk 00100006	2,8	c5	c5	SEAGATE	ST373405FC	Cheetah-5 LP	73GB
Disk 00100007	2,9	53	53	SEAGATE	ST373405FC	Cheetah-5 LP	73GB
Disk 00100008	2,10	36	36	SEAGATE	ST373405FC	Cheetah-5 LP	73GB
Disk 00100009	2,11	6e	6e	SEAGATE	ST373405FC	Cheetah-5 LP	73GB
Disk 0010000a	2,12	65	65	SEAGATE	ST373405FC	Cheetah-5 LP	73GB
Disk 0010000b	2,13	49	49	SEAGATE	ST373405FC	Cheetah-5 LP	73GB

4.3.2.06 fcDevs 6 – Bufs View

This view provides a quick count of all the IOs queued for each device. Reads and writes, which have been sent to the LLD, will be included in the “Rw” column. Non read-write IOs, which have been sent to the LLD, will be included in the “NRw” column. The other 3-6 columns represent IOs which are queued at the HDD level. The “Err” (error) queue is reserved for target resets and device resets. The “Con” (continue) queue is reserved for async opens, block reassigns, and a few other higher priority things. “Q1-Q4” are lower priority queues, which commonly used for normal IOs from the upper layers. For a disk device, only Q1 exists, and that is just the normal IO request queue. For a processor device, Q1-Q4 exist: Q1=SCSICON IOs, Q2=Mirror Write for Mirror Read, Q3=Mirror Read, and Q4=Mirror Write. (4.x version)

```
-> fcDevs 6

Bufs View

D=disk, E=enclosure, P=processor

  DevNum   Tray   Cur
           Slot   Alpa  Rw  NRw  Err  Con  Q1  Q2  Q3  Q4
D 00000001 3,1    c3   8   0    0   0   32
D 00000002 3,2    bc   8   0    0   0   0
D 00000003 3,3    ba   5   0    0   0   0
D 00000004 3,4    b9   1   0    0   0   0
P 00f00011      02   0   0    0   0   0   0  0  0  0
E 00000010      1e   0   0    0   0   0   0
```

(5.x version)

```
-> fcDevs 6

Bufs View

  DevNum   Tray   Cur
           Slot   Alpa  Rw  NRw  Err  Con  Q1  Q2  Q3  Q4  Q5
Disk 00000001 0,1    ef   0   0    0   0   0  0  0  0  0
Disk 00000002 0,2    e8   0   0    0   0   0  0  0  0  0
Disk 00000003 0,3    e4   0   0    0   0   0  0  0  0  0
Disk 0000000a 0,10   3a   0   0    0   0   0  0  0  0  0
Disk 0000000b 0,11   72   0   0    0   0   0  0  0  0  0
Disk 0000000c 0,12   67   0   0    0   0   0  0  0  0  0
Encl 00000010 0,0    25   0   0    0   0   0  0  0  0  0
Lmir 00f00011      02   0   0    0   0   0  0  0  0  0  0
This 00e00011      e8   0   0    0   0   0  0  0  0  0  0
```

4.3.2.07 fcDevs 7 - Detail (All Luns) View and fcDevs 8 - Detail (Active Luns Only) View

These views really get in to the low level implementation of the HDD driver. They list a lot of detail about each of the devices. These two views are identical, except that “fcDevs 8” only lists devices which have active IOs or are involved in error recovery. These views first list a translation of the “lun flags”. They then display the addresses of all the bufs which are queued to each of the queues. They then display low level detail info about the lunInfo, deviceInfo, and all of the pathInfo structures. The blocking tag (if set) is the reason we are not issuing any more IOs to this device. These views are typically reserved for use by the system analysts.

4.3.2.08 fcDevs 9 - All Views by LUN Device

Views all volume devices in volume order.

4.3.2.09 fcDevs 10 - All Views by View Type (Detailed)

This provides detailed output of all of the views in view order. Similar to fcDevs 1 but includes all devices not just active devices.

4.3.2.10 fcDevs 11 - RLS View

This view provides statistics on any Read Link Status Diagnostics data. The information provided can aid in the search for problems within the drive side loops of the storage array. The replacement command as of 6.16 and later code is **fcnShow 11**.

(5.x version)

```
-> fcdevs 11
```

Read Link Status View

DevNum	Tray Slot	Cur Alpa Chan	Link Fail	Loss Sync	Loss Sig	Proto Error	Bad Char	Bad CRC
Disk 00000001	0,1	ef 2	0	29	0	0	56085628	0
		3	1	90	0	0	52366265	0
Disk 00000002	0,2	e8 3	1	92	0	0	52091084	0
		2	0	34	0	0	56086978	0
Disk 00000003	0,3	e4 2	0	38	0	0	56087478	0
		3	1	94	0	0	60602259	0
Disk 00000004	0,4	e2 3	1	91	0	0	57176647	0
		2	0	34	0	0	56087178	0
Disk 00000005	0,5	e1 2	0	38	0	0	56088492	0
		3	1	96	0	0	60383540	0
Disk 00000006	0,6	e0 3	1	2031951	0	0	43482260	0
		2	0	38	0	0	56086520	0
Disk 00000007	0,7	dc 2	0	39	0	0	56087407	0
		3	1	99	0	0	58869094	0
Disk 00000008	0,8	da 3	1	103	0	0	63177029	0
		2	0	38	0	0	56087036	0
Disk 00000009	0,9	55 2	0	41	0	0	56088428	0
		3	1	108	0	0	63431439	0
Disk 0000000a	0,10	3a 3	1	110	0	0	46968377	0
		2	0	43	0	0	56087977	0
Disk 0000000b	0,11	72 2	0	44	0	0	56088012	0
		3	1	111	0	0	59477772	0
Disk 0000000c	0,12	67 3	1	114	0	0	41802906	0
		2	0	45	0	0	56086960	0
Disk 0000000d	0,13	4b 2	0	48	0	0	56087492	0
		3	1	115	0	0	52422163	0
Disk 0000000e	0,14	2e 3	1	118	0	0	27678644	0
		2	0	49	0	0	56088984	0
Encl 00000010		25 3	0	0	0	0	0	0
		2	0	0	0	0	0	0
Lmir 00f00011		01 0	1	2	1	0	0	0
		1	1	1	1	0	0	0
		2	0	0	1	0	0	0
		3	0	1	1	0	0	0
This 00e00011		02 3	0	0	1	0	0	0
		0	0	0	1	0	0	0
		1	0	0	1	0	0	0
		2	0	0	1	0	0	0

(6.10 – 6.15 version)

```
-> fcdevs 11
```

```
=====> CHANNEL 0 <=====
```

Read Link Status View

Rls Poll Period: 0 minutes

BaseLinkStat: 04/27/05-23:35:55 (GMT)
 PrevLinkStat: 04/27/05-23:35:42 (GMT)
 CurLinkStat: 04/27/05-23:35:55 (GMT)
 Cur Time: 04/27/05-23:50:54 (GMT)
 NextRlsPoll:

DevNum	Tray Slot	Cur Alpa	Alt Alpa	Link Chan	Link Fail	Loss Sync	Loss Sig	Proto Error	Bad Char	Bad CRC
This 00e00011	CT,0	02	02							
	Current			0	1	1	ff	0	0	0
	Prev			0	1	1	ff	0	0	0
	Base			0	1	1	ff	0	0	0
Lmir 00f00011	CT,1	01	01							

```

Current      0      0      0      0      0      0      0
Prev        0      0      0      0      0      0      0
Base        0      0      0      0      0      0      0

=====> CHANNEL 1 <====

Read Link Status View

Rls Poll Period:  0 minutes

BaseLinkStat: 04/27/05-23:35:55 (GMT)
PrevLinkStat: 04/27/05-23:35:42 (GMT)
CurLinkStat:  04/27/05-23:35:55 (GMT)
Cur Time:    04/27/05-23:50:54 (GMT)
NextRlsPoll:

    DevNum  Tray  Cur  Alt      Link  Loss  Loss  Proto  Bad  Bad
           Slot Alpa Alpa Chan Fail Sync Sig  Error Char  CRC
This 00e00011 CT,0  02  02      1      1      1      6      0      0      0
           Current
           Prev      1      1      1      6      0      0      0
           Base      1      1      1      6      0      0      0

Lmir 00f00011 CT,1  01  01      1      0      0      0      0      0      0
           Current
           Prev      1      0      0      0      0      0      0
           Base      1      0      0      0      0      0      0

Encl 00000010  1      23  23      1      0 dbf3f3      0      0 12329fa      4
           Current
           Prev      1      0 dbf3f3      0      0 12329fa      4
           Base      1      0 dbf3f3      0      0 12329fa      4

Encl 00100010  2      1f  1f      1      0 46d      0      0 400      1
           Current
           Prev      1      0 46d      0      0 400      1
           Base      1      0 46d      0      0 400      1

Disk 0000000f  2,1  cd  cd      1      0      0      0      0      5      0
           Current
           Prev      1      0      0      0      0      5      0
           Base      1      0      0      0      0      5      0

Disk 00100000  2,2  cc  cc      1      0      4      0      0      5      0
           Current
           Prev      1      0      4      0      0      5      0
           Base      1      0      4      0      0      5      0

Disk 00100001  2,3  cb  cb      1      0      5      0      0      5      0
           Current
           Prev      1      0      5      0      0      5      0
           Base      1      0      5      0      0      5      0

Disk 00100002  2,4  ca  ca      1      0      6      0      0      5      0
           Current
           Prev      1      0      6      0      0      5      0
           Base      1      0      6      0      0      5      0

Disk 00100003  2,5  c9  c9      1      0      d      0      0      5      0
           Current
           Prev      1      0      d      0      0      5      0
           Base      1      0      d      0      0      5      0

Disk 00100004  2,6  c7  c7      1      1      9      0      0      35f      0
           Current
           Prev      1      1      9      0      0      35f      0
           Base      1      1      9      0      0      35f      0

Disk 00100005  2,7  c6  c6      1      0      0      0      0      5      0
           Current
           Prev      1      0      0      0      0      5      0
           Base      1      0      0      0      0      5      0

Disk 00100006  2,8  c5  c5

```

	Current	1	0	2	0	0	5	0
	Prev	1	0	2	0	0	5	0
	Base	1	0	2	0	0	5	0
Disk 00100007	2,9 53 53							
	Current	1	0	3	0	0	5	0
	Prev	1	0	3	0	0	5	0
	Base	1	0	3	0	0	5	0
Disk 00100008	2,10 36 36							
	Current	1	0	4	0	0	5	0
	Prev	1	0	4	0	0	5	0
	Base	1	0	4	0	0	5	0
Disk 00100009	2,11 6e 6e							
	Current	1	0	8	0	0	5	0
	Prev	1	0	8	0	0	5	0
	Base	1	0	8	0	0	5	0
Disk 0010000a	2,12 65 65							
	Current	1	0	8	0	0	5	0
	Prev	1	0	8	0	0	5	0
	Base	1	0	8	0	0	5	0
Disk 0010000b	2,13 49 49							
	Current	1	0	9	0	0	5	0
	Prev	1	0	9	0	0	5	0
	Base	1	0	9	0	0	5	0
Disk 0000000e	1,14 dc d2							
	Current	1	0	0	1	0	4	0
	Prev	1	0	0	1	0	4	0
	Base	1	0	0	1	0	4	0
Disk 0000000c	1,12 e0 d3							
	Current	1	0	0	1	0	4	0
	Prev	1	0	0	1	0	4	0
	Base	1	0	0	1	0	4	0
Disk 0000000a	1,10 e1 d4							
	Current	1	0	0	1	0	4	0
	Prev	1	0	0	1	0	4	0
	Base	1	0	0	1	0	4	0
Disk 00000008	1,8 e2 d5							
	Current	1	0	0	1	0	4	0
	Prev	1	0	0	1	0	4	0
	Base	1	0	0	1	0	4	0
Disk 00000006	1,6 e4 d6							
	Current	1	0	0	1	0	4	0
	Prev	1	0	0	1	0	4	0
	Base	1	0	0	1	0	4	0
Disk 00000004	1,4 e8 d9							
	Current	1	0	0	1	0	4	0
	Prev	1	0	0	1	0	4	0
	Base	1	0	0	1	0	4	0
Disk 00000002	1,2 ef da							
	Current	1	0	0	1	0	4	0
	Prev	1	0	0	1	0	4	0
	Base	1	0	0	1	0	4	0
Disk 0000000d	1,13 d2 dc							
	Current	1	0	0	0	0	1	0
	Prev	1	0	0	0	0	1	0
	Base	1	0	0	0	0	1	0
Disk 0000000b	1,11 d3 e0							
	Current	1	0	0	0	0	1	0
	Prev	1	0	0	0	0	1	0
	Base	1	0	0	0	0	1	0
Disk 00000009	1,9 d4 e1							
	Current	1	0	0	0	0	1	0
	Prev	1	0	0	0	0	1	0


```

Base          1      0      0      0      0      1      0
Disk 00000007 1,7    d5    e2
Current      1      0      0      0      0      1      0
Prev        1      0      0      0      0      1      0
Base        1      0      0      0      0      1      0
Disk 00000005 1,5    d6    e4
Current      1      0      0      0      0      1      0
Prev        1      0      0      0      0      1      0
Base        1      0      0      0      0      1      0
Disk 00000003 1,3    d9    e8
Current      1      0      0      0      0      1      0
Prev        1      0      0      0      0      1      0
Base        1      0      0      0      0      1      0
Disk 00000001 1,1    da   ef
Current      1      0      0      0      0      1      0
Prev        1      0      0      0      0      1      0
Base        1      0      0      0      0      1      0

=====> CHANNEL 2 <=====

Read Link Status View

Rls Poll Period:  0 minutes

BaseLinkStat: 04/27/05-23:35:55 (GMT)
PrevLinkStat: 04/27/05-23:35:42 (GMT)
CurLinkStat:  04/27/05-23:35:55 (GMT)
Cur Time:    04/27/05-23:50:55 (GMT)
NextRlsPoll:

    DevNum  Tray  Cur  Alt      Link  Loss  Loss  Proto  Bad  Bad
           Slot  Alpa Alpa  Chan Fail  Sync  Sig   Error Char  CRC
This 00e00011 CT,0  02  02
Current      2      0      0      0      0      0      0      0      0
Prev        2      0      0      0      0      0      0      0      0
Base        2      0      0      0      0      0      0      0      0
Lmir 00f00011 CT,1  01  01
Current      2      0      0      0      0      0      0      0      0
Prev        2      0      0      0      0      0      0      0      0
Base        2      0      0      0      0      0      0      0      0

=====> CHANNEL 3 <=====

Read Link Status View

Rls Poll Period:  0 minutes

BaseLinkStat: 04/27/05-23:35:55 (GMT)
PrevLinkStat: 04/27/05-23:35:42 (GMT)
CurLinkStat:  04/27/05-23:35:55 (GMT)
Cur Time:    04/27/05-23:50:55 (GMT)
NextRlsPoll:

    DevNum  Tray  Cur  Alt      Link  Loss  Loss  Proto  Bad  Bad
           Slot  Alpa Alpa  Chan Fail  Sync  Sig   Error Char  CRC
This 00e00011 CT,0  02  02
Current      3      2      2      2      1      0      0      0      0
Prev        3      2      2      2      1      0      0      0      0
Base        3      2      2      2      1      0      0      0      0
Disk 0000000d 1,13  d2   dc
Current      3      0      0      0      0      0      1      0
Prev        3      0      0      0      0      0      1      0
Base        3      0      0      0      0      0      1      0

```

Disk 0000000b	1,11	d3	e0	Current	3	0	0	0	0	1	0
				Prev	3	0	0	0	0	1	0
				Base	3	0	0	0	0	1	0
Disk 00000009	1,9	d4	e1	Current	3	0	0	0	0	1	0
				Prev	3	0	0	0	0	1	0
				Base	3	0	0	0	0	1	0
Disk 00000007	1,7	d5	e2	Current	3	0	0	0	0	1	0
				Prev	3	0	0	0	0	1	0
				Base	3	0	0	0	0	1	0
Disk 00000005	1,5	d6	e4	Current	3	0	0	0	0	1	0
				Prev	3	0	0	0	0	1	0
				Base	3	0	0	0	0	1	0
Disk 00000003	1,3	d9	e8	Current	3	0	0	0	0	1	0
				Prev	3	0	0	0	0	1	0
				Base	3	0	0	0	0	1	0
Disk 00000001	1,1	da	ef	Current	3	0	0	0	0	1	0
				Prev	3	0	0	0	0	1	0
				Base	3	0	0	0	0	1	0
Disk 0000000e	1,14	dc	d2	Current	3	0	0	1	0	4	0
				Prev	3	0	0	1	0	4	0
				Base	3	0	0	1	0	4	0
Disk 0000000c	1,12	e0	d3	Current	3	0	0	1	0	4	0
				Prev	3	0	0	1	0	4	0
				Base	3	0	0	1	0	4	0
Disk 0000000a	1,10	e1	d4	Current	3	0	0	1	0	4	0
				Prev	3	0	0	1	0	4	0
				Base	3	0	0	1	0	4	0
Disk 00000008	1,8	e2	d5	Current	3	0	0	1	0	4	0
				Prev	3	0	0	1	0	4	0
				Base	3	0	0	1	0	4	0
Disk 00000006	1,6	e4	d6	Current	3	0	0	1	0	4	0
				Prev	3	0	0	1	0	4	0
				Base	3	0	0	1	0	4	0
Disk 00000004	1,4	e8	d9	Current	3	0	0	1	0	4	0
				Prev	3	0	0	1	0	4	0
				Base	3	0	0	1	0	4	0
Disk 00000002	1,2	ef	da	Current	3	0	0	1	0	4	0
				Prev	3	0	0	1	0	4	0
				Base	3	0	0	1	0	4	0
Encl 00000010	1	23	23	Current	3	0	8c757	0	0	eb2f1	0
				Prev	3	0	8c757	0	0	eb2f1	0
				Base	3	0	8c757	0	0	eb2f1	0
Encl 00100010	2	1f	1f	Current	3	0	4b7	0	0	8d6	1
				Prev	3	0	4b7	0	0	8d6	1
				Base	3	0	4b7	0	0	8d6	1
Disk 0000000f	2,1	cd	cd	Current	3	0	0	0	0	5	0

	Prev		3	0	0	0	0	5	0
	Base		3	0	0	0	0	5	0
Disk 00100000	2,2	cc	cc						
	Current		3	0	2	0	0	0	0
	Prev		3	0	2	0	0	0	0
	Base		3	0	2	0	0	0	0
Disk 00100001	2,3	cb	cb						
	Current		3	0	5	0	0	0	0
	Prev		3	0	5	0	0	0	0
	Base		3	0	5	0	0	0	0
Disk 00100002	2,4	ca	ca						
	Current		3	0	5	0	0	0	0
	Prev		3	0	5	0	0	0	0
	Base		3	0	5	0	0	0	0
Disk 00100003	2,5	c9	c9						
	Current		3	0	6	0	0	0	0
	Prev		3	0	6	0	0	0	0
	Base		3	0	6	0	0	0	0
Disk 00100004	2,6	c7	c7						
	Current		3	1	a	0	0	385	0
	Prev		3	1	a	0	0	385	0
	Base		3	1	a	0	0	385	0
Disk 00100005	2,7	c6	c6						
	Current		3	0	a	0	0	0	0
	Prev		3	0	a	0	0	0	0
	Base		3	0	a	0	0	0	0
Disk 00100006	2,8	c5	c5						
	Current		3	0	c	0	0	0	0
	Prev		3	0	c	0	0	0	0
	Base		3	0	c	0	0	0	0
Disk 00100007	2,9	53	53						
	Current		3	0	d	0	0	0	0
	Prev		3	0	d	0	0	0	0
	Base		3	0	d	0	0	0	0
Disk 00100008	2,10	36	36						
	Current		3	0	e	0	0	0	0
	Prev		3	0	e	0	0	0	0
	Base		3	0	e	0	0	0	0
Disk 00100009	2,11	6e	6e						
	Current		3	0	10	0	0	0	0
	Prev		3	0	10	0	0	0	0
	Base		3	0	10	0	0	0	0
Disk 0010000a	2,12	65	65						
	Current		3	0	11	0	0	0	0
	Prev		3	0	11	0	0	0	0
	Base		3	0	11	0	0	0	0
Disk 0010000b	2,13	49	49						
	Current		3	0	13	0	0	0	0
	Prev		3	0	13	0	0	0	0
	Base		3	0	13	0	0	0	0
Lmir 00f00011	CT,1	01	01						
	Current		3	1	1	3	0	0	0
	Prev		3	1	1	3	0	0	0
	Base		3	1	1	3	0	0	0

4.3.2.11 fcDevs 12 - Devices with any Errors

Lists information about any devices that have errors being reported.

4.3.2.12 fcDevs 13 - Devices with RW Errors Returned by VDD

Devices with only Read/Write errors that have been reported to the Virtual Disk Driver (VDD).

4.3.2.13 fcDevs 14 - Devices with Major Errors

View of any device that is reporting any major errors.

4.3.2.14 hddDump

06.15 and lower

Dumps detailed hdd errors on a per drive basis. Includes output from the following fcDevs commands:

- fcDevs 2
- fcDevs 3
- fcDevs 4
- fcDevs 5
- fcDevs 6
- fcDevs 7
- fcDevs 11
- fcDevs 12
- fcDevs 13
- fcDevs 14

06.16 and higher

There is no equivalent single command to perform this function.

5. ION Driver Commands

5.1 Overview

The ION driver is the replacement of the older Fibre Channel drive side (back-end) drivers previously used. The new drivers are designed to not only support Fibre drives, but also Serial ATA (SATA), Serially Attached SCSI (SAS) and other future drive protocols. This is the first stage in the complete update of the controller firmware.

The ION family of commands includes **lu**, **ch**, **iditn**, **tditn**, **idloc**, **idcmd** and **ionShow**. Along with these commands there are a couple of related sub-families, **fcn** and **sas**. We also have expanded the **ssm** family of commands as part of the back-end code update. These commands will be discussed in this chapter.

5.1.1 ion Commands

Each ch, lu, iditn, or tditn record begins with an attention character followed by '<' to get your attention (blank means things look normal):

	Channel	Logical Unit	Initiator Driver ITN	Target Driver ITN
-<	down	no itns conn	disconn	disconn
=<	ext down	rejecting IO req's	rejecting IO req's	on ext down channel
#<	blocked	restrict/suspended	blocked by LID	N/A
d<	degraded	look at ORP	degraded	N/A

5.1.1.01 ionHelp

There are two basic versions of the ionHelp output (see below) based on the controller firmware version.

(6.16 version)

```
-> ionHelp
CH - CHANNELS:
-----
chall [level] ..... level = 0  All Channel Summary
                               1  Connected Trays
                               2  ITN Counts
                               3  IO Statistics
                               99 All of the above
ch channel [level] ..... 0  Summary
                               >= 3 IO Detail

LU - INITIATOR DRIVER LOGICAL UNITS:
-----
luall [level] ..... 0  All Logical Units Summary
                               3  IO Detail
                               4  Open IO Detail
                               -1 Help
lu devnum [level] ..... 0  Summary

IDITN - INITIATOR DRIVER ITNS:
-----
iditnall [level] ..... 0  All Initiator Driver ITN Summary
                               11 ITN Details
                               21 Errors
                               22 Statistics
                               23 Read statistics
                               24 Write statistics
iditn itnID [level] ..... 0  Summary

TDITN - TARGET DRIVER ITNS:
-----
tditnall [level] ..... 0  All Target Driver ITN Summary
                               10 Details
tditn itnID [level] ..... 0  Summary
```

```

ION DATA STRUCTURES, etc:
-----
ionShow [level] ..... 0 Summary
                        1-9 Details
                        12 Logical Units

ionShowLtdItn <address> Show details of an LtdItn
ionChkCondMemoryFlush Flush ITN CC Rep Counts to DQ
    
```

The ionHelp as of 6.17 and later has two additional options for help. At the end of the initial help displayed you will find either a 'd' or 'h' option. The 'd' option will provide a more detailed listing of the ion family commands. The 'h' option provides more in depth help for the ion family commands.

(6.17 and higher version)

```

-> ionHelp
ch channel [,show] ..... one Channel
chall [show] ..... all Channels
lu devnum [,show] ..... one Logical Unit
luall [show] ..... all Logical Units
iditn iditnID [,show] ..... one Initiator Driver I-T-Nexus
iditnall [show] ..... all Initiator Driver I-T-Nexuses
iditnlu devnum [,show] ..... Initiator Driver I-T-Nexuses for devnum
tditn tditnID [,show] ..... one Target Driver I-T-Nexus
tditnall ..... all Target Driver I-T-Nexuses
idloc ..... Locations
idcmd cmdId [,show] ..... one Command
idcmdall [show] ..... all Commands
idcmdlu devnum [,show] ..... all Commands on devnum

show = 0 Summary
       1 IO Breakdown (all but idcmd)
       2 IO Errors (all but idcmd)
       3 Read/Write Completion
       4 Ctlr IO Breakdown (all but idcmd)
       5 Inquiry Data (only lu)
       9 Details
      -1 Help

Enter 'd' for a list of more detailed ion commands
      'h' for more detailed help info on the above commands
      'Enter' to quit
    
```

ionHelp Option 'd'

```

d

ION DATA STRUCTURES, etc:
-----
ionShow [level] ....level = 0 Summary
                        11 Initiator Driver ITN list
                        12 Logical Unit list

ionShowInitiatorPort <address> Show details of an InitiatorPort
ionShowDriveSummary Show drive inquiry data
ionShowDriveCertId <devnum> Show certification id
ionChkCondMemoryFlush Flush ITN CC Rep Counts to DQ

Global Variables:
-----
ccRepeatEnabledForSid = 0 or 1 sid will log counts instead of repeated CkConds
ccRepeatEnabledForStd = 0 or 1 std will log counts instead of repeated CkConds
    
```

ionHelp Option 'h'

```

h
NOTE: 'Object' refers to a Channel, LU, IDITN, or TDITN

*** S U M M A R Y *** (show=0)
.....IOs.....
Object : Qd Open Completed Errs
-----:-----
: 0 0 0 0

where:
IOs : # SCSI commands
Qd (initiator-only) : # currently queued in Initiator Driver
Open : # in progress
Completed : # completed
Errs : # completed with a bad status

*** I O B R E A K D O W N *** (show=1)
.....Open IOs.....R E A D S.....W R I T E S.....NON R/W.....WRT/VFY..
Object : Read Write NonRW : #Success BlksXfered #Errs : #Success BlksXfered #Errs :#Succ #Errs :#Succ #Errs
-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----
: 0 0 0 0 : 0 0 0 0 : 0 0 0 0 : 0 0 0 0 : 0 0 0 0 : 0 0 0 0

where:
    
```

```

Open IOs : # SCSI commands in progress
Read      : # read commands in progress
Write     : # write commands in progress
Other     : # non-read/write commands in progress
READS    : # completed read commands
WRITES   : # completed write commands
OTHER    : # completed non-read/write commands

* * * I O  E R R O R * * * (show=2)
       : .....E R R O R S.....
       :Chan .....Driver.....SCSI Check Conditions.....SCSI Status.....
       :.....IOs.....:Rlat : HID  LID  :Rec- Not  I1l Unit Abrt  : Resv  Q  ACA
Object : Completed :Errs :Abrt Dtec  EDC :ovrd Redy  Med  H/W  Req Attn  Cmd  Othr :Busy Conf Full Actv Abrt
-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----
       :   :   :   :   :   :   :   :   :   :   :   :   :   :   :
       : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 : 0 :

where:
IOs Completed      : # SCSI commands completed on the Object
Chan Rlat Errs (init-only): how many of the ERRORS were channel-related
ERRORS             : # bad SCSI status
  Driver (initiator-only) : # driver-detected errors
    HID Abrt           : # aborted by high-level initiator driver (timeouts)
    LID Dtec           : # low-level initiator driver detected errors
    EDC                 : # Error Detecting Code errors
  SCSI Check Conditions : # errors with SCSI status of check condition
  SCSI Status          : # errors with other SCSI status values

* * * R / W  C O M P L E T I O N * * * (show=3)
       :.....R E A D S.....:.....W R I T E S.....:
Object : #Success BlksXfered : #Success BlksXfered :#Errs
-----:-----:-----:-----:-----
       :         0           0 :           0           0 :       0
       :
where:
READS : # completed read commands
WRITES : # completed write commands
#Errs : total # commands that completed with a bad status

* * * C T L R  I O  B R E A K D O W N * * * (show=4)
       :.....Open IOs.....:.....M I R R O R  R E A D S.....:.....M I R R O R  W R I T E S.....:.....C A C H E
INV.....:.....I A C.....:.....I C O N.....
Object :MirRd MirWr CacIn  IAC  ICON : #Success BlksXfered #Errs : #Success BlksXfered #Errs : #Success #Errs:#Succ
#Errs :#Succ #Errs
-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:-----
       :         0         0         0         0         0 :           0           0 :           0           0 :           0           0 :
       : 0 : 0 0
where:
Open IOs : # inter-controller operations in progress
MirRd    : # mirror reads in progress
MirWr    : # mirror writes in progress
CacIn    : # cache invalidates in progress
IAC      : # inter-array communication messages in progress
ICON     : # inter-controller messages in progress
MIRROR READS : # completed mirror read operations
MIRROR WRITES : # completed mirror write operations
CACHE INV   : # completed cache invalidate operations
IAC         : # completed Inter-Array-Communications messages
ICON        : # completed Inter-Controller messages

Each ch, lu, iditn, or tditn record begins with an attention character
followed by '<' to get your attention (blank means things look normal):

  Channel    Logical Unit      Initiator Driver ITN Target Driver ITN
-----
-<  down     no itns conn     disconn           disconn
=<  ext down rejecting IO req's  rejecting IO req's  on ext down channel
#<  blocked restrict/suspended blocked by LID      N/A
d<  degraded look at ORP       degraded           N/A

```

5.1.1.02 ch and chall

The ch command examines a single device channel information. The chall command provides channel information for all drive side devices. This command is similar to the fcAll command except that it will also show the firmware level on the controller.

The basic syntax is: `ch 0xc0000i`

Explanation of the Operation-Redundancy-Performance (ORP) and Channels (either Init Chs or Channels) columns.

```

Drv = Drive side connection
Hst = Host side connection
Rvm = Remote Volume Mirror connection
FCP = Fibre Channel Protocol
STP = SCSI Transport Protocol
SAS = Serially Attached SCSI Transport Protocol
Link Down counts = The ioni::IoniMgmt::linkDownEvent calls
ITN cnt = Is a count of the connected ITNs on that channel (not counting diagnostic ITNs)
IO counts = Are "SCSI" IOs only (fcall counted all FC exchanges, including ELS, etc)
Qd = IOs that are queued in the high-level initiator driver
Open = IOs that are in the low level driver (and probably in progress on the channel)
Completed = IOs that completed
Errs = IOs that completed with an error status

```

(6.16)

```
-> chall
chAll (Tick 0000183578) ==> 06/19/06-20:38:08 (GMT)
6091-A 06.16.82.00
.....Channels.....Target.....Initiator.....
      Link :ITN  Open  Completed  IO :ITN  Qd  Open  Completed  IO
Ch H/D STP Stat Down :cnt  IOs      IOs  Errs :cnt  IOs  IOs      IOs  Errs
-----
0 Drv FCP Up   5 : 2    0      426    0 : 13  0    0      3306   6
1 Drv FCP Up   4 : 2    0      457    0 : 13  0    0      3365   6
2 Drv FCP Up   2 : 2    0      458    0 : 13  0    0      3975   6
3 Drv FCP Up   2 : 2    0      434    0 : 13  0    0      3762   6
4 Hst FCP Down 1 : 0    0        0    0 : 0   0    0        0    0
5 Hst FCP Down 1 : 0    0        0    0 : 0   0    0        0    0
6 Hst FCP Down 1 : 0    0        0    0 : 0   0    0        0    0
7 Hst FCP Down 1 : 2    0        0    0 : 1   0    0        0    0
```

(6.17 and higher)

```
-> chall
chAll (Tick 0022048817) ==> 01/09/07-00:52:39 (GMT)
1932-A 06.17.30.05
.....Channels.....Target.....Initiator.....
      Link :ITN  :.....IOs.....:ITN  :.....IOs.....
Ch H/D STP Down :cnt : Open  Completed  Errs :cnt : Qd  Open  Completed  Errs
-----
0 Drv SAS 0 : 1 : 0      47034    1 : 13 : 0    0      605944  36
1 Drv SAS 0 : 1 : 0      26543    0 : 13 : 0    0      410511  36
-< 2 Hst SAS 0 : 0 : 0        0    0 : 0 : 0    0        0    0
3 Hst FCP 1 : 1 : 1      408011   39 : 0 : 0    0        0    0
-< 4 Hst FCP 1 : 0 : 0        0    0 : 0 : 0    0        0    0
```

5.1.1.03 lu and luall

The lu command examines a single device path information. The luall command provides path information for all drive side devices and is the follow on replacement for the older fcDevs 4 command

The basic syntax is: lu 0xc0000i

Explanation of the Operation-Redundancy-Performance (ORP) and Channels (either Init Chs or Channels) columns.

```
ORP columns indicate the overall state of the lu for disk device types (normally, should be "+++").

O=operation - the state of the ITN currently chosen
+) chosen itn is not degraded
d) chosen itn is degraded

R=redundancy - the state of the redundant ITN
+) alternate itn is up
d) alternate itn is degraded
-) alternate itn is down
x) there is no alternate itn

P=performance - Are we using the preferred path?
+) chosen itn is preferred
-) chosen itn is not preferred
) no itn preferences

The Channels column indicates the state of the itn on that channel which is for its lu.

*) up & chosen
+) up & not chosen
D) degraded & chosen
d) degraded & not chosen
-) down
x) not present
```


(6.16)

```

-> luall
.....Logical Units..... Init Chs.....Initiator IOs.....
Devnum  T,S  Role  ORP  ::0 1 2 3 4 5 6 7 : Qd Open Completed Errs
-----
00000001 4, 1 Disk  +++ : * + : 0 0 598 3
00000002 4, 2 Disk  +++ : + * : 0 0 97833 9
00000003 4, 3 Disk  +++ : * + : 0 0 722 3
00000004 4, 4 Disk  +++ : + * : 0 0 746 3
00000005 4, 5 Disk  +++ : * + : 0 0 771 3
00000006 4, 6 Disk  +++ : + * : 0 0 758 3
00000007 4, 7 Disk  +++ : * + : 0 0 598 3
00000008 4, 8 Disk  +++ : + * : 0 0 598 3
00000009 4, 9 Disk  +++ : * + : 0 0 599 3
0000000a 4,10 Disk  +++ : + * : 0 0 607 3
00100001 3, 1 Disk  +++ : * + : 0 0 592 2
00100002 3, 2 Disk  +++ : + * : 0 0 818 2
00100003 3, 3 Disk  +++ : * + : 0 0 748 2
00100004 3, 4 Disk  +++ : + * : 0 0 96332 5
00100005 3, 5 Disk  +++ : * + : 0 0 708 2
00100006 3, 6 Disk  +++ : + * : 0 0 96105 5
00100007 3, 7 Disk  +++ : * + : 0 0 592 2
00100008 3, 8 Disk  +++ : + * : 0 0 592 2
00100009 3, 9 Disk  +++ : * + : 0 0 592 2
0010000a 3,10 Disk  +++ : + * : 0 0 593 2
00000010 4 Encl  ++ : A B : 0 0 253135 7
00100010 3 Encl  ++ : A B : 0 0 253132 6
00d00011 Diag  +x : * : 0 0 4 0
00e00011 Diag  ++ : + + * + : 0 0 0 0
00f00011 Mirr  ++ : + + + * : 0 0 2914844 0
    
```

(6.17 and higher)

```

-> luall
.....Logical Unit.....:Channels.....IOs.....
Devnum  Location  Role  :ORP : 0 1 2 3 : Qd Open Completed Errs
-----
00100010 t1 Encl  :++ : A B : 0 0 74896 0
00000001 t1,s1 FCdr  :+++ : * + : 0 0 12896 1
00000002 t1,s2 FCdr  :+++ : + * : 0 0 176 1
00000003 t1,s3 FCdr  :+++ : * + : 0 0 176 1
00000004 t1,s4 FCdr  :+++ : + * : 0 0 177 1
00000005 t1,s5 FCdr  :+++ : * + : 0 0 177 1
00000006 t1,s6 FCdr  :+++ : + * : 0 0 180 1
00000007 t1,s7 FCdr  :+++ : * + : 0 0 214 1
00000008 t1,s8 FCdr  :+++ : + * : 0 0 211 1
00000009 t1,s9 FCdr  :+++ : * + : 0 0 12935 1
0000000a t1,s10 FCdr  :+++ : + * : 0 0 211 1
0000000b t1,s11 FCdr  :+++ : * + : 0 0 211 1
0000000c t1,s12 FCdr  :+++ : + * : 0 0 211 1
0000000d t1,s13 FCdr  :+++ : * + : 0 0 214 1
0000000e t1,s14 FCdr  :+++ : + * : 0 0 168 1
00000010 t2 Encl  :++ : A B : 0 0 64198 0
0000000f t2,s1 FCdr  :+++ : * + : 0 0 211 1
00100000 t2,s2 FCdr  :+++ : + * : 0 0 12930 1
00100001 t2,s3 FCdr  :+++ : * + : 0 0 209 1
00100002 t2,s4 FCdr  :+++ : + * : 0 0 167 1
00100003 t2,s5 FCdr  :+++ : * + : 0 0 167 1
00100004 t2,s6 FCdr  :+++ : + * : 0 0 167 1
00100005 t2,s7 FCdr  :+++ : * + : 0 0 167 1
00100006 t2,s8 FCdr  :+++ : + * : 0 0 167 1
00100007 t2,s9 FCdr  :+++ : * + : 0 0 167 1
00100008 t2,s10 FCdr  :+++ : + * : 0 0 167 1
00100009 t2,s11 FCdr  :+++ : * + : 0 0 167 1
0010000a t2,s12 FCdr  :+++ : + * : 0 0 167 1
0010000b t2,s13 FCdr  :+++ : * + : 0 0 167 1
0010000c t2,s14 FCdr  :+++ : + * : 0 0 167 1
00e00011 c,this Am  :++ : * + + + : 0 0 0 0
00f00011 c,alt Bm  :++ : + + + * : 0 0 791801 0
    
```

5.1.1.04 iditn and iditnall

The iditn command examines a single device initiator I-T-N Nexus information. The iditnall command provides initiator I-T-N Nexus information for all drive side devices and is the follow on replacement for the older fcDevs 4 command and is same as the ionShow 11 command.

The basic syntax is: `iditn 0xc0000i`

Ah = Refers to the A controllers host (h) side connection. If this were the B controller then it would be Bh.
Am = Refers to the A controllers media (drive) side connection.
Bm = Refers to the B controllers media (drive) side connection.
IAC = Inter-Array Communication (RVM)
RmtA = Remote A controller connection (RVM).

(6.16)

```
-> iditnall 0
.....Initiator Driver ITNs.....Initiator IOs.....
Devnum      T,S Type Ch iditn Byte CnState Disc : Qd Open Completed Errs
-----
0x00000001 85, 1 FCdr 0 14 0x00 Connect 0 : 0 0 62091 1
0x00000001 85, 1 FCdr 1 11 0x00 Connect 0 : 0 0 4 0
0x00000002 85, 2 FCdr 0 15 0x01 Connect 0 : 0 0 4 0
0x00000002 85, 2 FCdr 1 10 0x01 Connect 0 : 0 0 725 1
0x00000003 85, 3 FCdr 0 16 0x02 Connect 0 : 0 0 741 1
0x00000003 85, 3 FCdr 1 9 0x02 Connect 0 : 0 0 4 0
0x00000004 85, 4 FCdr 0 17 0x03 Connect 0 : 0 0 4 0
0x00000004 85, 4 FCdr 1 8 0x03 Connect 0 : 0 0 62231 1
0x00000005 85, 5 FCdr 0 18 0x04 Connect 0 : 0 0 646 1
0x00000005 85, 5 FCdr 1 7 0x04 Connect 0 : 0 0 4 0
0x00000006 85, 6 FCdr 0 19 0x05 Connect 0 : 0 0 4 0
0x00000006 85, 6 FCdr 1 6 0x05 Connect 0 : 0 0 62184 1
0x00000007 85, 7 FCdr 0 20 0x06 Connect 0 : 0 0 584 1
0x00000007 85, 7 FCdr 1 4 0x06 Connect 0 : 0 0 4 0
0x00000008 85, 8 FCdr 0 21 0x07 Connect 0 : 0 0 4 0
0x00000008 85, 8 FCdr 1 3 0x07 Connect 0 : 0 0 585 1
0x00000009 85, 9 FCdr 0 23 0x08 Connect 0 : 0 0 585 1
0x00000009 85, 9 FCdr 1 5 0x08 Connect 0 : 0 0 4 0
0x0000000a 85,10 FCdr 0 22 0x09 Connect 0 : 0 0 4 0
0x0000000a 85,10 FCdr 1 2 0x09 Connect 0 : 0 0 585 1
0x0000000b 85,11 FCdr 0 24 0x0a Connect 0 : 0 0 590 1
0x0000000b 85,11 FCdr 1 1 0x0a Connect 0 : 0 0 4 0
0x00d00011 Ah 2 27 0x7d Connect 0 : 0 0 2 0
0x00e00011 Am 0 26 0x7d Connect 0 : 0 0 0 0
0x00e00011 Am 1 13 0x7d Connect 0 : 0 0 0 0
0x00f00011 Bm 0 25 0x7c Connect 0 : 0 0 1129927 0
0x00f00011 Bm 1 12 0x7c Connect 0 : 0 0 1129934 0
```

(6.17 and higher)

```
-> iditnall
...IDITN.....Logical Unit.....:Port :.....IOs.....
iditn Ch : Devnum Location Role :Byte : Qd Open Completed Errs
-----
1 0 : 00000001 t12,s1 FCdr :0x10 : 0 0 143 2
18 1 : 00000001 t12,s1 FCdr :0x10 : 0 0 4 0
2 0 : 00000002 t12,s2 FCdr :0x11 : 0 0 4 0
19 1 : 00000002 t12,s2 FCdr :0x11 : 0 0 7300 2
3 0 : 00000003 t12,s3 FCdr :0x12 : 0 0 7298 2
20 1 : 00000003 t12,s3 FCdr :0x12 : 0 0 4 0
4 0 : 00000004 t12,s4 FCdr :0x13 : 0 0 7 1
21 1 : 00000004 t12,s4 FCdr :0x13 : 0 0 35659 4
5 0 : 00000005 t12,s5 FCdr :0x14 : 0 0 7311 2
22 1 : 00000005 t12,s5 FCdr :0x14 : 0 0 4 0
6 0 : 00000006 t12,s6 FCdr :0x15 : 0 0 4 0
23 1 : 00000006 t12,s6 FCdr :0x15 : 0 0 232 2
7 0 : 00000007 t12,s7 FCdr :0x16 : 0 0 218 2
24 1 : 00000007 t12,s7 FCdr :0x16 : 0 0 4 0
8 0 : 00100000 t12,s8 FCdr :0x17 : 0 0 8 2
25 1 : 00100000 t12,s8 FCdr :0x17 : 0 0 28601 5
9 0 : 00100001 t12,s9 FCdr :0x52 : 0 0 229 2
26 1 : 00100001 t12,s9 FCdr :0x52 : 0 0 4 0
10 0 : 00100002 t12,s10 FCdr :0x62 : 0 0 4 0
27 1 : 00100002 t12,s10 FCdr :0x62 : 0 0 193 2
11 0 : 00100003 t12,s11 FCdr :0x42 : 0 0 192 2
28 1 : 00100003 t12,s11 FCdr :0x42 : 0 0 4 0
12 0 : 00100004 t12,s12 FCdr :0x4a : 0 0 7 1
29 1 : 00100004 t12,s12 FCdr :0x4a : 0 0 28552 4
13 0 : 00100005 t12,s13 FCdr :0x5a : 0 0 143 2
30 1 : 00100005 t12,s13 FCdr :0x5a : 0 0 4 0
14 0 : 00100006 t12,s14 FCdr :0x6a : 0 0 4 0
31 1 : 00100006 t12,s14 FCdr :0x6a : 0 0 143 2
16 0 : 00e00011 c,this Bm :0x7c : 0 0 0 0
32 1 : 00e00011 c,this Bm :0x7c : 0 0 0 0
```

33	3	:d<00d00011	c,this	Bh :0x03	: 0	0	0	0
15	0	: 00f00011	c,alt	Am :0x7d	: 0	0	412674	0
17	1	: 00f00011	c,alt	Am :0x7d	: 0	0	412671	0

5.1.1.05 tditn and tditnall

The tditn command examines a single device target I-T-N Nexus information. The tditnall command provides target I-T-N Nexus information for all host side connection. The tditnall command replaces the fc111 command and is also similar to the information from fcHosts 1.

The basic syntax is: `tditn x` (x = tditn number from the tditnall output.)

Ah = Refers to the A controllers host (h) side connection. If this were the B controller then it would be Bh.
Am = Refers to the A controllers media (drive) side connection.
Bm = Refers to the B controllers media (drive) side connection.
IAC = Inter-Array Communication (RVM)
RmtA = Remote A controller connection (RVM).

(6.16)

```
-> tditnall
.....Target Driver ITNs.....Target IOs.....:
tditn Ch InitiatorDevName InitiatorPrtnName Role CnState : Open Completed Errs : Host Label
-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
1 3 200000a0b8113bb4 200400a0b8113bb4 Am Connect : 0 0 0 :
2 2 200000a0b8113bb4 200300a0b8113bb4 Am Connect : 0 0 0 :
3 3 200000a0b8114418 200400a0b8114418 Bm Connect : 0 363 0 :
4 2 200000a0b8114418 200300a0b8114418 Bm Connect : 0 376 0 :
5 1 200000a0b8113bb4 200200a0b8113bb4 Am Connect : 0 0 0 :
6 0 200000a0b8113bb4 200100a0b8113bb4 Am Connect : 0 0 0 :
7 1 200000a0b8114418 200200a0b8114418 Bm Connect : 0 373 0 :
8 0 200000a0b8114418 200100a0b8114418 Bm Connect : 0 368 0 :
9 7 200600a0b8113bb4 204600a0b8113bb4 Ah Connect : 0 0 0 :
10 7 200000e08b80a60e 210000e08b80a60e Host Connect : 1 5016 2 : tslab71-2
```

(6.17 and higher)

```
-> tditnall
...TDITN.....Initiator.....IOs.....
tditn Ch : Location Device Name Port Name : Open Completed Errs
-----:-----:-----:-----:-----:-----:-----:-----:-----:-----:
1 0 : Bm 200000a0b80f1557 200100a0b80f1557 : 0 0 0
2 1 : Bm 200000a0b80f1557 200200a0b80f1557 : 0 0 0
3 0 : Am 200000a0b80f15b1 200100a0b80f15b1 : 0 225062 0
4 1 : Am 200000a0b80f15b1 200200a0b80f15b1 : 0 239065 0
5 3 :tslab47-1 200000e08b011cec 210000e08b011cec : 0 1512249 9
6 3 : Bh 200600a0b80f1557 200700a0b80f1559 : 0 0 0
```

5.1.1.06 ionShowInquiry

The ionShowInquiry command replaces both fcDevs 2 and fcDevs 3 information function.

```
-> ionShowInquiry
Disk 00000001 20000011c67f3a7e SEAGATE ST3146954FC MS01 3KN0CEDX00007602TL1T
Disk 00000002 20000011c67f476c SEAGATE ST3146954FC MS01 3KN0EF8K00007602TL59
Disk 00000003 20000011c67f46e8 SEAGATE ST3146954FC MS01 3KN0CN5600007604J8CS
Disk 00000004 20000011c67f4687 SEAGATE ST3146954FC MS01 3KN0CEFD00007602TKCZ
Disk 00000005 20000011c67f46f3 SEAGATE ST3146954FC MS01 3KN0CNKP00007604J8R2
Disk 00000006 20000011c67f2ddb SEAGATE ST3146954FC MS01 3KN0DDLX00007602TKSD
Disk 00000007 20000011c67f3a69 SEAGATE ST3146954FC MS01 3KN0DALA00007601M6LT
Disk 00000008 20000011c67f3a53 SEAGATE ST3146954FC MS01 3KN0D580000076026RU0
Disk 00000009 20000011c67f3a8c SEAGATE ST3146954FC MS01 3KN0DQ48000076026RXQ
Disk 0000000a 20000011c67f414f SEAGATE ST3146954FC MS01 3KN0EHP400007604JA26
Disk 00100001 20000011c67f2bbd SEAGATE ST3146954FC MS01 3KN0DDS100007601Q5WU
Disk 00100002 20000011c67f2d2b SEAGATE ST3146954FC MS01 3KN0DDK400007601M6HU
Disk 00100003 20000011c67f2a3a SEAGATE ST3146954FC MS01 3KN0DD6F000076025WS2
Disk 00100004 20000011c67f2739 SEAGATE ST3146954FC MS01 3KN0C5LK00007601M5DL
Disk 00100005 20000011c67f3a42 SEAGATE ST3146954FC MS01 3KN0DALB000076026RPZ
Disk 00100006 20000011c67f3a57 SEAGATE ST3146954FC MS01 3KN0DEL6000076026RSB
Disk 00100007 20000011c67f3a60 SEAGATE ST3146954FC MS01 3KN0DAL7000076026RNB
Disk 00100008 20000011c67f3a3b SEAGATE ST3146954FC MS01 3KN0DN71000076025X8D
Disk 00100009 20000011c67f2b09 SEAGATE ST3146954FC MS01 3KN0CYG800007602TKWR
Disk 0010000a 20000011c67f2aa0 SEAGATE ST3146954FC MS01 3KN0DCG5000076025X0G
Encl 00000010 100000a0b81dafce ENGENIO. SYM4600-FC..... 9833 N/A
Encl 00000010 100000a0b81dafce ENGENIO. SYM4600-FC..... 9833 N/A
Encl 00100010 100000a0b81dafd3 ENGENIO. SYM4600-FC..... 9833 N/A
Encl 00100010 100000a0b81dafd3 ENGENIO. SYM4600-FC..... 9833 N/A
This 00d00011 200600a0b8113bb4 SYMBIOS INFINITI 1.00 N/A
This 00e00011 200000a0b8113bb4 SYMBIOS INFINITI 1.00 N/A
Lmir 00f00011 200000a0b8114418 SYMBIOS INFINITI 1.00 N/A
```

5.1.1.07 ionShow 12

The ionShow 12 command replaces fcDevs 2 function to check the open/closed state of a device. **Note:** Drive capacity is shown in hexadecimal blocks. To calculate the size of the drive take the capacity of the drive and convert to decimal then divide by 2 (2 x 512 bytes/block = 1024 bytes or 1KB).

```
-> ionShow 12

Initiator Driver Logical Units:
Encl Disc Timeout 0
Expected Enclosures

Type Devnum ItnCnt Online Id Location State Capacity BlkSz
-----
Disk 00000001 2 2 20000004cff59f62 t12,s1 Open 88bb992 512
Disk 00000002 2 2 20000004cff5ab29 t12,s2 Open 88bb992 512
Disk 00000003 2 2 20000004cff59f52 t12,s3 Open 88bb992 512
Disk 00000004 2 2 20000004cff59f4c t12,s4 Open 88bb992 512
Disk 00000005 2 2 20000004cff5ab99 t12,s5 Open 88bb992 512
Disk 00000006 2 2 20000004cff5ab56 t12,s6 Open 88bb992 512
Disk 00000007 2 2 20000004cff5abb6 t12,s7 Open 88bb992 512
Disk 00100000 2 2 20000004cff5ac14 t12,s8 Open 88bb992 512
Disk 00100001 2 2 20000004cff5ab48 t12,s9 Open 88bb992 512
Disk 00100002 2 2 20000004cff5abda t12,s10 Open 88bb992 512
Disk 00100003 2 2 20000004cff5ac29 t12,s11 Open 88bb992 512
Disk 00100004 2 2 20000004cff5ac25 t12,s12 Open 88bb992 512
Disk 00100005 2 2 20000004cff5abd5 t12,s13 Open 88bb992 512
Disk 00100006 2 2 20000004cff5ab2b t12,s14 Open 88bb992 512
This 00e00011 2 2 200000a0b80f1557 c,this
This 00d00011 2 1 200600a0b80f1557 c,this
Lmir 00f00011 2 2 200000a0b80f15b1 c,alt

Remote Logical Units:
```

5.1.1.08 ionShow 99

The ionShow 99 command performs the following commands:

- chall 0 - Summary channel information
- luall 0 - Summary logical unit information
- iditnall 0- Summary drive side information
- tditnall 0- Summary host side information
- chall 1 - Channel I/O breakdown
- luall 1 - Logical unit I/O breakdown
- iditnall 1- Drive side I/O breakdown
- tditnall 1- Host side I/O breakdown
- chall 2 - Channel I/O errors
- luall 2 - Logical unit I/O errors
- iditnall 2- Drive side I/O errors
- tditnall 2- Host side I/O errors
- fcall 10 - Misc. chip information

This command can be used to gather detailed information to aid troubleshooting.

5.1.1.09 Controller I/O Breakdown

The commands **chall 4**, **luall 4**, **iditnall 4** and **tditnall 4** can be used to help check controllers for possible problems. These commands can be used in conjunction with **ionShow 99** to aid in troubleshooting.

```
-> chall 4 Channel information
Target Ctrl IO Breakdown
.Channel :.....Open Ios.....MIRROR READS.....MIRROR WRITES.....CACHE INV.....IAC.....ICON...
Ch H/D :MirRd MirWr CacIn IAC ICON : #Success BlksXfered #Errs : #Success BlksXfered #Errs : #Success #Errs :#Succ #Errs :#Succ #Errs
-----
0 Drv : 0 0 0 0 0 0 : 0 0 0 0 : 0 0 0 0 : 0 0 0 0 : 0 0 :1616106 0 0 : 0 0 0
1 Drv : 0 0 0 0 0 0 : 0 0 0 0 : 0 0 0 0 : 0 0 0 0 : 0 0 :1611034 0 0 : 0 0 0

Initiator Ctrl IO Breakdown
.Channel :.....Open Ios.....MIRROR READS.....MIRROR WRITES.....CACHE INV.....IAC.....ICON...
Ch H/D :MirRd MirWr CacIn IAC ICON : #Success BlksXfered #Errs : #Success BlksXfered #Errs : #Success #Errs :#Succ #Errs :#Succ #Errs
-----
```

```

0 Drv : 0 0 0 0 0 0 : 8874 50512 0 : 53 50510 0 : 9 0 :1610351 0 :4293726 0
1 Drv : 0 0 0 0 0 0 : 8768 55666 0 : 46 55488 0 : 19 0 :1616789 0 :4287389 0

-> luall 4 Logical unit information
Initiator IO Breakdown
.....Logical Unit.....Open IOs.....MIRROR READS.....MIRROR WRITES.....CACHE INV.....IAC.....ICON...
.....Devnum Location :MirRd MirWr CacIn IAC ICON : #Success BlksXfered #Errs : #Success BlksXfered #Errs : #Success #Errs :#Succ #Errs :#Succ #Errs
-----
00f00011 c,alt : 0 0 0 0 0 0 : 17642 106178 0 : 99 105998 0 : 28 0 :3227148 0 :8581135 0

-> iditnall 4 Drive side information
.....TDITM.....L Unit.....Open IOs.....MIRROR READS.....MIRROR WRITES.....CACHE INV.....IAC.....ICON...
.....iditn Ch :Location :MirRd MirWr CacIn IAC ICON : #Success BlksXfered #Errs : #Success BlksXfered #Errs : #Success #Errs :#Succ #Errs :#Succ #Errs
-----
1 0 : c,alt : 0 0 0 0 0 0 : 8874 50512 0 : 53 50510 0 : 9 0 :1610359 0 :4293744 0
17 1 : c,alt : 0 0 0 0 0 0 : 8768 55666 0 : 46 55488 0 : 19 0 :1616797 0 :4287407 0

-> tditnall 4 Host side information
.....TDITM.....Initiator.....Open IOs.....MIRROR READS.....MIRROR WRITES.....CACHE INV.....IAC.....ICON...
.....tditn Ch : Location :MirRd MirWr CacIn IAC ICON : #Success BlksXfered #Errs : #Success BlksXfered #Errs : #Success #Errs :#Succ #Errs :#Succ #Errs
-----
3 0 : Am : 0 0 0 0 0 0 : 0 0 0 0 : 0 0 0 : 0 0 :1616118 0 : 0 0
4 1 : Am : 0 0 0 0 0 0 : 0 0 0 0 : 0 0 0 : 0 0 :1611046 0 : 0 0

.....Open IOs.....MIRROR READS.....MIRROR WRITES.....CACHE INV.....IAC.....ICON...
Object :MirRd MirWr CacIn IAC ICON : #Success BlksXfered #Errs : #Success BlksXfered #Errs : #Success #Errs :#Succ #Errs :#Succ #Errs
-----
: 0 0 0 0 0 0 : 0 0 0 0 : 0 0 0 : 0 0 : 0 0 : 0 0

where:
Open IOs : # inter-controller operations in progress MIRROR READS : # completed mirror read operations
MirRd : # mirror reads in progress MIRROR WRITES : # completed mirror write operations
MirWr : # mirror writes in progress CACHE INV : # completed cache invalidate operations
CacIn : # cache invalidates in progress IAC : # completed Inter-Array-Communications messages
IAC : # inter-array communication messages in progress ICON : # completed Inter-Controller messages
ICON : # inter-controller messages in progress

```

5.2.1 hids Commands

The hids command set replaces hdd functions and is part of the ION driver update. Running hids without parameters will provide a summary of usage information. Running hids 1 will provide more details of hids usage.

The basic syntax is: hids <number> or hids '<case sensitive letter>'

Below is a listing of the hids commands that are available.

```

-> hids

=====
Usage Summary
=====

MAPS
MapCfg='M'= 77 MapAdr='A'= 65 MapInd='m'=109

OBJECT TABLES
Cmds='c'= 99 Devs='d'=100 ITNs='i'=105 LUs='l'=108

INDIVIDUAL OBJECTS
Cmd='C'= 67 Buf='B'= 66

STATISTICS
Dpatch='R'= 82 PrfMon='s'=115 Cmd='S'= 83 Concat='T'= 84

MISCELLANEOUS
UseSum===== 0 UseDtl===== 1 Expln='h'=104 ShoLst='P'= 80
AllFnc='z'=122

```

(hids 1)

```

-> hids 1

=====
Usage Detailed
=====

Function Description Func (Dec) LineFilter Options

MAPS
Map Showing LU-Dev-ITN hids 'M'( 77), LF, 0
Map with Addresses hids 'A'( 65), LF, 0
LU, Dev, & ITN STL Map hids 'm'(109), LF, 0

OBJECT TABLES
Show All Allocated Cmds hids 'c'( 99), LF, 0
Show All Devices hids 'd'(100), LF, 0
Show All Itns hids 'i'(105), LF, 0

```

```

Show All LUs  hids 'l'(108), LF, 0
INDIVIDUAL OBJECTS
      Cmd Show  hids 'C'( 67), LF, 0
      Buf Show  hids 'B'( 66), LF, 0
STATISTICS
      Statistics: Dispatch hids 'R'( 82), LF, 0
      Statistics: PerfMon  hids 's'(115), LF, 0
      Statistics: Cmd      hids 'S'( 83), LF, 0
      Statistics: Concat   hids 'T'( 84), LF, 0
MISCELLANEOUS
      Usage Summary  hids ''( 0), LF, 0
      Usage Detailed hids ''( 1), LF, 0
      Explanations   hids 'h'(104), LF, 0
      Show Struct List hids 'P'( 80), LF, 0
      All Functions   hids 'z'(122), LF, 0

LineFilters:
  Buf, Cmd  = adrs
  Dev, Itn  = id
  LU        = devnum
  Exceptions = 'e'
    
```

SAS systems (6.17 only)

```

-> hids

AutoPrompt      = enabled (To change, enter hi 0,1,<0 or 1>)
ShowLegend      = disabled (To change, enter hi 0,2,<0 or 1>)
ShowExceptionsOnly = disabled (To change, enter hi 0,3,<0 or 1>)

AutoPrompt
.....
ION  : ( ionHelp)( idcmdall)( luall )( chall)( iditnall)
..HID.: ( hidHelp)(00=Status)
Main : ( 1=Keys ) ( 2=Status)
Maps : (10=DnumLu) (11=DevLu ) (12=Lu ) (13=DevNam) (14=LidHid) (15=ItnDev)
Objs : (20=Buf ) (21=Cmd ) (22=Lu ) (23=Dev ) (24=Itn )
Misc : (30=OldCmd) (31=AnyObj) (32=Paths ) (33=X-Chek)
.....
    
```

5.2.1.01 hids 104 or 'h'

The hids 104 or 'h' command provides an explanation of various items that will show up when running hids commands.

```

-> hids 104
      or
-> hids 'h'

=====
                        Explanations
=====

1. LUs and ITNs can have only one DEVICE.
2. A DEVICE can have many LUs and ITNs.

ROLES
Am or Bm = MediaSide port for A or B controller.
Ah or Bh = Hostside port for A or B controller.
Encl = An Enclosure
FCdr = A Fibre Channel Drive
RmtA = A port for Remote Mirroring

ITN STATE
++ (Wkng-Norm) = Working-normal
WD (Wkng-Degr) = Working-degraded
WR (Wkng-Rest) = Working-restricted
QD (Qing-Dcon) = Queueing-disconnected
QS (Qing-Susp) = Queueing-suspended
QB (Qing-Blck) = Queueing-blocked
FI (Fail-Ioer) = Fail-Ioerr
FM (Fail-Miss) = Fail-Missing
    
```

5.2.1.02 hids 2

The hids 2 command is a SAS only command and provides basic status information. **Note:** When using hids commands of SAS system (6.17 firmware) that if “Autoprompt” is enabled then you will always have a list of the hids functions that are available at the end of the output.

```
-> hids 2

=====
HID MASTER STATUS
=====
QS=QueueState:      +=optimal      R=restricted      <=nonDispatchable
ItnState: d=degraded g=good        R=restricted      B=blocked         f=failed
                D=degPref    +=preferred      S=suspended      -=disconnected    F=failIoErr
-----
          CmdOwner Que  HidQnum Q  .Chosen.  ...Others...
LU  DEV   Role   DevNum Hid Lid Dep  Cur Lim S  ch: ITN:s  ch:ITN:state
L001 D001 SASdr  00000003  0  0  32  Q06 Q06 +  C1:P016:+ C0:P001:g
L002 D002 SASdr  00000004  0  0  32  Q06 Q06 +  C1:P017:+ C0:P002:g
L003 D003 SASdr  00000005  0  0  32  Q06 Q06 +  C1:P018:+ C0:P003:g
L004 D004 SASdr  00000006  0  0  32  Q06 Q06 +  C1:P019:+ C0:P004:g
L005 D005 SASdr  00000007  0  0  32  Q06 Q06 +  C1:P020:+ C0:P005:g
L006 D006 SASdr  00000008  0  0  32  Q06 Q06 +  C1:P021:+ C0:P006:g
L007 D007 SASdr  00000009  0  0  32  Q06 Q06 +  C1:P022:+ C0:P007:g
L008 D008 SASdr  0000000a  0  0  32  Q06 Q06 +  C1:P023:+ C0:P008:g
L009 D009 SASdr  0000000b  0  0  32  Q06 Q06 +  C1:P024:+ C0:P009:g
L010 D010 SASdr  0000000c  0  0  32  Q06 Q06 +  C1:P025:+ C0:P010:g
L011 D011   Am  00f00011  0  0  32  Q06 Q06 +  C0:P011:+ C1:P026:+
L012 D012 SASdr  00000001  0  0  32  Q06 Q06 +  C1:P014:+ C0:P012:g
L013 D013 SASdr  00000002  0  0  32  Q06 Q06 +  C1:P015:+ C0:P013:g
L014 D014   Bh  00d00011  0  0  32  Q06 Q06 +  C3:P027:+
AutoPrompt
-----
ION   : ( ionHelp)( idcmdall)( lual1)(  chall)( iditnall)
..HID.: ( hidHelp)(00=Status)
Main  : ( 1=Keys ) ( 2=Status)
Maps  : (10=DnumLu)(11=DevLu ) (12=Lu ) (13=DevNam) (14=LidHid) (15=ItnDev)
Objs  : (20=Buf ) (21=Cmd ) (22=Lu ) (23=Dev ) (24=Itn )
Misc  : (30=OldCmd) (31=AnyObj) (32=Paths ) (33=X-Chek)
-----
```

5.2.1.03 hids 32

The hids 32 command is a SAS (6.17 firmware) only command and provides path information.

```
-> hids 32

=====
HID PATHS
=====
QS=QueueState:      +=optimal      R=restricted      <=nonDispatchable
ItnState: d=degraded g=good        R=restricted      B=blocked         f=failed
                D=degPref    +=preferred      S=suspended      -=disconnected    F=failIoErr
-----
DEVNUM   LU Adrs (L id)  DEV Adrs (D id)  ITN Adrs (I id)  QS  Chan  State
00000003 054c86c0 (L001)  054c8880 (D001)  054c8940 (I001)  +   C0    g
00000003 054c86c0 (L001)  054c8880 (D001)  05479560 (I016)  +   C1    +
00000004 054ca800 (L002)  054ca9a0 (D002)  054caa60 (I002)  +   C0    g
00000004 054ca800 (L002)  054ca9a0 (D002)  05478920 (I017)  +   C1    +
00000005 054c9760 (L003)  054c98e0 (D003)  054c9960 (I003)  +   C0    g
00000005 054c9760 (L003)  054c98e0 (D003)  05477ca0 (I018)  +   C1    +
00000006 054c4de0 (L004)  054c4f40 (D004)  054c4fc0 (I004)  +   C0    g
00000006 054c4de0 (L004)  054c4f40 (D004)  05477040 (I019)  +   C1    +
00000007 054c7260 (L005)  054c7400 (D005)  054c74c0 (I005)  +   C0    g
00000007 054c7260 (L005)  054c7400 (D005)  054763e0 (I020)  +   C1    +
00000008 054c61c0 (L006)  054c6340 (D006)  054c63c0 (I006)  +   C0    g
00000008 054c61c0 (L006)  054c6340 (D006)  05475760 (I021)  +   C1    +
00000009 054c5bc0 (L007)  054c5d00 (D007)  054c5d80 (I007)  +   C0    g
00000009 054c5bc0 (L007)  054c5d00 (D007)  05474b00 (I022)  +   C1    +
0000000a 054c3620 (L008)  054c37e0 (D008)  054c3880 (I008)  +   C0    g
0000000a 054c3620 (L008)  054c37e0 (D008)  05473e80 (I023)  +   C1    +
0000000b 054c2580 (L009)  054c26e0 (D009)  054c2760 (I009)  +   C0    g
0000000b 054c2580 (L009)  054c26e0 (D009)  05473220 (I024)  +   C1    +
0000000c 054c1fa0 (L010)  054c2100 (D010)  054c2180 (I010)  +   C0    g
```

```

0000000c 054c1fa0 (L010) 054c2100 (D010) 054725c0 (I025) + C1 +
00f00011 054bfa80 (L011) 054bfbe0 (D011) 054bfc40 (I011) + C0 +
00f00011 054bfa80 (L011) 054bfbe0 (D011) 05471940 (I026) + C1 +
00000001 01fff120 (L012) 01fff2c0 (D012) 01fff340 (I012) + C0 g
00000001 01fff120 (L012) 01fff2c0 (D012) 01ffbf20 (I014) + C1 +
00000002 054bf2a0 (L013) 054c0940 (D013) 054bf400 (I013) + C0 g
00000002 054bf2a0 (L013) 054c0940 (D013) 0547a1c0 (I015) + C1 +
00d00011 04bb51c0 (L014) 04bb5380 (D014) 04bba220 (I027) + C3 +
AutoPrompt
.....
ION : ( ionHelp)( idcmdall)( luall )( chall)( iditnall)
..HID.: ( hidHelp)(00=Status)
Main : ( 1=Keys )( 2=Status)
Maps : (10=DnumLu)(11=DevLu )(12=Lu )(13=DevNam)(14=LidHid)(15=ItnDev)
Objs : (20=Buf )(21=Cmd )(22=Lu )(23=Dev )(24=Itn )
Misc : (30=OldCmd)(31=AnyObj)(32=Paths )(33=X-Chek)
.....

```

5.2.1.04 hids 77

The hids 77 command provides channel and LU-Dev-ITN information. Use **hids 104** for explanation of headers.

```

-> hids 77

=====
Map Showing LU-Dev-ITN
=====
LU: DevNum  Dev  DEV: DeviceName      Lu:It  Itn  ITN:Location:Ch:PC:IS: Dev
4:00000001  13  13:20000004cff59f62  1:2   13   13:FCdr   :c0:PC:++: 13
      29:FCdr   :c1:- :++: 13
5:00000002  11  11:20000004cff5ab29  1:2   27   11:FCdr   :c0:- :++: 11
      27:FCdr   :c1:PC:++: 11
6:00000003  10  10:20000004cff59f52  1:2   10   10:FCdr   :c0:PC:++: 10
      26:FCdr   :c1:- :++: 10
7:00000004  14  14:20000004cff59f4c  1:2   30   14:FCdr   :c0:- :++: 14
      30:FCdr   :c1:PC:++: 14
8:00000005  9    9:20000004cff5ab99  1:2   9    9:FCdr    :c0:PC:++: 9
      25:FCdr   :c1:- :++: 9
9:00000006  8    8:20000004cff5ab56  1:2   24   8:FCdr    :c0:- :++: 8
      24:FCdr   :c1:PC:++: 8
10:00000007 7    7:20000004cff5abb6  1:2   7    7:FCdr    :c0:PC:++: 7
      23:FCdr   :c1:- :++: 7
11:00100000 15   15:20000004cff5ac14  1:2   31   15:FCdr   :c0:- :++: 15
      31:FCdr   :c1:PC:++: 15
12:00100001 6    6:20000004cff5ab48  1:2   6    6:FCdr    :c0:PC:++: 6
      22:FCdr   :c1:- :++: 6
13:00100002 5    5:20000004cff5abda  1:2   21   5:FCdr    :c0:- :++: 5
      21:FCdr   :c1:PC:++: 5
14:00100003 4    4:20000004cff5ac29  1:2   4    4:FCdr    :c0:PC:++: 4
      20:FCdr   :c1:- :++: 4
15:00100004 12   12:20000004cff5ac25  1:2   28   12:FCdr   :c0:- :++: 12
      28:FCdr   :c1:PC:++: 12
16:00100005 3    3:20000004cff5abd5  1:2   3    3:FCdr    :c0:PC:++: 3
      19:FCdr   :c1:- :++: 3
17:00100006 2    2:20000004cff5ab2b  1:2   18   2:FCdr    :c0:- :++: 2
      18:FCdr   :c1:PC:++: 2
3:00d00011 17   17:200600a0b80f1557  1:2   33   33:Bh     :c3:-C:++: 17
      34:Bh     :c2:- :QD: 17
2:00e00011 16   16:200000a0b80f1557  1:2   16   16:Bm     :c0:RC:++: 16
      32:Bm     :c1:R :++: 16
1:00f00011 1    1:200000a0b80f15b1  1:2   17   1:Am      :c0:R :++: 1
      17:Am     :c1:RC:++: 1

LU count: 17
Device count: 17
HidItn count: 34

```


5.2.1.05 hids 108

The hids 108 command shows all of the drive side devices information. Use **hids 104** for explanation of headers.

Note: Drive capacity is shown in decimal blocks. To calculate the size of the drive take the capacity of the drive and divide by 2 (2 x 512 bytes/block = 1024 bytes or 1KB). The capacity of non-drive devices should be ignored.

```
-> hids 108

=====
                        Show All LUs
=====
Address      idlu      DevNum iddev  LUN BlkSz  Capacity DP  EdcInfo QdIOs OpenIOs
-----
0x1a8bfa40   6 0x00000001  20  0  512  286749488  NoEdc  0  0/16
0x1a8bf614  15 0x00000002  19  0  512  286749488  NoEdc  0  0/16
0x1a8bf9e4   7 0x00000003  18  0  512  286749488  NoEdc  0  0/16
0x1a8bf988   8 0x00000004  17  0  512  286749488  NoEdc  0  0/16
0x1a8bf8d0  10 0x00000005  16  0  512  286749488  NoEdc  0  0/16
0x1a8bf92c   9 0x00000006  15  0  512  286749488  NoEdc  0  0/16
0x1a8bf784  11 0x00000007  14  0  512  286749488  NoEdc  0  0/16
0x1a8bf728  12 0x00000008  13  0  512  286749488  NoEdc  0  0/16
0x1a8bf6cc  13 0x00000009  12  0  512  286749488  NoEdc  0  0/16
0x1a8bf670  14 0x0000000a  11  0  512  286749488  NoEdc  0  0/16
0x1aaf9370   4 0x00000010  26  0  512   1048576  NoEdc  0  0/1
0x1a8bf390  22 0x00100001   8  0  512  286749488  NoEdc  0  0/16
0x1a8bf5b8  16 0x00100002   7  0  512  286749488  NoEdc  0  0/16
0x1a8bf334  23 0x00100003   6  0  512  286749488  NoEdc  0  0/16
0x1a8bf2d8  24 0x00100004   5  0  512  286749488  NoEdc  0  0/16
0x1a8bf55c  17 0x00100005   4  0  512  286749488  NoEdc  0  0/16
0x1a8bf27c  25 0x00100006   9  0  512  286749488  NoEdc  0  0/16
0x1a8bf500  18 0x00100007   3  0  512  286749488  NoEdc  0  0/16
0x1a8bf4a4  19 0x00100008  10  0  512  286749488  NoEdc  0  0/16
0x1a8bf3ec  21 0x00100009   2  0  512  286749488  NoEdc  0  0/16
0x1a8bf448  20 0x0010000a   1  0  512  286749488  NoEdc  0  0/16
0x1aaf9f10   3 0x00100010  25  0  512   1048576  NoEdc  0  0/1
0x1a8c2d8c   5 0x00d00011  27  0  512   1048576  NoEdc  0  0/32
0x1bba13e8   2 0x00e00011  23  0  512   1048576  NoEdc  0  0/32
0x1bba194c   1 0x00f00011  22  0  512   1048576  NoEdc  0  0/32
```

5.3.1 fcn Commands

Like the ion and hids command sets, the fcn command set replaces functions from older firmware commands and it too is part of the ION driver update.

5.3.1.01 fcnHelp

Assistance with the usage of the fcn commands is provided with this command. Unlike the hids commands, the fcn command set is uniform across all firmware levels starting at 6.16.

```
-> fcnHelp
fcnShowChannel <channel#>[,level]
fcnShow        [level: 0-Basic 9-Details 10-Enclosures 11-RLS Stats]
fcnRls        [0-SetBaseline 1-Update 2-SetPoll [parm]]
fcnChannelReport [level 0-default, 1-Detailed (All), 2-Detailed [,channel]]
fcnCMCClearCounts [level 0-Clear counters (All), 1-Clear counters [,channel]]
```

5.3.1.02 fcnShow

A complete overview of a storage system's controller/drive trays along with the Channel, ITN, WWNN, WWPNN, Role, Port ID, Loop position and physical tray/slot information plus topology data is provided with this command.

```

-> fcnShow
FCP Low-Level Drivers:
LldName
-----
FcLite

Channels:
Ch LldName Top Link ChMiswire EsmMiswire SpdCntrl Speed MaxSpd SpeedNegErr
-----
00 FcLite AL 16 Fixed 2G 2G
01 FcLite AL 16 Fixed 2G 2G
02 FcLite Unk Down Auto 2G 2G
03 FcLite AL 1 Auto 1G 2G

Controller Enclosure Properties:
Ctrlr Ch LogicalId Tray Slots SlotAddresses
-----
This 01 0x0000000000000000 12 14 +10 +11 +12 +13 +14 +15 +16 +17 +52 +62 +42 +4a +5a +6a
Alt 00 0x0000000000000000 12 14 +10 +11 +12 +13 +14 +15 +16 +17 +52 +62 +42 +4a +5a +6a

External Enclosure Properties:

Ports Participating in Loops
Channel iditn Fc_WWideNodeName WorldWidePrtName-Role HA PortId LoopPos T,S
-----
0 16 2000000a0b80f1557 200100a0b80f1557-Bm 7c 000002 1 12,B
0 15 2000000a0b80f15b1 200100a0b80f15b1-Am 7d 000001 2 --,--
0 14 20000004cff5ab2b 21000004cff5ab2b-FCdr 6a 00002c 3 12,14
0 13 20000004cff5abd5 21000004cff5abd5-FCdr 5a 000049 4 12,13
0 12 20000004cff5ac25 21000004cff5ac25-FCdr 4a 000065 5 12,12
0 11 20000004cff5ac29 21000004cff5ac29-FCdr 42 00006e 6 12,11
0 10 20000004cff5abda 21000004cff5abda-FCdr 62 000036 7 12,10
0 9 20000004cff5ab48 21000004cff5ab48-FCdr 52 000053 8 12, 9
0 8 20000004cff5ac14 21000004cff5ac14-FCdr 17 0000c5 9 12, 8
0 7 20000004cff5abb6 21000004cff5abb6-FCdr 16 0000c6 10 12, 7
0 6 20000004cff5ab56 21000004cff5ab56-FCdr 15 0000c7 11 12, 6
0 5 20000004cff5ab99 21000004cff5ab99-FCdr 14 0000c9 12 12, 5
0 4 20000004cff59f4c 21000004cff59f4c-FCdr 13 0000ca 13 12, 4
0 3 20000004cff59f52 21000004cff59f52-FCdr 12 0000cb 14 12, 3
0 2 20000004cff5ab29 21000004cff5ab29-FCdr 11 0000cc 15 12, 2
0 1 20000004cff59f62 21000004cff59f62-FCdr 10 0000cd 16 12, 1

1 32 200000a0b80f1557 200200a0b80f1557-Bm 7c 000002 1 12,B
1 31 20000004cff5ab2b 22000004cff5ab2b-FCdr 6a 00002c 2 12,14
1 30 20000004cff5abd5 22000004cff5abd5-FCdr 5a 000049 3 12,13
1 29 20000004cff5ac25 22000004cff5ac25-FCdr 4a 000065 4 12,12
1 28 20000004cff5ac29 22000004cff5ac29-FCdr 42 00006e 5 12,11
1 27 20000004cff5abda 22000004cff5abda-FCdr 62 000036 6 12,10
1 26 20000004cff5ab48 22000004cff5ab48-FCdr 52 000053 7 12, 9
1 25 20000004cff5ac14 22000004cff5ac14-FCdr 17 0000c5 8 12, 8
1 24 20000004cff5abb6 22000004cff5abb6-FCdr 16 0000c6 9 12, 7
1 23 20000004cff5ab56 22000004cff5ab56-FCdr 15 0000c7 10 12, 6
1 22 20000004cff5ab99 22000004cff5ab99-FCdr 14 0000c9 11 12, 5
1 21 20000004cff59f4c 22000004cff59f4c-FCdr 13 0000ca 12 12, 4
1 20 20000004cff59f52 22000004cff59f52-FCdr 12 0000cb 13 12, 3
1 19 20000004cff5ab29 22000004cff5ab29-FCdr 11 0000cc 14 12, 2
1 18 20000004cff59f62 22000004cff59f62-FCdr 10 0000cd 15 12, 1
1 17 200000a0b80f15b1 200200a0b80f15b1-Am 7d 000001 16 --,--

3 33 200600a0b80f1557 200700a0b80f1559-Bh 03 0000e2 1 --,--

Ports not Participating in a Loop:
2 200600a0b80f1557 200700a0b80f1558-Bh e4 ffffff 0 --,--
    
```

(SAS with Fibre host card only)

```

-> fcnShow
FCP Low-Level Drivers:
LldName
-----
FcLite

Channels:
Ch LldName  Top Link ChMiswire EsmMiswire SpdCntrl  Speed  MaxSpd  SpeedNegErr
-----
03 FcLite   AL      2                Auto    2G      4G
04 FcLite   Unk Down                Auto    4G      4G

External Enclosure Properties:

Ports Participating in Loops
Channel iditn Fc_WWideNodeName WorldWidePrtName-Role  HA PortId LoopPos  T,S
-----
      3      27 200400a0b82fc0f7 202500a0b82fc0f7-Bh   04 0000e1      2  --,--

Ports not Participating in a Loop:
      4      200400a0b82fc0f7 203500a0b82fc0f7-Bh   e0 ffffff      0  --,--
    
```

5.3.1.03 fcnShow 11 and fcnRls

This is the replacement command for fcDevs 11 which provides Read Link Status (RLS) information. The RLS counters can be cleared, updated or a new baseline set using the fcnRls command.

```

-> fcnShow 11

Read Link Stats
=====

RLS Poll period 0 minutes

BaseLine Time: 01/04/07-18:27:10 (GMT)
Last RLS Time: 01/18/07-05:28:50 (GMT)
Current Time: 01/29/07-22:24:08 (GMT)

Ports Participating in Loops
Channel iditn Role HA PortId LoopPos T,S RLSStats: LinkFail LossSync LossSig ProtoErr BadChar BadCRC
-----
      0      16 Bm    7c 000002      1 12,B Current:      1      1      1      0      0      0
      Prev:      1      1      1      0      0      0
      Baseline: 0      0      1      0      0      0
      0      15 Am    7d 000001      2 --,-- Current:      1      0      1      0      0      0
      Prev:      1      0      1      0      0      0
      Baseline: 1      0      1      0      0      0
      0      14 FCdr   6a 00002c      3 12,14 Current:      2    4503      0      0    152151      0
      Prev:      2    4503      0      0    152151      0
      Baseline: 2    4497      0      0    151539      0
      0      13 FCdr   5a 000049      4 12,13 Current:      4      78      0      0    155388      0
      Prev:      4      78      0      0    155388      0
      Baseline: 4      75      0      0    155266      0
      0      12 FCdr   4a 000065      5 12,12 Current:      1      76      0      0    152974      0
      Prev:      1      76      0      0    152974      0
      Baseline: 1      73      0      0    152973      0
      0      11 FCdr   42 00006e      6 12,11 Current:      4      77      0      0    153626      0
      Prev:      4      77      0      0    153626      0
      Baseline: 4      74      0      0    153503      0
      0      10 FCdr   62 000036      7 12,10 Current:      4      71      0      0    154452      0
      Prev:      4      71      0      0    154452      0
      Baseline: 4      68      0      0    154330      0
      0      9 FCdr   52 000053      8 12, 9 Current:      3      71      0      0    151932      0
      Prev:      3      71      0      0    151932      0
      Baseline: 3      68      0      0    151810      0
      0      8 FCdr   17 0000c5      9 12, 8 Current:      3      86      0      0    151331      0
      Prev:      3      86      0      0    151331      0
      Baseline: 3      83      0      0    151210      0
      0      7 FCdr   16 0000c6     10 12, 7 Current:      2      71      0      0    150089      0
      Prev:      2      71      0      0    150089      0
      Baseline: 2      68      0      0    149968      0
      0      6 FCdr   15 0000c7     11 12, 6 Current:      3      79      0      0    151272      0
      Prev:      3      79      0      0    151272      0
      Baseline: 3      77      0      0    151026      0
      0      5 FCdr   14 0000c9     12 12, 5 Current:      4    348      0      0    152180      0
      Prev:      4    348      0      0    152180      0
      Baseline: 4    346      0      0    152177      0
      0      4 FCdr   13 0000ca     13 12, 4 Current:      3      67      0      0    151661      0
      Prev:      3      64      0      0    151661      0
      Baseline: 3      64      0      0    151418      0
      0      3 FCdr   12 0000cb     14 12, 3 Current:      1    5001      0      0    151895      0
      Prev:      1    5001      0      0    151895      0
      Baseline: 1    4998      0      0    151651      0
      0      2 FCdr   11 0000cc     15 12, 2 Current:      3      81      0      0    149628      0
      Prev:      3      81      0      0    149628      0
      Baseline: 3      78      0      0    149384      0
      0      1 FCdr   10 0000cd     16 12, 1 Current:      6    157      0      0    151329      0
      Prev:      6    157      0      0    151329      0
      Baseline: 6    154      0      0    151087      0
    
```

1	32 Bm	7c 000002	1 12,B	Current:	0	2	1	0	0	0
				Prev:	0	2	1	0	0	0
				Baseline:	0	0	1	0	0	0
1	31 FCdr	6a 00002c	2 12,14	Current:	5	281	0	0	174425	0
				Prev:	5	281	0	0	174425	0
				Baseline:	5	281	0	0	174423	0
1	30 FCdr	5a 000049	3 12,13	Current:	2	265	0	0	171952	0
				Prev:	2	265	0	0	171952	0
				Baseline:	2	265	0	0	171951	0
1	29 FCdr	4a 000065	4 12,12	Current:	3	268	0	0	172420	0
				Prev:	3	268	0	0	172420	0
				Baseline:	3	268	0	0	172419	0
1	28 FCdr	42 00006e	5 12,11	Current:	2	269	0	0	172847	0
				Prev:	2	269	0	0	172847	0
				Baseline:	2	269	0	0	172846	0
1	27 FCdr	62 000036	6 12,10	Current:	3	270	0	0	174957	0
				Prev:	3	270	0	0	174957	0
				Baseline:	3	270	0	0	174956	0
1	26 FCdr	52 000053	7 12, 9	Current:	4	268	0	0	170028	0
				Prev:	4	268	0	0	170028	0
				Baseline:	4	268	0	0	170027	0
1	25 FCdr	17 0000c5	8 12, 8	Current:	4	266	0	0	172428	0
				Prev:	4	266	0	0	172428	0
				Baseline:	4	266	0	0	172427	0
1	24 FCdr	16 0000c6	9 12, 7	Current:	3	269	0	0	171940	0
				Prev:	3	269	0	0	171940	0
				Baseline:	3	269	0	0	171939	0
1	23 FCdr	15 0000c7	10 12, 6	Current:	4	4859	0	0	171827	0
				Prev:	4	4859	0	0	171827	0
				Baseline:	4	4859	0	0	171826	0
1	22 FCdr	14 0000c9	11 12, 5	Current:	2	270	0	0	173349	0
				Prev:	2	270	0	0	173349	0
				Baseline:	2	270	0	0	173348	0
1	21 FCdr	13 0000ca	12 12, 4	Current:	5	287	0	0	172463	0
				Prev:	5	287	0	0	172463	0
				Baseline:	5	287	0	0	172462	0
1	20 FCdr	12 0000cb	13 12, 3	Current:	5	262	0	0	171019	0
				Prev:	5	262	0	0	171019	0
				Baseline:	5	262	0	0	171018	0
1	19 FCdr	11 0000cc	14 12, 2	Current:	1	15806	0	0	172272	0
				Prev:	1	15806	0	0	172272	0
				Baseline:	1	15806	0	0	172271	0
1	18 FCdr	10 0000cd	15 12, 1	Current:	1	260	0	0	172386	0
				Prev:	1	260	0	0	172386	0
				Baseline:	1	260	0	0	172385	0
1	17 Am	7d 000001	16 --,--	Current:	1	0	1	0	0	0
				Prev:	1	0	1	0	0	0
				Baseline:	1	0	1	0	0	0
3	33 Bh	03 0000e2	1 --,--	Current:	1	5	1	0	0	0
				Prev:	1	5	1	0	0	0
				Baseline:	1	5	1	0	0	0

5.3.1.02 fcnChannelReport and fcnCMClearCounts

This command is very useful in determining the status of each of the channels. These counts can be cleared using the **fcnCMClearCounts** command. Using the command by itself will provide a simple representation of the status of the channels.

```
-> fcnChannelReport

LinkUps:      < > UpNeverDown <+> UpWasDown
LinkDowns:    <-> Down          <=> DownExtended <x> DownFailed/Missing
Unstable:     <~> LinkGoingUpAndDown( 5 LinkUps in 30 Seconds )

value = 178 = 0xb2
-> 01/29/07-22:34:13 (GMT) (tShell): NOTE: fcnChannelReport ==> 0 1 =2 3
```

Using the “1” parameter after the command will provide detailed information about each of the channels.

```
-> fcnChannelReport 1
Channel 0:
  Type: Drive
  Status: Up      stateQualifier: 0x00
  Extended Link Downs observed: 00000000      Unstable Links observed: 00000001
  linkUpTimes:
  01/04/07-18:27:29 (GMT)
  01/04/07-18:27:30 (GMT)
  04/12/09-06:33:14 (GMT)
  01/04/07-18:27:18 (GMT)
  01/04/07-18:27:20 (GMT)

  linkUpIndex: 01      linkDownTime: 01/04/07-18:27:30 (GMT)
  extLinkDownTimeout: 00000000      Previously Displayed State:
  chanStat: 0x44eae084

Channel 1:
  Type: Drive
```

```

Status: Up      stateQualifier: 0x00
Extended Link Downs observed: 00000000      Unstable Links observed: 00000001
linkUpTimes:
01/04/07-18:27:29 (GMT)
01/04/07-18:27:30 (GMT)
04/12/09-06:33:14 (GMT)
01/04/07-18:27:18 (GMT)
01/04/07-18:27:20 (GMT)

linkUpIndex: 01      linkDownTime: 01/04/07-18:27:30 (GMT)
extLinkDownTimeout: 00000000      Previously Displayed State:
chanStat: 0x44e8df5c

Channel 2:
Type: Host
Status: Down      stateQualifier: 0x01
Extended Link Downs observed: 00000001      Unstable Links observed: 00000000
MAX Extended Link Down: 0 seconds ended at 04/12/09-06:33:17 (GMT)
linkUpTimes:
04/12/09-06:33:17 (GMT)
04/12/09-06:33:17 (GMT)
04/12/09-06:33:17 (GMT)
04/12/09-06:33:17 (GMT)
04/12/09-06:33:17 (GMT)

linkUpIndex: 00      linkDownTime: 04/12/09-06:33:17 (GMT)
extLinkDownTimeout: 00000000      Previously Displayed State: =
chanStat: 0x44e404d4

Channel 3:
Type: Host
Status: Up      stateQualifier: 0x00
Extended Link Downs observed: 00000000      Unstable Links observed: 00000001
linkUpTimes:
04/12/09-06:33:17 (GMT)
04/12/09-06:33:17 (GMT)
04/12/09-06:33:17 (GMT)
04/12/09-06:33:17 (GMT)
04/12/09-06:33:17 (GMT)

linkUpIndex: 01      linkDownTime: 04/12/09-06:33:17 (GMT)
extLinkDownTimeout: 00000000      Previously Displayed State:
chanStat: 0x44dedc0c

LinkUps:      < > UpNeverDown <+> UpWasDown
LinkDowns:    <-> Down      <=> DownExtended <x> DownFailed/Missing
Unstable:     <-> LinkGoingUpAndDown( 5 LinkUps in 30 Seconds )

value = 178 = 0xb2
-> 01/29/07-22:36:50 (GMT) (tShell): NOTE: fcnChannelReport ==> 0 1 =2 3

```

5.4 Serially Attached SCSI (SAS)

While the SAS drivers are a subset of the ION drivers, it is noteworthy to maintain a separate section for these commands. Initially, SAS will be used for price band 1-3 storage systems. However SAS will eventually be used in the larger price band 4-6 systems.

5.4.1.01 sasHelp

Like many of the other new command sets, the SAS commands now have some help information to provide assistance.

```

-> sasHelp

Helpful commands when debugging sas-sata problems

sasShowIocData (ioc)      - ioc number (0 - max)
sasIoDqLevel              - off(0) by default
sasDqLevel                - =2 by default
sasSAODqLevel             - =2 by default
sasShowChannels           - Current channel status
sasShowCmdBuffers (0/1)  - Current outstanding target(host side) operations

```

```

sasShowCounts (0/1) - list the number of outstanding mf(s) -1 list all mpiValues
sasShowAll (mpiValue) - All active message frames (mf)
sasShowBuf (buf) - Current mf and ssc information associated with a buf, if
active
sasShowMfIdx (ioc, req_idx) - mf Details
sasShowMf (mf) - mf Details
sasShowSscIdx (ioc, req_idx) - ssc Details
sasShowSsc (ssc) - ssc Details
sasShowHosts - Hosts Info
sasShowDevices - Device Info
sasShowAllExpanders - Expander Info
sasShowExpanders (ch, lev) - Show Expander Info on channel
sasShowPhyErrStats - Shows error stats for all backend devices
sasSAOMenu - Several SATA affiliation routines
sasShowEnclMap - Displays Encls, Levels (on each channel) and Id
sasShowWorker - Prints the status of the SAS Worker
sasShowMiswires - Displays miswire info for the array
sasShowAllSasPhyInfo (ioc) - Show All SasPhyInfo structure for a IOC
sasShowSasPhyInfo (ioc, phy) - Show SasPhyInfo structure
ionShow - Shows the current connection state for devices

DebugOnly
sasExpfwdl=1 - Forces Expander Code download
expdlDebug=3 - Prints Expander Info during boot
sasResetCtrlExp - Resets the Expander - may cause IO failures
sasDiscoveryDebug=1 - Prints lots of extra debug stuff during boot
sasShowLastChanEnclSlot(b,t) - Shows the last C/E/S for this bus target
    
```

5.4.1.02 sasShowChannels

Used to monitor the SAS channels.

```

-> sasShowChannels
ch: 0 - DRIVE, dev: 500a0b82fbc3d000, path: 500a0b82fbc3d001, role: Bm, ioc: 0, portInfo:
2,2,2, numLevels: 1
ch: 1 - DRIVE, dev: 500a0b82fbc3d000, path: 500a0b82fbc3d000, role: Bm, ioc: 0, portInfo:
0,2,2, numLevels: 1
ch: 2 - HOST, dev: 500a0b82fc0f7004, path: 500a0b82fbc3d004, role: Bh, ioc: 0, portInfo:
4,4,0, numLevels: 0
    
```

5.4.1.03 sasShowMiswires

Can also use the shell command **sasShowPhyErrStats** to aid in troubleshooting cabling issues between trays.

5.4.1.04 sasShowPhyErrStats

Used to isolate bad cables between SAS expansion trays. The SAS PHY Error Statistics data is collected using the storage management softwares gather all support data function. The data generated by that feature can be read from the shell using this command.

The “External” 4-wide ports on the expanders are highlighted in **red**. These are the ports that attach to the next expansion box via cables. If one of these cables was bad, it could be indicated by high error counts.

```

-> sasShowPhyErrStats 1

This is the Controller in slot A
Time since last clear: 0 days, 0 hours, 48 minutes, 30 seconds

Enclosure 0
From Phy # To # Cur/Max Speed # invalidDWords # disparityErrs # lossesOfSync # phyResetProbs
===== # # ===== # ===== # ===== # ===== # =====
HostIocA 4 # Host3 # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x0000003b
5 # # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000026
6 # # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000017
7 # # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000005
BaseIocA 0 # Expander0 # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000000
1 # # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000000
2 # Expander1 # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000000
3 # # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000000
BaseIocB 2 # Expander0 # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000000
3 # # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000000
0 # Expander1 # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000000
1 # # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000000
4 # Host2 # 3.0/3.0 Gbps # 0x00000000 # 0x00000000 # 0x00000000 # 0x00000012
    
```

5	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000	# 0x00000000
6	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000	# 0x00000037
7	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000	# 0x00000028
Expander0	16	# BaseIocA	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	17	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	0	# Drive1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Drive2	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	2	# Drive3	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	3	# Drive4	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	4	# Drive5	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	5	# Drive6	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	6	# Drive7	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	7	# Drive8	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	9	# Drive10	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	10	# Drive11	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	11	# Drive12	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	12	# Drive13	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	13	# Drive14	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	18	# BaseIocB	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	19	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	20	# External	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	21	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	22	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	23	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
Expander1	16	# BaseIocA	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	17	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	0	# Drive1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Drive2	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	2	# Drive3	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	3	# Drive4	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	4	# Drive5	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	5	# Drive6	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	6	# Drive7	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	7	# Drive8	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	9	# Drive10	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	10	# Drive11	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	11	# Drive12	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	12	# Drive13	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	13	# Drive14	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	18	# BaseIocB	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	19	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	20	# External	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	21	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	22	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	23	#	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
Drive1	0	# Expander0	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Expander1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
Drive2	0	# Expander0	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Expander1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
Drive3	0	# Expander0	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Expander1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
Drive4	-	# Expander0	# 3.0/3.0 Gbps	# INVALID	# INVALID	# INVALID
	-	# Expander1	# 3.0/3.0 Gbps	# INVALID	# INVALID	# INVALID
Drive5	-	# Expander0	# 3.0/3.0 Gbps	# INVALID	# INVALID	# INVALID
	-	# Expander1	# 3.0/3.0 Gbps	# INVALID	# INVALID	# INVALID
Drive6	0	# Expander0	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Expander1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
Drive7	-	# Expander0	# 3.0/3.0 Gbps	# INVALID	# INVALID	# INVALID
	-	# Expander1	# 3.0/3.0 Gbps	# INVALID	# INVALID	# INVALID
Drive8	0	# Expander0	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Expander1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
Drive10	-	# Expander0	# 3.0/3.0 Gbps	# INVALID	# INVALID	# INVALID
	-	# Expander1	# 3.0/3.0 Gbps	# INVALID	# INVALID	# INVALID
Drive11	0	# Expander0	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Expander1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
Drive12	0	# Expander0	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Expander1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000001
Drive13	0	# Expander0	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
	1	# Expander1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000
Drive14	0	# Expander0	# 3.0/3.0 Gbps	# 0x00000035	# 0x00000012	# 0x00000000
	1	# Expander1	# 3.0/3.0 Gbps	# 0x00000000	# 0x00000000	# 0x00000000

- Drive numbering is ONE based
 - Enclosure, Phy, Expander and IOC numbering is ZERO based
 - Phys with valid, all zero error counts are not displayed
 - INVALID means it's a SATA Drive or the I/O to retrieve the stats failed

5.4.1.05 sasShowDevices

Shows all of the devices on the drive side of a SAS system.

```
-> sasShowDevices
0- 0: SASAddr: 5000c50001b08dcb, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b08dc9, flags: x 1, devHandle: x19, parentDevHandle: x a, B/T: x 0/x e, phyId: 0
    itnId: 12, cmdCnt: 0
1 SASAddr: 5000c50001b08dca, flags: x 1, devHandle: x b, parentDevHandle: x 9, B/T: x 0/x 0, phyId: 0
```

```

itnId: 14, cmdCnt: 0
0- 1: SASAddr: 5000c50001b09053, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b09051, flags: x 1, devHandle: x1a, parentDevHandle: x a, B/T: x 0/x f, phyId: 1
  itnId: 13, cmdCnt: 0
  1 SASAddr: 5000c50001b09052, flags: x 1, devHandle: x c, parentDevHandle: x 9, B/T: x 0/x 1, phyId: 1
    itnId: 15, cmdCnt: 0

0- 2: SASAddr: 5000c50001b02f67, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b02f65, flags: x 1, devHandle: x1b, parentDevHandle: x a, B/T: x 0/x10, phyId: 2
  itnId: 1, cmdCnt: 0
  1 SASAddr: 5000c50001b02f66, flags: x 1, devHandle: x d, parentDevHandle: x 9, B/T: x 0/x 2, phyId: 2
    itnId: 16, cmdCnt: 0

0- 3: SASAddr: 5000c50001b0918b, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b09189, flags: x 1, devHandle: x1c, parentDevHandle: x a, B/T: x 0/x11, phyId: 3
  itnId: 2, cmdCnt: 0
  1 SASAddr: 5000c50001b0918a, flags: x 1, devHandle: x e, parentDevHandle: x 9, B/T: x 0/x 3, phyId: 3
    itnId: 17, cmdCnt: 0

0- 4: SASAddr: 5000c50001b08f13, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b08f11, flags: x 1, devHandle: x1d, parentDevHandle: x a, B/T: x 0/x12, phyId: 4
  itnId: 3, cmdCnt: 0
  1 SASAddr: 5000c50001b08f12, flags: x 1, devHandle: x f, parentDevHandle: x 9, B/T: x 0/x 4, phyId: 4
    itnId: 18, cmdCnt: 0

0- 5: SASAddr: 5000c50001b02f33, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b02f31, flags: x 1, devHandle: x1e, parentDevHandle: x a, B/T: x 0/x13, phyId: 5
  itnId: 4, cmdCnt: 0
  1 SASAddr: 5000c50001b02f32, flags: x 1, devHandle: x10, parentDevHandle: x 9, B/T: x 0/x 5, phyId: 5
    itnId: 19, cmdCnt: 0

0- 6: SASAddr: 5000c50001b02d2f, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b02d2d, flags: x 1, devHandle: x1f, parentDevHandle: x a, B/T: x 0/x14, phyId: 6
  itnId: 5, cmdCnt: 0
  1 SASAddr: 5000c50001b02d2e, flags: x 1, devHandle: x11, parentDevHandle: x 9, B/T: x 0/x 6, phyId: 6
    itnId: 20, cmdCnt: 0

0- 7: SASAddr: 5000c50001b091a3, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b091a1, flags: x 1, devHandle: x20, parentDevHandle: x a, B/T: x 0/x15, phyId: 7
  itnId: 6, cmdCnt: 0
  1 SASAddr: 5000c50001b091a2, flags: x 1, devHandle: x12, parentDevHandle: x 9, B/T: x 0/x 7, phyId: 7
    itnId: 21, cmdCnt: 0

0- 8: SASAddr: 5000c50001b08fcb, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b08fc9, flags: x 1, devHandle: x21, parentDevHandle: x a, B/T: x 0/x16, phyId: 8
  itnId: 7, cmdCnt: 0
  1 SASAddr: 5000c50001b08fca, flags: x 1, devHandle: x13, parentDevHandle: x 9, B/T: x 0/x 8, phyId: 8
    itnId: 22, cmdCnt: 0

0- 9: SASAddr: 5000c50001b02f7b, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b02f79, flags: x 1, devHandle: x22, parentDevHandle: x a, B/T: x 0/x17, phyId: 9
  itnId: 8, cmdCnt: 0
  1 SASAddr: 5000c50001b02f7a, flags: x 1, devHandle: x14, parentDevHandle: x 9, B/T: x 0/x 9, phyId: 9
    itnId: 23, cmdCnt: 0

0-10: SASAddr: 5000c50001b03077, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b03075, flags: x 1, devHandle: x23, parentDevHandle: x a, B/T: x 0/x18, phyId: 10
  itnId: 9, cmdCnt: 0
  1 SASAddr: 5000c50001b03076, flags: x 1, devHandle: x15, parentDevHandle: x 9, B/T: x 0/x a, phyId: 10
    itnId: 24, cmdCnt: 0

0-11: SASAddr: 5000c50001b0921f, physicalPort: 0, deviceInfo: x00000401, flags: x3, devState: x0
0 SASAddr: 5000c50001b0921d, flags: x 1, devHandle: x24, parentDevHandle: x a, B/T: x 0/x19, phyId: 11
  itnId: 10, cmdCnt: 0
  1 SASAddr: 5000c50001b0921e, flags: x 1, devHandle: x16, parentDevHandle: x 9, B/T: x 0/x b, phyId: 11
    itnId: 25, cmdCnt: 0

0-15: SASAddr: 50001c1071530119, physicalPort: 0, deviceInfo: x00000441, flags: x3, devState: x0
0 SASAddr: 50001c1071530019, flags: x 1, devHandle: x26, parentDevHandle: x a, B/T: x 0/x1b, phyId: 24
  1 SASAddr: 50001c1071530119, flags: x 1, devHandle: x18, parentDevHandle: x 9, B/T: x 0/x d, phyId: 24

0-16: SASAddr: 500a0b82fbc3d000, physicalPort: 0, deviceInfo: x00001471, flags: x1, devState: x0
0 SASAddr: 500a0b82fbc3d001, flags: x 1, devHandle: x 2, parentDevHandle: x 0, B/T: x 0/x 0, phyId: 18
  1 SASAddr: 500a0b82fbc3d000, flags: x 1, devHandle: x 1, parentDevHandle: x 0, B/T: x 0/x b, phyId: 16

0-17: SASAddr: 500a0b82fc0f7000, physicalPort: 0, deviceInfo: x00001471, flags: x3, devState: x0
0 SASAddr: 500a0b82fc0f7000, flags: x 1, devHandle: x25, parentDevHandle: x a, B/T: x 0/x1a, phyId: 16
  itnId: 11, cmdCnt: 0
  1 SASAddr: 500a0b82fc0f7001, flags: x 1, devHandle: x17, parentDevHandle: x 9, B/T: x 0/x c, phyId: 18
    itnId: 26, cmdCnt: 0
    
```

5.4.1.06 sasShowExpanders

Shows expander information for one channel

```

-> sasShowExpanders
                                Channel: 0, Level: 0, Enclosure: 0
-----
                                Parent expander
devHandle 0x9 | sasAddress: 50001c1071530000 | # of Phys: 25 | First Phy: 0
-----
                                Wide Ports (3):
WidePort 00, startingPhy: 16, numActivePhys/numPhys: 02/02, portType: Controller
WidePort 01, startingPhy: 18, numActivePhys/numPhys: 02/02, portType: Alt Controller
WidePort 02, startingPhy: 20, numActivePhys/numPhys: 00/04, portType: Expansion Out
    
```



```

                                Narrow Ports (13):
Phy: 00, Type:                Drive, Slot: 0, devHandle: 0x0b, B/T: 0x00/0x00 itnId: 1
Phy: 01, Type:                Drive, Slot: 1, devHandle: 0x0c, B/T: 0x00/0x01 itnId: 2
Phy: 02, Type:                Drive, Slot: 2, devHandle: 0x0d, B/T: 0x00/0x02 itnId: 3
Phy: 03, Type:                Drive, Slot: 3, devHandle: 0x0e, B/T: 0x00/0x03 itnId: 4
Phy: 04, Type:                Drive, Slot: 4, devHandle: 0x0f, B/T: 0x00/0x04 itnId: 5
Phy: 05, Type:                Drive, Slot: 5, devHandle: 0x10, B/T: 0x00/0x05 itnId: 6
Phy: 06, Type:                Drive, Slot: 6, devHandle: 0x11, B/T: 0x00/0x06 itnId: 7
Phy: 07, Type:                Drive, Slot: 7, devHandle: 0x12, B/T: 0x00/0x07 itnId: 8
Phy: 08, Type:                Drive, Slot: 8, devHandle: 0x13, B/T: 0x00/0x08 itnId: 9
Phy: 09, Type:                Drive, Slot: 9, devHandle: 0x14, B/T: 0x00/0x09 itnId: 10
Phy: 10, Type:                Drive, Slot: 10, devHandle: 0x15, B/T: 0x00/0x0a itnId: 11
Phy: 11, Type:                Drive, Slot: 11, devHandle: 0x16, B/T: 0x00/0x0b itnId: 12
Phy: 24, Type:                Enclosure, Slot: 15, devHandle: 0x18, B/T: 0x00/0x0d itnId: -1

```

5.4.1.07 sasShowAllExpanders

Shows expander information for all channels

```

-> sasShowAllExpanders
                                Channel: 0, Level: 0, Enclosure: 0
-----
                                Parent expander
devHandle 0xa | sasAddress: 50001c1071530000 | # of Phys: 25 | First Phy: 0
-----
                                Wide Ports (3):
WidePort 00, startingPhy: 16, numActivePhys/numPhys: 02/02, portType: Alt Controller
WidePort 01, startingPhy: 18, numActivePhys/numPhys: 02/02, portType: Controller
WidePort 02, startingPhy: 20, numActivePhys/numPhys: 00/04, portType: Expansion Out

                                Narrow Ports (13):
Phy: 00, Type:                Drive, Slot: 0, devHandle: 0x19, B/T: 0x00/0x0e itnId: 12
Phy: 01, Type:                Drive, Slot: 1, devHandle: 0x1a, B/T: 0x00/0x0f itnId: 13
Phy: 02, Type:                Drive, Slot: 2, devHandle: 0x1b, B/T: 0x00/0x10 itnId: 1
Phy: 03, Type:                Drive, Slot: 3, devHandle: 0x1c, B/T: 0x00/0x11 itnId: 2
Phy: 04, Type:                Drive, Slot: 4, devHandle: 0x1d, B/T: 0x00/0x12 itnId: 3
Phy: 05, Type:                Drive, Slot: 5, devHandle: 0x1e, B/T: 0x00/0x13 itnId: 4
Phy: 06, Type:                Drive, Slot: 6, devHandle: 0x1f, B/T: 0x00/0x14 itnId: 5
Phy: 07, Type:                Drive, Slot: 7, devHandle: 0x20, B/T: 0x00/0x15 itnId: 6
Phy: 08, Type:                Drive, Slot: 8, devHandle: 0x21, B/T: 0x00/0x16 itnId: 7
Phy: 09, Type:                Drive, Slot: 9, devHandle: 0x22, B/T: 0x00/0x17 itnId: 8
Phy: 10, Type:                Drive, Slot: 10, devHandle: 0x23, B/T: 0x00/0x18 itnId: 9
Phy: 11, Type:                Drive, Slot: 11, devHandle: 0x24, B/T: 0x00/0x19 itnId: 10
Phy: 24, Type:                Enclosure, Slot: 15, devHandle: 0x26, B/T: 0x00/0x1b itnId: -1

                                Channel: 1, Level: 0, Enclosure: 0
-----
                                Parent expander
devHandle 0x9 | sasAddress: 50001c1071530100 | # of Phys: 25 | First Phy: 0
-----
                                Wide Ports (3):
WidePort 00, startingPhy: 16, numActivePhys/numPhys: 02/02, portType: Controller
WidePort 01, startingPhy: 18, numActivePhys/numPhys: 02/02, portType: Alt Controller
WidePort 02, startingPhy: 20, numActivePhys/numPhys: 00/04, portType: Expansion Out

                                Narrow Ports (13):
Phy: 00, Type:                Drive, Slot: 0, devHandle: 0x0b, B/T: 0x00/0x00 itnId: 14
Phy: 01, Type:                Drive, Slot: 1, devHandle: 0x0c, B/T: 0x00/0x01 itnId: 15
Phy: 02, Type:                Drive, Slot: 2, devHandle: 0x0d, B/T: 0x00/0x02 itnId: 16
Phy: 03, Type:                Drive, Slot: 3, devHandle: 0x0e, B/T: 0x00/0x03 itnId: 17
Phy: 04, Type:                Drive, Slot: 4, devHandle: 0x0f, B/T: 0x00/0x04 itnId: 18
Phy: 05, Type:                Drive, Slot: 5, devHandle: 0x10, B/T: 0x00/0x05 itnId: 19
Phy: 06, Type:                Drive, Slot: 6, devHandle: 0x11, B/T: 0x00/0x06 itnId: 20
Phy: 07, Type:                Drive, Slot: 7, devHandle: 0x12, B/T: 0x00/0x07 itnId: 21
Phy: 08, Type:                Drive, Slot: 8, devHandle: 0x13, B/T: 0x00/0x08 itnId: 22
Phy: 09, Type:                Drive, Slot: 9, devHandle: 0x14, B/T: 0x00/0x09 itnId: 23
Phy: 10, Type:                Drive, Slot: 10, devHandle: 0x15, B/T: 0x00/0x0a itnId: 24
Phy: 11, Type:                Drive, Slot: 11, devHandle: 0x16, B/T: 0x00/0x0b itnId: 25
Phy: 24, Type:                Enclosure, Slot: 15, devHandle: 0x18, B/T: 0x00/0x0d itnId: -1

```

5.5 Subsystem Monitor (SSM)

The subsystem monitor system is used to check the condition of the enclosure trays.

5.5.1.01 ssmHelp

This list the SSM commands that can be used to determine the status of various componets.

```

-> ssmHelp
ssmGetCptTree <options>[,<trayid>] - print the internal Component Tree
    options : 0 - all enclosures, common statuses
             : 1 - just one enclosure identified by <trayid>
             : 2 - w/ other status data
             : 4 - w/ VPD infomation

ssmGetDependSts - print the status of the Dependency LEDs

ssmGetCallbackQ - get the maximum depth of the Callback Queue

ssmGetAlarmSts - get the Audible Alarm Status

ssmGetTempSensor - get the Temperature Sensor Thresholds & Temperature

ssmGetActiveDevnums - get a list of active devnums from ION

ssmSetDependSts <cpt>,<sts> - set the status of Dependency critical components
    cpt : 1 - Controller A
         : 2 - Controller B
         : 3 - Support Module A
         : 4 - Support Module B
         : 5 - Interconnect CRU
         : 6 - Battery CRU A
         : 7 - Battery CRU B
         : 8 - Power Supply A
         : 9 - Power Supply B
         : 10 - Data Path A
         : 11 - Data Path B
    sts : 0 - use actual component status
         : 1 - forced status - device OKAY
         : 2 - forced status - device FAILED
         : 5 - forced status - device MISSING

ssmSetServiceRequest <cpt>,<mode> - set the Service Request flag for a component
    cpt : 1 - Controller A
         : 2 - Controller B
         : 3 - Support Module A
         : 4 - Support Module B
         : 5 - Interconnect CRU

         : 6 - Battery CRU A
         : 7 - Battery CRU B
    mode : 1 - disable Service Allowed mode
         : 2 - enable Service Allowed mode
         : 3 - request Service ON
         : 4 - request Service OFF

ssmSetAlarm <trayid>, <option> - set tray alarm state
    option : 1 - Enable the audible alarm
           : 2 - Disable the audible alarm
           : 3 - Mute the audible alarm

ssmSetTempSensor <warning>, <critical> - set the temp sensor thresholds
    warning : -1 - set the temp sensor warning threshold to its default
             : WW - set the temp sensor warning threshold to WW (Celsius)
    critical : -1 - set the temp sensor critical threshold to its default
             : <= WW - set the temp sensor critical threshold to (WW+5)
             : CC - set the temp sensor critical thershold to CC

ssmClearEnclSocPage <traynum>, <esmslot> - clear SBOD ESM SOC diagnostic page (page x81)
    traynum : Tray Id {0-7,0-7}
    esmslot : Esm A {1}, ESM B {2}

clearEnclPage81 <traynum> - clear page x81 stats for specified SBOD tray

clearEnclosuresPage81 - clear page x81 stats for all SBOD trays

ssmDumpEncl <enclid>,<option> - print information about a particular enclosure
    enclid : <pathid> - find the enclosure by its Path Id
           : <trayid> - find the enclosure by its Tray Id
    option : -1 - enclosure all Pages
           : 1 - enclosure CFG Page
    
```

```

: 2 - enclosure STS Page
: 3 - enclosure INQ Page
: 4 - enclosure VPD Page
: 5 - enclosure SOC Page
: 6 - enclosure CTL Page

ssmDumpHost <option> - print information sent to Host
option :-1 - all Pages
: 1 - CFG Page
: 2 - STS Page
: 3 - DriveArray Page
: 4 - Translation Page

ssmDumpBCM <option> - print information available in BCM
option :-1 - all Tables
: 1 - Subsystem Table (NVS RAM options)
: 2 - Array Table (more NVSRAM options)
: 3 - Line/Status Table

ssmDumpSesList - build & dump the SES List
ssmDumpBypassDrives - build & dump the Drive List
ssmDumpAllocBlocks - print allocated buffers history
ssmShowEnclosures <option> - print information about all enclosures
option : 0 - Tray information
: 1 - Disk information
: 2 - More information

ssmShowEncl <enclid>,<option> - print information about a particular enclosure
enclid : <pathid> - find the enclosure by its Path Id
: <trayid> - find the enclosure by its Tray Id
option :-1 - enclosure all Pages
: 1 - enclosure CFG Page
: 2 - enclosure STS Page
: 3 - enclosure INQ Page
: 4 - enclosure VPD Page
: 5 - enclosure SOC Page
: 6 - enclosure CTL Page

ssmShowHost <option> - print information sent to Host
option :-1 - all Pages
: 1 - CFG Page
: 2 - STS Page
: 3 - DriveArray Page
: 4 - Translation Page

showEnclosuresPage81 - display page x81 stats for all SBOD enclosures

```

5.5.1.02 ssmShow

These SSM commands are designed to monitor enclosures and information that is sent to hosts. This is an abbreviated list of `ssmHelp`. This command does not work with SAS systems.

```

-> ssmShow
ssmShowEnclosures <option> - print information about all enclosures
option : 0 - Tray information
: 1 - Disk information
: 2 - More information

ssmShowEncl <enclid>,<option> - print information about a particular enclosure
enclid : <pathid> - find the enclosure by its Path Id
: <trayid> - find the enclosure by its Tray Id
option :-1 - enclosure all Pages
: 1 - enclosure CFG Page
: 2 - enclosure STS Page
: 3 - enclosure INQ Page
: 4 - enclosure VPD Page
: 5 - enclosure SOC Page
: 6 - enclosure CTL Page

ssmShowHost <option> - print information sent to Host
option :-1 - all Pages
: 1 - CFG Page
: 2 - STS Page
: 3 - DriveArray Page
: 4 - Translation Page

```

```
showEnclosuresPage81 - display page x81 stats for all SBOD enclosures
```

5.5.1.03 ssmShowEnclosures

This command print information about all enclosures.

- option : 0 - Tray information
- : 1 - Disk information
- : 2 - More information

(non-SAS example)

```
-> ssmShowEnclosures
TRAY      TYPE          DATA PATH          STATUS  ERRORS*
-----
000      CNTRLR   - 6091      [  A  ]          On-Line  None
001      SBOD     - FIBRE     [02100010][01100010] On-Line  None
002      FIBRE    - FIBRE     [02000010][01000010] On-Line  None

* Error Code:
'C' - Tray cabling problem. 'D' - Tray access denied. 'F' - Tray ID conflict.
'R' - Tray lost redundancy. 'U' - Tray unsupported or uncertified.

TRAY      DEVNUM  TYPE      GOODTOMAP  CERTIFIED  INQUIRY DATA
-----
01 Esm 01  02100010  4,2        YES        YES        LSILOGIC SYM2610-FC  9641
01 Esm 02  01100010  4,2        YES        YES        LSILOGIC SYM2610-FC  9641
02 Esm 01  02000010  2,2        YES        YES        LSILOGIC SYM2600-FC  9330
02 Esm 02  01000010  2,2        YES        YES        LSILOGIC SYM2600-FC  9330

-> ssmShowEnclosures 1

          DEVNUM  TRAY  STATE  REDUNCHAN  WWN
Disk 01  00000001  01   OK      0          2000002037f2e6f10000000000000000
Drive FAULT LED: Present OFF
Disk 02  00000002  01   OK      0          2000002037c87bcc0000000000000000
Drive FAULT LED: Present OFF
Disk 03  00000003  01   OK      0          2000002037a54afa0000000000000000
Drive FAULT LED: Present OFF
Disk 04  00000004  01   OK      0          2000002037f2e6b90000000000000000
Drive FAULT LED: Present OFF
Disk 05  00000005  01   OK      0          2000002037f2b7810000000000000000
Drive FAULT LED: Present OFF
Disk 06  00000006  01   OK      0          2000002037d9098c0000000000000000
Drive FAULT LED: Present OFF
Disk 07  00000007  01   OK      0          2000002037f2e6f20000000000000000
Drive FAULT LED: Present OFF
Disk 08  00000008  01   OK      0          2000002037f2e5fb00000000000000000
Drive FAULT LED: Present OFF
Disk 09  00000009  01   OK      0          2000002037f2e6a30000000000000000
Drive FAULT LED: Present OFF
Disk 10  0000000a  01   OK      0          2000002037ec728c0000000000000000
Drive FAULT LED: Present OFF
Disk 11  0000000b  01   OK      0          2000002037f2e6370000000000000000
Drive FAULT LED: Present OFF
Disk 12  0000000c  01   OK      0          2000002037a791aa00000000000000000
Drive FAULT LED: Present OFF
Disk 13  0000000d  01   OK      0          2000002037f2b7ff00000000000000000
Drive FAULT LED: Present OFF
Disk 14  0000000e  01   OK      0          2000002037f2e5760000000000000000
Drive FAULT LED: Present OFF
```

```

Disk 01 0000000f 02 OK 0 20000011c647b7af00000000000000000
Drive FAULT LED: Present OFF

Disk 02 00100000 02 OK 0 20000004cf76dbfd000000000000000000
Drive FAULT LED: Present OFF

Disk 03 00100001 02 OK 0 20000004cf94da87000000000000000000
Drive FAULT LED: Present OFF

Disk 04 00100002 02 OK 0 20000004cf810fd70000000000000000000
Drive FAULT LED: Present OFF

Disk 05 00100003 02 OK 0 20000004cf94539000000000000000000000
Drive FAULT LED: Present OFF

Disk 06 00100004 02 OK 0 20000004cf810b9600000000000000000000
Drive FAULT LED: Present OFF

Disk 07 00100005 02 OK 0 2000000c50bd2ea30000000000000000000000
Drive FAULT LED: Present OFF

Disk 08 00100006 02 OK 0 20000004cf9459580000000000000000000000
Drive FAULT LED: Present OFF

Disk 09 00100007 02 OK 0 20000004cf9481300000000000000000000000
Drive FAULT LED: Present OFF

Disk 10 00100008 02 OK 0 20000004cf94ceac000000000000000000000000
Drive FAULT LED: Present OFF

Disk 11 00100009 02 OK 0 20000004cf945bfa000000000000000000000000
Drive FAULT LED: Present OFF

Disk 12 0010000a 02 OK 0 20000004cf94595d000000000000000000000000
Drive FAULT LED: Present OFF

Disk 13 0010000b 02 OK 0 20000004cf76e7f9000000000000000000000000
Drive FAULT LED: Present OFF

Disk 14 0010000c 02 OK 0 20000004cf945b53000000000000000000000000
Drive FAULT LED: Present OFF

-> ssmShowEnclosures 2
Audible Alarm (non-manageable) in tray 1 is UNKNOWN
Audible Alarm (non-manageable) in tray 2 is UNKNOWN
Audible Alarm in controller tray is DISABLED, count = 0

Conditions = 0x00000000
Controller A SAA LED is OFF
Controller B SAA LED is OFF
SupportCRU A SAA LED is OFF
SupportCRU B SAA LED is OFF
Interconnect SAA LED is OFF
    
```

(SAS example)

```

-> ssmShowEnclosures
[Storage Array]
  [0x0101 - Enclosure - Tray ID: 0, ELI: 0000000000000000, Status: Okay]

-> ssmShowEnclosures 1
[Storage Array]
  [Enclosure]
    Status: Okay
    Swapped?: No
    Predicted Fail?: No
    Enclosure Logical ID: 00 00 00 00 00 00 00 00
    devAddress: 0x0101
    Slot: 1
    Generic VPD Byte Array: 50 4E 20 31 34 36 31 37 2D 30 32 20 20 20 20 00 | PN 14617-02 . |
    53 4E 20 30 36 34 36 39 30 30 33 32 33 20 20 00 | SN 0646900323 . |
    56 4E 20 45 4E 47 45 4E 49 4F 20 00 44 54 20 31 | VN ENGENIO .DT 1 |
    31 2F 32 30 30 36 20 00 46 54 20 4D 49 44 50 4C | 1/2006 .FT MIDPL |
    41 4E 45 00 | ANE. |

    CRU Type: Non-Removable
    SAA Request / SAA On: No / No
    LED Control: Engenio Encl cfg:0x46
    LED State: Present Online
    Alarm Control: Off
    Is Summary Fault On?: No (cfw detected error? No, esm detected error? No)
    
```

```

Tray ID: 0
Service Tag:
Asset Tag:
Chassis Name:
devNum: 0x00000000
Controller Enclosure?: Yes
Redundant?: Yes
WorkingChannel: -1
Locked Out?: No
Hardware Mismatched?: No
Firmware Mismatched?: No
ESM Fact Def Mismatch?: No
Polling Disabled?: No
Tray Max Speed: 3 Gbps
Tray Features: Soft Tray Id, Has Managed Alarm
Num Drive Compartments: 4
Num Drive Slots: 12
Is Indicating Failure?: No
Is SAR?: No
Is Indicating Warning?: No
Is Warning Requested?: No
Has ID LED?: Yes (SM: Yes)
Is Identified?: No
Both EEPROMs Readable?: Yes
Split Mode - On?: No
Split Mode - Reported?: No
Split Mode - Matching Encl:

-> ssmShowEnclosures 2
[Storage Array]
  [Enclosure Component(s)]
    Flags:
      F1=Swap, F2=Controller, F3=Redundant, F4=Identified, F5=Indic Fail, F6=SAR, F7=Indic Warn,
      F8=Warn Requested,
      F9=Poll Disabled, F10=FW Mismatch, F11=HW Mismatch, F12=Locked Out
    devAddr # Status # Slot # Tray # devNum # Gbps # F1 # F2 # F3 # F4 # F5 # F6 # F7
# F8 # F9 # F10 # F11 # F12
===== # ===== # ===== # ===== # ===== # ===== # ===== # ===== #
=== # === # === # === # === # === # === # === # === # === # === # === #
0x0101 # Okay # 1 # 0 # 0x00000000 # 3 # No # Yes # Yes # No # No # No # No
# No # No # No # No # No

```

5.5.1.04 ssmAudibleAlarm

Use this command to silence an alarm for a single fault event.
 The syntax is: ssmAudibleAlarm -i,0

5.5.1.05 ssmIdentifyDrive

Use this command to identify a single drive.
 To flash fault indicator : ssmIdentifyDrive c,i,1
 To flash fault indicator : ssmIdentifyDrive c,i,0

Appendix

A.1 Destination Driver MEL Events Decoder

(as of 4/2/01)

A.1.1 FIBRE DRIVE-SIDE INTERFACES ONLY

MEL events as logged by the driver go through a bunch of magic to be displayed by the GUI in an intelligible format. This document will allow you to make some sense of major events logged by the destination driver. For a full treatment on the decoding of Major Event Logs (MEL) events see the document “**Major Event Log Specification**”.

Interpreting the Display

In the GUI, events are displayed in the following general format when “View Details” is selected:

```

Date/Time: 6/28/00 4:02 PM
Sequence number: 3982
Event type: 1012
Category: Error
Priority: Informational
Description: Destination driver error
Event specific codes: 0/100/6
Component type: Drive
Component location: None

Raw data:
8e 0f 00 00 00 00 00 00 12 10 11 10 fb 67 52 7c
10 00 10 00 00 01 00 00 00 00 00 00 00 01 10 00
0c 00 12 01 00 00 00 00 00 01 00 00 06 00 00 00
    
```

Much of the pertinent information is available without parsing the raw data, which is in part just the data in the formatted section above it. However, there are a few other items in there of interest.

Raw data contains the following information, which generally corresponds to fields found in the MEL_EVENT structure (melLib.h), with a few enhancements:

<u>Field</u>	<u>Length</u>
sequence number	8 bytes
event number	4 bytes; two compose the identifier and two are flags
timestamp	4 bytes
device	4 bytes
id	4 bytes
origin	2 bytes
lun number	2 bytes
controller	1 byte
ndf	1 byte
dfl	1 byte
fill byte	1 byte
data buffer contents	variable

Here are some details about fields in driver-logged events that are not self-explanatory.

0x1012 -- MEL_EV_DST_DRIVER – Destination driver error

Event Specific Codes x/yy/zz, where
 x = controller slot (0 or 1)
 yy = HDD error code, retrieved from errData (see HDD_STAT table below)

zz = LLD error code, retrieved from errData. It can represent one of two things:
the XCB_STAT code (see XCB_STAT table) if available, or
the HDD error code repeated

I load the last field with a repeat of the HDD_STAT code only because I thought observers would start wondering why it's not being used. This way, it's obvious that it wasn't a case of forgetting to fill in the XCB_STAT code, but rather that there was not an XCB_STAT code available.

Component type

This event will blindly report that the component type is "Drive". It should be noted that the component type is built into the event number in the form of flags. In other words, MEL_EV_DST_DRIVER is a "Drive" event.

Component Location

Typically, Tray and Slot information is reported here. However, if ssm doesn't have this information for a given device number, no location is reported.

0x100A -- MEL_EV_DRIVE_CHK_COND – Check condition

Event Specific Codes **xx/yy/zz**, where
 xx = sense key
 yy = ASC
 zz = ASCQ

Raw Data

The raw data is useful in the case of a check condition, because the sense buffer is displayed in the location reserved for data buffer contents.

0x1206 -- MEL_EV_FC_LINK_ERROR_THRESHOLD – ongoing link problem

0x1207 -- MEL_EV_FC_LINK_ERROR_THRESHOLD_CRITICAL – initial link problem

Component Type

Channel

Component Location

The (one-relative) index of the channel in question will be reported, as well as the channel type (host or drive).

For the events below, no event specific codes are explicitly presented. Drive events will have tray/slot information presented in the component location field. Enclosure events have a universal, vague reference to "Tray Component". It *appears* that for events related to the alternate controller, the *reporting* controller is specified in the location information.

0x1501 MEL_EV_DFC_DRIVE_RESET
0x1504 MEL_EV_DFC_DRIVE_ENABLE
0x1507 MEL_EV_DFC_DRIVE_BYPASS
0x150A MEL_EV_DFC_DRIVE_MISSING
0x1502 MEL_EV_DFC_ALT_CTL_RESET
0x1505 MEL_EV_DFC_ALT_CTL_ENABLE
0x1508 MEL_EV_DFC_ALT_CTL_BYPASS
0x150B MEL_EV_DFC_ALT_CTL_MISSING
0x1503 MEL_EV_DFC_ENCLOSURE_RESET
0x1506 MEL_EV_DFC_ENCLOSURE_ENABLE
0x1509 MEL_EV_DFC_ENCLOSURE_BYPASS
0x150C MEL_EV_DFC_ENCLOSURE_MISSING

Tables of Statuses

XCB (low level driver) status table

#define XCB_STAT_GOOD	0x00
#define XCB_STAT_GEN_ERROR	0x01
#define XCB_STAT_BAD_ALPA	0x02
#define XCB_STAT_OVERFLOW	0x03
#define XCB_STAT_COUNT	0x04
#define XCB_STAT_LINK_FAILURE	0x05
#define XCB_STAT_LOGOUT	0x06
#define XCB_STAT_OXR_ERROR	0x07
#define XCB_STAT_ABTS_SENDER	0x08
#define XCB_STAT_ABTS_RECEIVER	0x09
#define XCB_STAT_OP_HALTED	0x0a
#define XCB_STAT_DATA_MISMATCH	0x0b
#define XCB_STAT_KILL_IO	0x0c
#define XCB_STAT_BAD_SCSI	0x0d
#define XCB_STAT_MISROUTED	0x0e
#define XCB_STAT_ABTS_REPLY_TIMEOUT	0x0f
#define XCB_STAT_ABTS_BY_LLD	0x10
#define XCB_STAT_REPLY_TIMEOUT	0x11
#define XCB_STAT_FCP_RSP_ERROR	0x12
#define XCB_STAT_LS_RJT	0x13
#define XCB_STAT_FCP_CHECK_COND	0x14
#define XCB_STAT_FCP_SCSI_STAT	0x15
#define XCB_STAT_FCP_RSP_CODE	0x16
#define XCB_STAT_FCP_SCSICON	0x17
#define XCB_STAT_MAX_TYPE	0x18

HDD (high level driver) status table

#define HDD_STAT_GOOD	0x00000000
#define HDD_STAT_CHECK_CONDITION	0x00000002
#define HDD_STAT_PATH_ERROR	0x00000100
#define HDD_STAT_RECOVERED_ERROR	0x00000101
#define HDD_STAT_NO_AVAIL_PATH	0x00000102
#define HDD_STAT_DEVICE_MISSING	0x00000103
#define HDD_STAT_TIME_OUT	0x00000104
#define HDD_STAT_DEVICE_ERROR	0x00000105
#define HDD_STAT_NO_DEVICE	0x00000106
#define HDD_STAT_ABORT_NO_REPLY	0x00000107
#define HDD_STAT_MISC_ERROR	0x00000108
#define HDD_STAT_MIRROR_CHANNEL_BUSY	0x00000109
#define HDD_STAT_SCSICON	0x00000110
#define HDD_STAT_KILL_IO	0x00000111
#define HDD_STAT_LLD_ABORT	0x00000112
#define HDD_STAT_ILLEGAL_REQUEST	0x00000113

A.2 LOOP-ID to ALPA conversion table

There is a one-to-one correspondence between loopID and ALPA. LoopID are continuous between 0 – 126, whereas ALPAs span the range between 0 – 239 (0xEF).

ALPA	LoopID		ALPA	LoopID		ALPA	LoopID
EF	0		A3	43 (2B)		4D	86 (56)
E8	1		9F	44 (2C)		4C	87 (57)
E4	2		9E	45 (2D)		4B	88 (58)
E2	3		9D	46 (2E)		4A	89 (59)
E1	4		9B	47 (2F)		49	90 (5A)
E0	5		98	48 (30)		47	91 (5B)
DC	6		97	49 (31)		46	92 (5C)
DA	7		90	50 (32)		45	93 (5D)
D9	8		8F	51 (33)		43	94 (5E)
D6	9		88	52 (34)		3C	95 (5F)
D5	10 (0A)		84	53 (35)		3A	96 (60)
D4	11 (0B)		82	54 (36)		39	97 (61)
D3	12 (0C)		81	55 (37)		36	98 (62)
D2	13 (0D)		80	56 (38)		35	99 (63)
D1	14 (0E)		7C	57 (39)		34	100 (64)
CE	15 (0F)		7A	58 (3A)		33	101 (65)
CD	16 (10)		79	59 (3B)		32	102 (66)
CC	17 (11)		76	60 (3C)		31	103 (67)
CB	18 (12)		75	61 (3D)		2E	104 (68)
CA	19 (13)		74	62 (3E)		2D	105 (69)
C9	20 (14)		73	63 (3F)		2C	106 (6A)
C7	21 (15)		72	64 (40)		2B	107 (6B)
C6	22 (16)		71	65 (41)		2A	108 (6C)
C5	23 (17)		6E	66 (42)		29	109 (6D)
C3	24 (18)		6D	67 (43)		27	110 (6E)
BC	25 (19)		6C	68 (44)		26	111 (6F)
BA	26 (1A)		6B	69 (45)		25	112 (70)
B9	27 (1B)		6A	70 (46)		23	113 (71)
B6	28 (1C)		69	71 (47)		1F	114 (72)
B5	29 (1D)		67	72 (48)		1E	115 (73)
B4	30 (1E)		66	73 (49)		1D	116 (74)
B3	31 (1F)		65	74 (4A)		1B	117 (75)
B2	32 (20)		63	75 (4B)		18	118 (76)
B1	33 (21)		5C	76 (4C)		17	119 (77)
AE	34 (22)		5A	77 (4D)		10	120 (78)
AD	35 (23)		59	78 (4E)		0F	121 (79)
AC	36 (24)		56	79 (4F)		0B	122 (7A)
AB	37 (25)		55	80 (50)		04	123 (7B)
AA	38 (26)		54	81 (51)		02	124 (7C)
A9	39 (27)		53	82 (52)		01	125 (7D)
A7	40 (28)		52	83 (53)		00	126 (7E)
A6	41 (29)		51	84 (54)			
A5	42 (2A)		50	85 (55)			

A.3 Engenio Host Sense Data and ASC/ASCQ codes

A.3.1 Host Sense Data

A.3.1.01 Request Sense Data Format

Sense data returned by the Request Sense command is formatted as shown in the table below. Future releases may increase the length of the data up to 255 bytes. The information is defined in the paragraphs following the table.

	7	6	5	4	3	2	1	0
0-17	SCSI Standard Sense Data							
0	Valid	Error Code (0x70 or 0x71)						
1	00							
2	0	0	ILI	0	Sense Key			
3 - 6	Information							
7	Additional Sense Length; 152 (0x98) or 10 (0x0A)							
8 - 11	Command Specific Information							
12	Array Additional Sense Code (ASC)							
13	Array Additional Sense Code Qualifier (ASCQ)							
14	Field Replaceable Unit (FRU)							
15 - 17	SKSV	Sense Key Specific Bytes						
18-40	Error Recovery Information							
18 - 19	Recovery Action(s)							
20	Total Number of Errors (for this operation)							
21	Total Retry Count (for this operation)							
22 - 25	ASC/ASCQ Stack (for multiple errors)							
26 - 33	Additional FRU Information							
34 - 36	Error Specific Information							
37 - 40	Error Detection Point							
41-101	Environment Information							
41 - 50	Original CDB							
51	Host ID							
52-53	Host Descriptor							
54 - 69	Array Board Serial Number							
70 - 73	Array Software Revision Level							
74	Reserved (Zero filled)							
75	LUN Number							
76	LUN Status							
77	Reserved (Zero filled)							
78	Reserved (Zero filled)							
79 - 82	Drive Software Revision Level							
83 - 98	Drive Product ID (from drive Inquiry)							
99 - 100	Array Power-up Status							
101	RAID Level							
102-135	Drive Sense Data							
102-103	Drive Sense Identifier							
104-135	Drive Sense Data							
136 - 155	I/O Identification Area							
136-139	I/O Sequence Number							
140-155	Date and Time Stamp							
156-159	Expansion Area							
156-159	Reserved (Zero filled)							

A.3.1.02 Incorrect Length Indicator (ILI) - Byte 2

This bit is used to inform the host system that the requested non-zero byte transfer length for a Read or Write Long command does not exactly match the available data length. The information field in the sense data will be set to the difference (residue) of the requested length minus the actual length in bytes. Negative values will be indicated by two's complement notation. Since the controller does not support Read or Write Long, this bit is always zero.

A.3.1.03 Sense Key - Byte 2

Possible sense keys returned are shown in the following table:

SENSE KEY	DESCRIPTION
0x00	No Sense
0x01	Recovered Error
0x02	Not Ready
0x03	Medium Error
0x04	Hardware Error
0x05	Illegal Request
0x06	Unit Attention
0x07	Data Protect
0x0B	Aborted Command
0x0E	Miscompare

A.3.1.04 Information Bytes - Bytes 3-6

This field is implemented as defined in the SCSI standard for direct access devices. The information could be any one of the following types of information:

- The unsigned logical block address indicating the location of the error being reported.
- The first invalid logical block address if the sense key indicates an illegal request.

A.3.1.05 Additional Sense Length - Byte 7

This value will indicate the number of additional sense bytes to follow. Some errors cannot return valid data in all of the defined fields. For these errors, invalid fields will be zero-filled unless specified in the SCSI-2 standard as containing 0xFF if invalid.

The value in this field will be 152 (0x98) in most cases. However, there are situations when only the standard sense data will be returned. For these sense blocks, the additional sense length is 10 (0x0A).

A.3.1.06 Command Specific Information - Bytes 8-11

This field is only valid for sense data returned after an unsuccessful Reassign Blocks command. The logical block address of the first defect descriptor not reassigned will be returned in this field. These bytes will be 0xFFFFFFFF if information about the first defect descriptor not reassigned is not available or if all the defects have been reassigned. The command-specific field will always be zero-filled for sense data returned for commands other than Reassign Blocks.

A.3.1.07 Additional Sense Codes - Bytes 12-13

See the section on supported sense codes and qualifiers in Chapter 10 for details on the information returned in these fields.

A.3.1.08 Field Replaceable Unit Code - Byte 14

A non-zero value in this byte identifies a field replaceable unit that has failed or a group of field replaceable modules that includes one or more failed devices. For some Additional Sense Codes, the FRU code must be used to determine where the error occurred. As an example, the Additional Sense Code for SCSI bus parity error is returned for a parity error detected on either the host bus or one of the drive buses. In this case, the FRU field must be evaluated to determine if the error occurred on the host channel or a drive channel.

Because of the large number of replaceable units possible in an array, a single byte is not sufficient to report a unique identifier for each individual field replaceable unit. To provide meaningful information that will decrease field troubleshooting and problem resolution time, FRUs have been grouped. The defined FRU groups are listed below.

FRU CODE	DESCRIPTION
0x01	Host Channel Group
0x02	Controller Drive Interface Group
0x03	Controller Buffer Group
0x04	Controller Array ASIC Group
0x05	Controller Other Group
0x06	Subsystem Group
0x07	Subsystem Configuration Group
0x08	Sub-enclosure Group
0x09	Redundant Controller Group
0x0A-0x0F	Reserved
0x10-0xFF	Drive Groups

Host Channel Group (0x01)

A FRU group consisting of the host SCSI bus, its SCSI interface chip, and all initiators and other targets connected to the bus.

Controller Drive Interface Group (0x02)

A FRU group consisting of the SCSI interface chips on the controller which connect to the drive buses.

Controller Buffer Group (0x03)

A FRU group consisting of the controller logic used to implement the on-board data buffer.

Controller Array ASIC Group(0x04)

A FRU group consisting of the ASICs on the controller associated with the array functions.

Controller Other Group (0x05)

A FRU group consisting of all controller related hardware not associated with another group.

Subsystem Group (0x06)

A FRU group consisting of subsystem components that are monitored by the array controller, such as power supplies, fans, thermal sensors, and AC power monitors. Additional information about the specific failure within this FRU group can be obtained from the additional FRU bytes field of the array sense.

Subsystem Configuration Group (0x07)

A FRU group consisting of subsystem components that are configurable by the user, on which the array controller will display information (such as faults).

Sub-enclosure Group (0x08)

A FRU group consisting of the attached enclosure devices. This group includes the power supplies, environmental monitor, and other subsystem components in the sub-enclosure.

Redundant Controller Group (0x09)

A FRU group consisting of the attached redundant controllers.

Drive Group (0x10 - 0xFF)

A FRU group consisting of a drive (embedded controller, drive electronics, and Head Disk Assembly), its power supply, and the SCSI cable that connects it to the controller; or supporting sub-enclosure environmental electronics. The FRU code designates the channel ID in the most significant nibble and the SCSI ID of the drive in the least significant nibble. To read the devnum value take the first digit of the Drive Group number and subtract one (i.e. Drive Group value of 3b = 0x0020000b = 2, 11).

NOTE: Channel ID 0 is not used because a failure of drive ID 0 on this channel would cause an FRU code of 0x00, which the SCSI-2 standard defines as no specific unit has been identified to have failed or that the data is not available.

A.3.1.09 Sense Key Specific Bytes - Bytes 15-17

This field is valid for a sense key of Illegal Request when the sense-key specific valid (SKSV) bit is on. The sense-key specific field will contain the data defined below. In this release of the software, the field pointer is only supported if the error is in the CDB.

	7	6	5	4	3	2	1	0
15	SKSV	C/D	Reserved		BPV	Bit Pointer		
16	Field Pointer (MSB)							
17	Field Pointer (LSB)							

- C/D = 1 indicates the illegal parameter is in the CDB.
- C/D = 0 indicates that the illegal parameter is in the parameters sent during a Data Out phase.
- BPV = 0 indicates that the value in the Bit Pointer field is not valid.
- BPV = 1 indicates that the Bit Pointer field specifies which bit of the byte designated by the Field Pointer field is in error. When a multiple-bit error exists, the Bit Pointer field will point to the most-significant (left-most) bit of the field.

The Field Pointer field indicates which byte of the CDB or the parameter was in error. Bytes are numbered from zero. When a multiple-byte field is in error, the pointer will point to the most-significant byte.

A.3.1.10 Recovery Actions - Bytes 18-19

This is a bit-significant field that indicates the recovery actions performed by the array controller.

Byte 18:

Bit	Description
0-3	Reserved
4	Drive command retried
5	Failed drive
6	Downed LUN
7	Information logged

Byte 19:

Bit	Description
0	Check data used
1	Reserved
2	Reserved
3	Issued Reassign Block command
4	Issued Start Stop Unit command
5	Reserved
6	Asserted Reset signal on drive channel
7	Reserved

A.3.1.11 Total Number Of Errors - Byte 20

This field contains a count of the total number of errors encountered during execution of the command. The ASC and ASCQ for the last two errors encountered are in the ASC/ASCQ stack field.

A.3.1.12 Total Retry Count - Byte 21

The total retry count is for all errors seen during execution of a single CDB set.

A.3.1.13 ASC/ASCQ Stack - Bytes 22-25

These fields store information when multiple errors are encountered during execution of a command. The ASC/ASCQ pairs are presented in order of most recent to least recent error detected.

A.3.1.14 Additional FRU Information - Bytes 26-33

These bytes provide additional information about the field replaceable unit identified in byte 14. The first two bytes are qualifier bytes that provide details about the FRU in byte 14. Byte 28 is an additional FRU code which identifies a second field replaceable unit. The value in byte 28 can be interpreted using the description for byte 14. Bytes 29 and 30 provide qualifiers for byte 28, just as bytes 26 and 27 provide qualifiers for byte 14. The table below shows the layout of this field. Following the table is a description of the FRU group code qualifiers.

	7	6	5	4	3	2	1	0
26	FRU Group Qualifier for byte 14 (MSB)							
27	FRU Group Qualifier for byte 14 (LSB)							
28	Additional FRU Group Code							
29	Additional FRU Group Code Qualifier (MSB)							
30	Additional FRU Group Code Qualifier (LSB)							
31	2nd Additional FRU Group Code							
32	2nd Additional FRU Group Code Qualifier (MSB)							
33	2nd Additional FRU Group Code Qualifier (LSB)							

FRU Group Qualifiers For The Host Channel Group (Code 0x01)

FRU Group Qualifier - Bytes 26 (MSB) & 27 (LSB) - The most significant byte indicates which host channel is reporting the failed component. The least significant byte provides the device type and state of the device being reported.

Host Channel MSB Format:

Bit	7	6	5	4	3	2	1	0
Field	Mini-Hub Port		Controller Number		Host Channel Number			

Mini-Hub Port indicates which of the Mini-Hub ports is being referenced. For errors where the Mini-Hub port is irrelevant port 0 is specified.

Value	Controller
0	Port 0 - 'IN'
1	Port 1 - 'OUT'
2-3	Reserved

Controller Number indicates which controller the host interface is connected to.

Value	Controller
0	Controller A
1	Controller B
2 - 7	Reserved

Host Channel Number indicates which channel of the specified controller. Values 1 through 4 are valid.

Host Channel LSB Format:

Bit	7	6	5	4	3	2	1	0
Field	Device State				Device Type Identifier			

Host Channel Device State is defined as:

Value	State
0	Optimal
1	Warning
2	Failed
3	Missing
4 - 7	Reserved

Host Channel Device Type Identifier is defined as:

Device Type Identifier	Type of Element
0x00	Unspecified
0x08	Controller electronics
0x0F	SCSI Port/Transceiver (includes GBIC)
0x16	FC "Mini-Hub"

FRU Group Qualifiers For Controller Drive Interface Group (Code 0x02)

FRU Group Qualifier - Bytes 26 (MSB) & 27 (LSB) - The most significant byte indicates which drive channel is reporting the failed component. The least significant byte provides the device type and state of the device being reported.

Drive Channel MSB Format:

Bit	7	6	5	4	3	2	1	0
Field	Mini-Hub Port*		Reserved		Drive Channel Number			

* = Reserved for parallel SCSI

Mini-Hub Port indicates which of the Mini-Hub ports is being referenced. For errors where the Mini-Hub port is irrelevant port 0 is specified.

Value	Controller
0	Port 0 - 'IN'
1	Port 1 - 'OUT'
2-3	Reserved

Drive Channel Number indicates which channel. Values 1 through 6 are valid.

Drive Channel LSB Format (Not used on parallel SCSI):

Bit	7	6	5	4	3	2	1	0
Field	Device State			Device Type Identifier				

Device Interface Channel Device State is defined as:

Value	State
0	Optimal
1	Warning
2	Failed
3	Missing
4 - 7	Reserved

Host Channel Device Type Identifier is defined as:

Device Type Identifier	Type of Element
0x00	Unspecified
0x08	Controller Electronics
0x0F	SCSI Port/Transceiver (includes GBIC)
0x16	FC "Mini-Hub"

FRU Group Qualifiers For The Subsystem Group (Code 0x06)

FRU Group Qualifier - Bytes 26 (MSB) & 27 (LSB) - The most significant byte indicates which primary component fault line is reporting the failed component. The information returned depends on the configuration set up by the user. Refer to the section on Subsystem Fault Data Storage in Chapter 9 for more information. The least significant byte provides the device type and state of the device being reported. The format for the least significant byte is the same as Byte 27 of the FRU Group Qualifier for the Sub-enclosure Group (0x08).

FRU Group Qualifiers For The Sub-enclosure Group (Code 0x08)

FRU Group Qualifier - Bytes 26 (MSB) & 27 (LSB) - The most significant byte indicates which enclosure identifier is reporting the failed component. The least significant byte provides the device type and state of the device being reported.

Statuses are reported such that the first enclosure for each channel is reported, followed by the second enclosure for each channel.

Sub-enclosure MSB Format:

Bit	7	6	5	4	3	2	1	0
Field	TIE	Sub-Enclosure Identifier						

When the Tray Identifier Enable (TIE) bit is set to 01b, the Sub-Enclosure Identifier field provides the tray identifier for the sub-enclosure being described.

When set to 00b, the Sub-enclosure Identifier is defined as:

	Enclosure #1	Enclosure #2
Channel 1	0x01	0x06
Channel 2	0x02	0x07
Channel 3	0x03	0x08
Channel 4	0x04	0x09
Channel 5	0x05	0x0A

Sub-enclosure LSB Format:

Bit	7	6	5	4	3	2	1	0
Field	Device State				Device Type Identifier			

Sub-enclosure Device State is defined as:

Value	State
0	Optimal
1	Warning
2	Failed
3	Missing
4 - 7	Reserved

Sub-enclosure Device Type Identifier is defined as:

Device Type Identifier	Type of Element
0x00	Unspecified
0x01	Device
0x02	Power Supply
0x03	Cooling Element
0x04	Temperature Sensors
0x06	Audible Alarm
0x07	Environmental Services Electronics
0x08	Controller Electronics
0x09	Nonvolatile Cache
0x0A	Reserved
0x0B	Uninterruptible Power Supply
0x0C - 0x0E	Reserved
0x0F	SCSI Port Transceiver
0x10 - 0x15	Reserved
0x16	Sub-Enclosure
0x17-0x1F	Reserved

FRU Group Qualifiers For The Redundant Controller Group (Code 0x09)

FRU Group Qualifier - Bytes 26 (MSB) & 27 (LSB) - The most significant byte indicates which tray contains the failed controller. The least significant byte indicates the failed controller within the tray.

Redundant Controller MSB Format:

Bit	7	6	5	4	3	2	1	0
Tray number of the subsystem that holds the controller								

Redundant Controller LSB Format:

Bit	7	6	5	4	3	2	1	0
Reserved							Controller Number	

The Controller Number field is defined as:

Value	Definition
00b	Controller A
01b	Controller B
01b	Reserved
11b	Reserved

A.3.1.15 Error Specific Information - Bytes 34-36

This field provides information read from the array controller VLSI chips and other sources. It is intended primarily for development testing, and the contents are not specified.

A.3.1.16 Error Detection Point - Bytes 37-40

The error detection point field will indicate where in the software the error was detected. It is intended primarily for development testing, and the contents are not specified.

A.3.1.17 Original CDB - Bytes 41-50

This field contains the original Command Descriptor Block received from the host.

A.3.1.18 Host ID - Byte 51

The host ID is the SCSI ID of the host that selected the array controller for execution of this command.

A.3.1.19 Host Descriptor - Bytes 52-53

This bit position field provides information about the host. Definitions are given below.

LS Byte

Bit	Definition
0	Data is being transferred 16-bit wide
1	Reserved
2	Wide negotiation completed successfully (May have negotiated for 8-bit wide)
3-7	Reserved

MS Byte

Bit	Definition
0	Message-using host
1	Reselectable host
2	Data is being transferred synchronously (Bit off means asynchronous data transfer)
3	Synchronous negotiation successful (May have negotiated for asynchronous)
4	Reserved
5	AEN supported
6	Polled AEN supported
7	Reserved

A.3.1.20 Controller Serial Number - Bytes 54-69

This sixteen-byte field contains the manufacturing identification of the array hardware. Bytes of this field are identical to the information returned by the Unit Serial Number page in the Inquiry Vital Product Data.

A.3.1.21 Array Software Revision - Bytes 70-73

The Array Application Software Revision Level matches that returned by an Inquiry command.

A.3.1.22 LUN Number - Byte 75

The LUN number field is the logical unit number in the Identify message received from the host after selection.

A.3.1.23 LUN Status - Byte 76

This field indicates the status of the LUN. It's contents are defined in the logical array page description in the Mode Parameters section of this specification except for the value of 0xFF, which is unique to this field. A value of 0xFF returned in this byte indicates the LUN is undefined or is currently unavailable (reported at Start of Day before the LUN state is known).

A.3.1.24 Drive Software Revision - Bytes 79-82

This field contains the software revision level of the drive involved in the error if the error was a drive error and the controller was able to retrieve the information.

A.3.1.25 Drive Product ID - Bytes 83-98

This field identifies the Product ID of the drive involved in the error if the error was a drive error and the controller was able to determine this information. This information is obtained from the drive Inquiry command.

A.3.1.26 Array Power-up Status - Bytes 99-100

In this release of the software, these bytes are always set to zero.

A.3.1.27 RAID Level - Byte 101

This byte indicates the configured RAID level for the logical unit returning the sense data. The values that can be returned are 0, 1, 3, 5, or 255. A value of 255 indicates that the LUN RAID level is undefined.

A.3.1.28 Drive Sense Identifier - Bytes 102-103

These bytes identify the source of the sense block returned in the next field. Byte 102 identifies the channel and ID of the drive. Refer to the FRU group codes for physical drive ID assignments. Byte 103 is reserved for identification of a drive logical unit in future implementations and it is always set to zero in this release.

A.3.1.29 Drive Sense Data - Bytes 104-135

For drive detected errors, these fields contain the data returned by the drive in response to the Request Sense command from the array controller. If multiple drive errors occur during the transfer, the sense data from the last error will be returned.

A.3.1.30 Sequence Number - Bytes 136-139

This field contains the controller's internal sequence number for the IO request.

A.3.1.31 Date and Time Stamp - Bytes 140-155

The 16 ASCII characters in this field will be three spaces followed by the month, day, year, hour, minute, second when the error occurred in the following format:

MMDDYY/HHMMSS

A.3.2 Sense Codes

A.3.2.1 Sense Keys

The table below lists the Sense keys returned by the array controller in the sense data.

SENSE KEY	DESCRIPTION
0x00	No Sense
0x01	Recovered Error
0x02	Not Ready
0x03	Medium Error
0x04	Hardware Error
0x05	Illegal Request
0x06	Unit Attention
0x07	Data Protect (Not used)
0x08	Blank Check (Not used)
0x09	Vendor Specific (Not used)
0x0A	Copy Aborted (Not used)
0x0B	Aborted Command
0x0C	Equal (Not used)
0x0D	Volume Overflow (Not used)
0x0E	Miscompare
0x0F	Reserved (Not used)

A.3.2.2 Additional Sense Codes And Qualifiers

This lists the Additional Sense Codes (ASC), and Additional Sense Code Qualifier (ASCQ) values returned by the array controller in the sense data. SCSI-2 defined codes are used when possible. Array specific error codes are used when necessary, and are assigned SCSI-2 vendor unique codes 80-FFH. More detailed sense key information may be obtained from the array controller command descriptions or the SCSI-2 standard.

Codes defined by SCSI-2 and the array vendor specific codes are shown below. The most probable sense keys (listed below for reference) returned for each error are also listed in the table. A sense key encapsulated by parentheses in the table is an indication that the sense key is determined by the value in byte 0x0A of the User-configurable region of the NVSRAM.

ASC	ASCQ	Sense Key	Description
00	00	0	No Additional Sense Information The controller has no sense data available for the requesting host and addressed logical unit combination
04	01	2	Logical Unit is in the Process of Becoming Ready The controller is executing its initialization functions on the addressed logical unit. This includes drive spinup and validation of the drive/logical unit configuration information.
04	04	2	Logical Unit Not Ready, Format In Progress The controller previously received a Format Unit command from an initiator, and is in the process of executing that command.
04	07	2	Logical Unit Not Ready, Operation in Progress The storage controller cannot respond immediately to a PRIN or PROUT command to a logical unit because it is in the process of removing non-persistent registrations and reservations for that volume. This can be expected to occur on the first PRIN or PROUT command to a logical unit having non-persistent registrations and reservations after a controller power cycle.
04	81	2	Storage Module Firmware Incompatible - Manual Code Synchronization Required
04	A1	2	Quiescence Is In Progress or Has Been Achieved
0C	00	4	Unrecovered Write Error Data could not be written to media due to an unrecoverable RAM, battery or drive error.
0C	00	6	Caching Disabled Data caching has been disabled due to loss of mirroring capability or low battery capacity.
0C	01	1	Write Error Recovered with Auto Reallocation The controller recovered a write operation to a drive and no further action is required by the host. Auto reallocation may not have been used, but this is the only standard ASC/ASCQ that tells the initiator that no further actions are required by the driver.

ASC	ASCQ	Sense Key	Description
0C	80	4,(6)	<p>Unrecovered Write Error Due to Non-Volatile Cache Failure</p> <p>The subsystem Non-Volatile cache memory recovery mechanisms failed after a power cycle or reset. This is possibly due to some combination of Battery failure, alternate controller failure or foreign controller.</p> <p>User data may have been lost.</p>
0C	81	4,(6)	<p>Deferred Unrecoverable Error Due to Memory Failure</p> <p>Recovery from a Data Cache error was unsuccessful.</p> <p>User data may have been lost.</p>
11	00	3	<p>Unrecovered Read Error</p> <p>An unrecovered read operation to a drive occurred and the controller has no redundancy to recover the error (RAID 0, degraded RAID 1, degraded mode RAID 3, or degraded RAID 5)</p>
11	8A	6	<p>Miscorrected Data Error - Due to Failed Drive Read</p> <p>A media error has occurred on a read operation during a reconfiguration operation,</p> <p>User data for the LBA indicated has been lost.</p>
18	02	1	<p>Recovered Data - Data Auto Reallocated</p> <p>The controller recovered a read operation to a drive and no further action is required by the host. Auto reallocation may not have been used, but this is the only standard ASC/ASCQ that tells the initiator that no further actions are required by the driver.</p>
1A	00	5	<p>Parameter List Length Error</p> <p>A command was received by the controller that contained a parameter list and the list length in the CDB was less than the length necessary to transfer the data for the command.</p>
20	00	5	<p>Invalid Command Operation Code</p> <p>The controller received a command from the initiator that it does not support.</p>
21	00	5	<p>Logical Block Address Out of Range</p> <p>The controller received a command that requested an operation at a logical block address beyond the capacity of the logical unit. This error could be in response to a request with an illegal starting address or a request that started at a valid logical block address and the number of blocks requested extended beyond the logical unit capacity.</p>
24	00	5	<p>Invalid Field in CDB</p> <p>The controller received a command from the initiator with an unsupported value in one of the fields in the command block.</p>

ASC	ASCQ	Sense Key	Description
25	00	5	<p>Logical Unit Not Supported</p> <p>The addressed logical unit is currently unconfigured. An Add LUN operation in the Logical Array Mode Page must be executed to define the logical unit before it is accessible.</p>
26	00	5	<p>Invalid Field in Parameter List</p> <p>The controller received a command with a parameter list that contained an error. Typical errors that return this code are unsupported mode pages, attempts to change an unchangeable mode parameter, or attempts to set a changeable mode parameter to an unsupported value.</p>
26	04	5	<p>Invalid Release of Persistent Reservation</p> <p>A RELEASE service action is received where the requesting initiator port is a valid persistent reservation holder, but the scope and type fields do not match the scope and type of the established reservation.</p>
27	00	7	<p>Write Protected</p> <p>The addressed LUN is write-protected. In this release, the write protection may have been applied by either the Remote Volume Mirroring feature or the Volume Copy feature.</p>
28	00	6	<p>Not Ready to Ready Transition</p> <p>The controller has completed its initialization operations on the logical unit and it is now ready for access.</p>
29	00	6	<p>Power On, Reset, or Bus Device Reset Occurred</p> <p>The controller has detected one of the above conditions.</p>
29	04	6	<p>Device Internal Reset</p> <p>The controller has reset itself due to an internal error condition.</p>
29	81	(6)	<p>Default Configuration has been Created</p> <p>The controller has completed the process of creating a default logical unit. There is now an accessible logical unit that did not exist previously. The host should execute its device scan to find the new logical unit.</p>
29	82	6	<p>Controller Firmware Changed Through Auto Code Synchronization</p> <p>The controller firmware has been changed through the Auto Code Synchronization (ACS) process.</p>
2A	01	6	<p>Mode Parameters Changed</p> <p>The controller received a request from another initiator to change the mode parameters for the addressed logical unit. This error notifies the current initiator that the change occurred.</p> <p>This error may also be reported in the event that Mode Select parameters changed as a result of a cache synchronization error</p>

ASC	ASCQ	Sense Key	Description
			during the processing of the most recent Mode Select request.
2A	02	6	<p>Log Parameters Changed</p> <p>The controller received a request from another initiator to change the log parameters for the addressed logical unit. This error notifies the current initiator that the change occurred.</p> <p>This error is returned when a Log Select command is issued to clear the AEN log entries.</p>
2A	03	6	<p>Reservations Preempted</p> <p>A command is received that is the next command after clearing of any persistent reservation and registrations as a result of the CLEAR service action to a logical unit having "registrants only" or "all registrants" type of reservation. The condition is reported to all registrants that have been removed, other than the one that delivered the CLEAR service action.</p> <p>If the reservation type is other than "registrants only" or "all registrants," this condition is NOT indicated to any initiator.</p>
2A	04	6	<p>Reservations Released</p> <p>A command is received that is the next command after release of a "registrants only" or "all registrants" persistent reservation. The reservation may be released directly (RELEASE service action), or indirectly as a result of the removal of the last reservation holder or by changing the reservation type. Service actions that can cause these events are RELEASE, PREEMPT, PREEMPT AND ABORT, REGISTER, or REGISTER AND IGNORE. The condition is reported to registrants according to the following rules:</p> <ol style="list-style-type: none"> 1) If the command is RELEASE, it is reported to all registrants, other than the one that delivered the RELEASE service action. 2) If the command is PREEMPT, PREEMPT AND ABORT, REGISTER, or REGISTER AND IGNORE, it is reported to all initiators that did not lose their registration as a result of the service action. <p>If the reservation type is other than "registrants only" or "all registrants," this condition is NOT indicated to any initiator.</p>
2A	05	6	<p>Registrations Preempted</p> <p>A command is received that is the next command after removal of reservation keys for a logical unit having "registrants only" or "all registrants" persistent reservation. Service actions that can cause this event are PREEMPT and PREEMPT AND ABORT. This condition is reported to all initiators that lost their registration as a result of the removal of reservation keys, other than the one that delivered the service action.</p> <p>If the reservation type is other than "registrants only" or "all registrants," this condition is NOT indicated to any initiator.</p>

ASC	ASCQ	Sense Key	Description
2F	00	6	<p>Commands Cleared by Another Initiator</p> <p>The controller received a Clear Queue message from another initiator. This error is to notify the current initiator that the controller cleared the current initiators commands if it had any outstanding.</p>
31	01	1,4	<p>Format Command Failed</p> <p>A Format Unit command issued to a drive returned an unrecoverable error.</p>
32	00	4	<p>Out of Alternates</p> <p>A Re-assign Blocks command to a drive failed.</p>
3F	01	(6)	<p>Drive micro-code changed</p>
3F	0E	6	<p>Reported LUNs data has changed</p> <p>Previously LUN data reported via a Report LUNs command has changed (due to LUN creation/deletion or controller hot swap)</p>
3F	8N	(6)	<p>Drive No Longer Usable</p> <p>The controller has set a drive to a state that prohibits use of the drive. The value of N in the ASCQ indicates the reason why the drive cannot be used.</p> <p>0 - The controller set the drive state to "Failed - Write failure"</p> <p>1 - Not used</p> <p>2 - The controller set the drive state to "Failed" because it was unable to make the drive usable after replacement. A format or reconstruction error occurred.</p> <p>3 - Not used</p> <p>4 - Not used</p> <p>5 - The controller set the drive state to "Failed - No response"</p> <p>6 - The controller set the drive state to "Failed - Format failure"</p> <p>7 - The controller set the drive state to "User failed via Mode Select"</p> <p>8 - Not used</p> <p>9 - The controller set the drive state to "Wrong drive removed/replaced"</p> <p>A - Not used</p> <p>B - The controller set the drive state to "Drive capacity < minimum"</p> <p>C - The controller set the drive state to "Drive has wrong block size"</p> <p>D - The controller set the drive state to "Failed - Controller storage failure"</p>

ASC	ASCQ	Sense Key	Description
			E - Drive failed due to reconstruction failure at Start of Day (SOD)
3F	90	6	Automatic Code Synchronization Successful The automatic code synchronization was completed successfully.
3F	98	(6)	Drive Marked Offline Due to Internal Recovery Procedure An error has occurred during interrupted write processing causing the LUN to transition to the DEAD state. Drives in the drive group that did not experience the read error will transition to the Offline state (0x0B) and log this error.
3F	A1	4	Mini-Hub VPD Access Error An error was encountered while attempting to read or write Mini-Hub VPD Inquiry Data. Some possible causes may be that the Mini-Hub is not present or the VPD data is inaccessible.
3F	BD	(6)	The controller has detected a drive with Mode Select parameters that are not recommended or which could not be changed. Currently this indicates the QErr bit is set incorrectly on the drive specified in the FRU field of the Request Sense data.
3F	C3	(6)	The controller had detected a failed drive side channel specified in the FRU Qualifier field.
3F	C6	(6)	An Overtemp condition has been detected in the controller or drive module.
3F	C7	(6)	Non-media Component Failure The controller has detected the failure of a subsystem component other than a disk or controller. The FRU codes and qualifiers indicate the faulty component.
3F	C8	(6)	AC Power Fail The Uninterruptible Power Source has indicated that AC power is no longer present and the UPS has switched to standby power.
3F	C9	(6)	Standby Power Depletion Imminent The UPS has indicated that its standby power source is nearing depletion. The host should take actions to stop IO activity to the controller.
3F	CA	(6)	Standby Power Source Not at Full Capability The UPS has indicated that its standby power source is not at full capacity.
3F	CB	(6)	AC Power Has Been Restored The UPS has indicated that AC power is now being used to supply power to the controller.
3F	D8	(6)	Cache Battery Life Expiration The cache battery has reached the specified expiration age

ASC	ASCQ	Sense Key	Description
3F	D9	(6)	Cache Battery Life Expiration Warning The cache battery is within the specified number of weeks of failing
3F	E0	(6)	Logical Unit Failure The controller has placed the logical unit in a "dead" state. User data and/or parity can no longer be maintained to ensure availability. The most likely cause is the failure of a single drive in non-redundant configurations or a second drive in a configuration protected by one drive. The data on the logical unit is no longer accessible.
3F	EB	(6)	LUN marked DEAD due to Media Error Failure during SOD An error has occurred during interrupted write processing causing the LUN to transition to the DEAD state
40	NN	4,(6)	Diagnostic Failure on Component NN (0x80 - 0xFF) The controller has detected the failure of an internal controller component. This failure may have been detected during operation as well as during an on-board diagnostic routine. The values of NN supported in this release of the software are listed below. 80 - Processor RAM 81 - RAID Buffer 82 - NVSRAM 83 - RAID Parity Assist (RPA) chip or cache holdup battery 84 - Battery Backed NVSRAM or Clock Failure 91 - Diagnostic Self Test failed non-data transfer components test 92 - Diagnostic Self Test failed data transfer components test 93 - Diagnostic Self Test failed drive Read/Write Buffer data turnaround test 94 - Diagnostic Self Test failed drive Inquiry access test 95 - Diagnostic Self Test failed drive Read/Write data turnaround test 96 - Diagnostic Self Test failed drive Self Test
43	00	4	Message Error The controller attempted to send a message to the host, but the host responded with a Reject message.
44	00	4,B	Internal Target Failure The controller has detected a hardware or software condition that does not allow the requested command to be completed. If the sense key is 0x04 indicating a hardware failure, the

ASC	ASCQ	Sense Key	Description
			controller has detected what it believes is a fatal hardware or software failure and it is unlikely that a retry would be successful. If the sense key is 0x0B indicating an aborted command, the controller has detected what it believes is a temporary software failure that is likely to be recovered if retried.
45	00	1,4	Selection Time-out on a Destination Bus A drive did not respond to selection within a selection time-out period.
47	00	1,B	SCSI Parity Error The controller detected a parity error on the host SCSI bus or one of the drive SCSI buses.
47	80	6	Fibre Link Error The fibre link error thresholds defined in Byte 0x38 of the User Configurable Options NVSRAM region have been exceeded.
48	00	1,B	Initiator Detected Error Message Received The controller received an Initiator Detected Error Message from the host during the operation.
49	00	B	Invalid Message Error The controller received a message from the host that is not supported or was out of context when received.
49	80	B	Drive Reported Reservation Conflict A drive returned a status of reservation conflict.
4B	00	1,4	Data Phase Error The controller encountered an error while transferring data to/from the initiator or to/from one of the drives.
4B	00	B	Source Transfer Error The amount of data received from the host does not match the data transfer length specified.
4E	00	B	Overlapped Commands Attempted The controller received a tagged command while it had an untagged command pending from the same initiator or it received an untagged command while it had a tagged command(s) pending from the same initiator.
55	04	5	Insufficient Registration Resources A PERSISTENT RESERVE OUT command, with service action REGISTER or REGISTER AND IGNORE EXISTING KEY is attempted and there are insufficient resources in the controller to carry out the operation.
5D	80	6	Drive Reported PFA (Predicted Failure Analysis) Condition

ASC	ASCQ	Sense Key	Description
5D	90	6	Controller Reported PFA (Predicted Failure Analysis) Condition
80	02	1,4	Bad ASC code detected by Error/Event Logger
84	00	4,5	Operation Not Allowed With the Logical Unit in its Current State The requested command or Mode Select operation is not allowed with the logical unit in the state indicated in byte 76 of the sense data. Examples would be an attempt to read or write a "dead" logical unit or an attempt to verify or repair parity on a "degraded" logical unit.
84	01	5	Operation Not Allowed – UTM LUN The requested operation could not be performed because it was addressed to the UTM LUN.
84	06	4	LUN Awaiting Format A mode select has been done to create a LUN but the LUN has not been formatted.
84	20	4	Operation Not Allowed – The Snapshot Volume’s Repository is Full The write command is not allowed to a snapshot volume because the snapshot’s repository is full and the Repository Full Policy setting has instructed the controller to fail the snapshot volume (and its repository volume). The Repository Full Policy is controlled by the system administrator.
84	21	4	Operation Not Allowed – The Snapshot Operation has been Stopped. The requested command is not allowed to a snapshot volume because the operation has been stopped by the system administrator.
84	22	4	Operation Not Allowed – The Snapshot Volume’s Repository is Full The write command is not allowed to a volume that has an active snapshot nor to its snapshot volume because the snapshot’s repository is full and the Repository Full Policy setting has instructed the controller to fail writes. Read operations continue to be allowed. The Repository Full Policy is controlled by the system administrator.
84	30	7	Illegal IO Origin The command cannot be processed because a volume acting in the primary role received a read/write command from the remote array.
84	31	7	Read Protected The address LUN is read-protected. In this release, the read protection may have been applied by either the Remote Volume Mirroring feature or the Volume Copy feature.

ASC	ASCQ	Sense Key	Description
85	01	4	Drive IO Request Aborted IO Issued to Failed or Missing drive due to recently failed removed drive. This error can occur as a result of IOs in progress at the time of a failed or removed drive.
87	00	4	Microcode Download Error The controller detected an error while downloading microcode and storing it in non-volatile memory.
87	08	4	Incompatible Board Type For The Code Downloaded
87	0C	6	Download failed due to UTM LUN number conflict
87	0E	6	Controller Configuration Definition Inconsistent with Alternate Controller
88	0A	(6)	Subsystem Monitor NVSRAM values configured incorrectly.
8A	00	5	Illegal Command for Drive Access The initiator attempted to pass a command through to a drive that is not allowed. The command could have been sent in pass through mode or by attempting to download drive microcode.
8A	01	5	Illegal Command for the Current RAID Level The controller received a command that cannot be executed on the logical unit due to its RAID level configuration. Examples are parity verify or repair operations on a RAID 0 logical unit.
8A	20	5	Illegal Command for Current Volume Configuration The controller received a command that cannot be executed due to the current volume configuration.
8B	02	B, (6)	Quiescence Is In Progress or Has Been Achieved
8B	03	B	Quiescence Could Not Be Achieved Within the Quiescence Timeout Period
8B	04	5	Quiescence Is Not Allowed
8E	01	E, (6)	A Parity/Data Mismatch was Detected The controller detected inconsistent parity/data during a parity verification.
91	00	5	General Mode Select Error An error was encountered while processing a Mode Select command.
91	03	5	Illegal Operation for Current Drive State A drive operation was requested through a Mode Select that cannot be executed due to the state of the drive. An example would be a Delete Drive when the drive is part of a LUN.
91	09	5	Illegal Operation with Multiple SubLUNs Defined An operation was requested that cannot be executed when

ASC	ASCQ	Sense Key	Description
			multiple SubLUNs are defined on the drive.
91	33	5	<p>Illegal Operation for Controller State</p> <p>The requested Mode Select operation could not be completed due to the current state of the controller.</p>
91	36	5	<p>Command Lock Violation</p> <p>The controller received a Write Buffer Download Microcode, Send Diagnostic, or Mode Select command, but only one such command is allowed at a time and there was another such command active.</p>
91	50	5	<p>Illegal Operation For Drive Group State</p> <p>An operation was requested that cannot be executed due to the current state of the Drive Group.</p>
91	51	5	<p>Illegal Reconfiguration Request - Legacy Constraint</p> <p>Command could not be completed due to Legacy configuration or definition constraints</p>
91	53	5	<p>Illegal Reconfiguration Request - System Resource Constraint</p> <p>Command could not be completed due to resource limitations of the controller</p>
94	01	5	<p>Invalid Request Due to Current Logical Unit Ownership.</p> <p>The request is illegal because the volume is not owned by the controller receiving the request. Route the request to the alternate controller, if available.</p> <p>If the alternate is not available change the volume ownership from the alternate controller to this controller, then retry the request.</p>
94	02	5	<p>Invalid Request Due to Current Logical Unit Ownership.</p> <p>The request is illegal because this is a mirrored secondary volume and it is not owned by the controller receiving the request. Route the request to the alternate controller in the storage array, the controller owner of this volume.</p> <p>If the alternate controller is not available the request must be failed because you can not transfer ownership of a mirrored secondary volume.</p>
95	01	4	<p>Extended Drive Insertion/Removal Signal</p> <p>The controller has detected the drive insertion/removal signal permanently active.</p>
95	02	(6)	<p>Controller Removal/Replacement Detected or Alternate Controller Released from Reset</p> <p>The controller detected the activation of the signal/signals used to indicate that the alternate controller has been removed or replaced.</p>

ASC	ASCQ	Sense Key	Description
98	01	(6)	The controller has determined that there are multiple sub-enclosures with the same ID value selected.
98	02	(6)	Sub-Enclosure with redundant ESMs specifying different Tray Ids
98	03	(6)	Sub-Enclosure ESMs have different firmware levels
A0	00	(6)	Write Back Caching Could Not Be Enabled The controller could not perform write back caching due to a battery failure or discharge, Two Minute Warning signal from the UPS, or an ICON failure.
A1	00	(6)	Write Back Caching Could Not Be Enabled - RDAC Cache Size Mismatch The controller could not perform write back caching due to the cache sizes of the two controllers in the RDAC pair not matching.
A4	00	(6)	Global Hot Spare Size Insufficient for All Drives in Subsystem. A defined Global Hot Spare is not large enough to cover all of the drives present in the subsystem. Failure of a drive larger than the Global Hot Spare will not be covered by the Global Hot Spare drive.
A6	00	(6)	Recovered processor memory failure The controller has detected and corrected a recoverable error in processor memory.
A7	00	(6)	Recovered data buffer memory error The controller has detected and corrected a recoverable error in the data buffer memory. Sense bytes 34-36 will contain the count of errors encountered and recovered
A8	00	4	General MetaData Error The operation could not be completed because metadata needed to perform the operation is missing, could not be read or has been corrupted.
A8	01	4	Snapshot Repository MetaData Error The operation could not be completed because metadata needed to perform the operation is missing, could not be read or has been corrupted. The metadata resides in the snapshot's repository volume.
C0	00	4,(6)	The Inter-controller Communications Have Failed The controller has detected the failure of the communications link between redundant controllers.
D0	06	4	Drive IO Time-out The controller destination IO timer expired while waiting for a drive command to complete.

ASC	ASCQ	Sense Key	Description
D1	0A	4	<p>Drive Reported Busy Status</p> <p>A drive returned a busy status in response to a command.</p>
E0	NN	4	<p>Destination Channel Error</p> <p>NN = 00 through 07 indicates the Sense Key returned by the drive after a check condition status</p> <p>NN = 10 indicates that a bus level error occurred</p>
E0	NN	6	<p>Fibre Channel Destination Channel Error</p> <p>NN = 20 indicates redundant path is not available to devices</p> <p>NN = 21 indicates destination drive channels are connected to each other</p> <p>Sense Byte 26 will contain the Tray ID.</p> <p>Sense Byte 27 will contain the Channel ID.</p>
E1	NN	4	<p>SATA Drive Error</p> <p>NN = 00 – This indicates that the Frodo SATA chip on the PCI bus timed out while fetching a command descriptor block from ring buffer memory. The path controller for the given drive is switched to the alternate controller and no retries are attempted.</p> <p>NN = 01 – This indicates that framing errors and/or data packet CRC errors are occurring over the high speed serial SATA link and the final (twelfth) retry attempt has been made to the path controller. The path controller for the given drive is switched to the alternate controller at this time.</p>
E1	NN	4	<p>NN = 02 – This indicates that a PRD table entry exceeded the length of the data request, meaning the Frodo chip and the disk drive did not agree on the data transfer length. The path controller for the given drive is switched to the alternate controller at this time.</p> <p>NN = 03 - This indicates that a PRD table entry was shorter than the length of the data request, meaning the Frodo chip and the disk drive did not agree on the data transfer length. The path controller for the given drive is switched to the alternate controller at this time.</p>
E1	NN	4	<p>NN = 04 – This indicates that the disk drive reported an ATA protocol error. Typically this is caused by uncorrectable read errors (media errors) from the device. This can also be caused by the firmware attempting to execute an invalid command sequence. If this is a potentially recoverable ATA errors, retries are attempted. For other errors, the path controller for the given drive is switched to the alternate controller.</p> <p>NN = 05 – This indicates that the Frodo chip encountered a PCI Bus Error during a data DMA phase. This generally means that there was no valid response from memory on the PCI bus. The path controller for the given drive is switched to the alternate</p>

ASC	ASCQ	Sense Key	Description
			<p>controller at this time.</p> <p>NN = 06 - This indicates an unknown SATA channel error.</p> <p>NN = 07 - This indicates that the device was in an invalid state when a read or write request came in from the high level destination driver. The disk may be broken, gone, or out of service.</p> <p>NN = 08 - This indicates that an IOCTL command timed out because of a firmware or hardware error. The path controller for the given drive is switched to the alternate controller at this time.</p> <p>NN = 09 - This indicates that an IOCTL command timed out because of a firmware or hardware error. The path controller for the given drive is switched to the alternate controller at this time.</p>
E1	NN	4	<p>NN = 0A - This indicates that the high-level driver timed out an IO shipping request. This results in a path switch from the alternate controller to the local path.</p>
E1	NN	4	<p>NN = 0B - This is a routine error that indicates that an IO shipping request being processed on the alternate controller has failed.</p> <p>NN = 0C - This indicates that the Frodo chip is stopped because the abort acknowledge interrupt was set in the qdma command register. The firmware uses this bit to abort a sequence of I/O operations when it encounters an error. This results in a path switch from the alternate controller to the local path.</p> <p>NN = 0D - This indicates that during an error recovery attempt, outstanding requests are aborted so that they can be retried in the proper order. These aborts do not get logged in the Mel log.</p>
E1	NN	4	<p>NN = 0E - This indicates that the high level destination driver timed out waiting for a request to complete and released the buffer.</p> <p>NN = 0F - This indicates that during recovery from an ATA error, the amount of time for the retry expired or the number of retries available has been exceeded.</p> <p>NN = 10 - This indicates that there was a fault trying to communicate with the path controller for a given drive. When this occurs, the disk path is switched to the other controller.</p> <p>NN = 11 - This indicates that the signature write in auto signing mode failed. An unsigned disk is not useable and will be put offline.</p>

A.4 Industry Standard ASC/ASCQ Codes

A.4.1 SCSI ASC/ASCQ Table Format Explanation

The following shows several examples of table entries for ASC/ASCQ values with each column of the table identified in detail.

```

| -> ASC value (in hexadecimal)
|
| | -> ASCQ value (in hexadecimal)
| |
| | | -> Codes identifying devices that may use the ASC/ASCQ pair
| | | -> value. (See list of device code letters below.)
| | |
| | | | -> Error or exception indicated by the
| | | | -> ASC/ASCQ pair value.
| | | | -----
00/00 DTLPWROMAEBKVF NO ADDITIONAL SENSE INFORMATION
04/04 DTL O LOGICAL UNIT NOT READY, FORMAT IN PROGRESS
3B/05 L PAPER JAM
    
```

An ASC/ASCQ code value may be used by several SCSI device types. The letters in the DTLPWROMAEBKVF column indicate which SCSI device types have the option of using the listed ASC/ASCQ value. When all the DTLPWROMAEBKVF letters are present, then all SCSI device types may use the listed ASC/ASCQ value. If only one letter is present (such as with the PAPER JAM ASC/ASCQ in the example above) then only one SCSI device type may use the listed ASC/ASCQ. (In the case of the PAPER JAM example, the only SCSI device type that may use the ASC/ASCQ is the Printer Device type.)

The complete list of letters and the SCSI device types they represent is as follows:

- D - Direct Access Device (SBC)
- T - Sequential Access Device (SSC-2)
- L - Printer Device (SSC)
- P - Processor Device (SPC-2)
- W - Write Once Read Multiple Device (SBC)
- R - CD/DVD Device (MMC-3)
- O - Optical Memory Device (SBC)
- M - Media Changer Device (SMC-2)
- A - Storage Array Device (SCC-2)
- E - Enclosure Services Device (SES)
- B - Simplified Direct-Access Device (RBC)
- K - Optical Card Reader/Writer Device (OCRW)
- V - Automation/Drive Interface (ADC)
- F - Object-based Storage (OSD)

A.4.2 SCSI ASC/ASCQ Assignments

Numeric Sorted Listing as of 3/25/05

ASC/ASCQ	DTLPWROMAEBKVF	Description
00h/00h	DTLPWROMAEBKVF	NO ADDITIONAL SENSE INFORMATION
00h/01h	T	FILEMARK DETECTED
00h/02h	T	END-OF-PARTITION/MEDIUM DETECTED
00h/03h	T	SETMARK DETECTED
00h/04h	T	BEGINNING-OF-PARTITION/MEDIUM DETECTED

00h/05h	TL	END-OF-DATA DETECTED
00h/06h	DTLPWROMAEBKVF	I/O PROCESS TERMINATED
00h/11h	R	AUDIO PLAY OPERATION IN PROGRESS
00h/12h	R	AUDIO PLAY OPERATION PAUSED
00h/13h	R	AUDIO PLAY OPERATION SUCCESSFULLY COMPLETED
00h/14h	R	AUDIO PLAY OPERATION STOPPED DUE TO ERROR
00h/15h	R	NO CURRENT AUDIO STATUS TO RETURN
00h/16h	DTLPWROMAEBKVF	OPERATION IN PROGRESS
00h/17h	DTL WROMAEBKVF	CLEANING REQUESTED
00h/18h	T	ERASE OPERATION IN PROGRESS
00h/19h	T	LOCATE OPERATION IN PROGRESS
00h/1Ah	T	REWIND OPERATION IN PROGRESS
00h/1Bh	T	SET CAPACITY OPERATION IN PROGRESS
00h/1Ch	T	VERIFY OPERATION IN PROGRESS
01h/00h	D W O BK	NO INDEX/SECTOR SIGNAL
02h/00h	D WROM BK	NO SEEK COMPLETE
03h/00h	DTL W O BK	PERIPHERAL DEVICE WRITE FAULT
03h/01h	T	NO WRITE CURRENT
03h/02h	T	EXCESSIVE WRITE ERRORS
04h/00h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, CAUSE NOT REPORTABLE
04h/01h	DTLPWROMAEBKVF	LOGICAL UNIT IS IN PROCESS OF BECOMING READY
04h/02h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, INITIALIZING COMMAND REQUIRED
04h/03h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, MANUAL INTERVENTION REQUIRED
04h/04h	DTL RO B	LOGICAL UNIT NOT READY, FORMAT IN PROGRESS
04h/05h	DT W OMA BK	LOGICAL UNIT NOT READY, REBUILD IN PROGRESS
04h/06h	DT W OMA BK	LOGICAL UNIT NOT READY, RECALCULATION IN PROGRESS
04h/07h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, OPERATION IN PROGRESS
04h/08h	R	LOGICAL UNIT NOT READY, LONG WRITE IN PROGRESS
04h/09h	DTLPWROMAEBKVF	LOGICAL UNIT NOT READY, SELF-TEST IN PROGRESS
04h/0Ah	DTLPWROMAEBKVF	LOGICAL UNIT NOT ACCESSIBLE, ASYMMETRIC ACCESS STATE TRANSITION
04h/0Bh	DTLPWROMAEBKVF	LOGICAL UNIT NOT ACCESSIBLE, TARGET PORT IN STANDBY STATE
04h/0Ch	DTLPWROMAEBKVF	LOGICAL UNIT NOT ACCESSIBLE, TARGET PORT IN UNAVAILABLE STATE
04h/10h	DT WROM B	LOGICAL UNIT NOT READY, AUXILIARY MEMORY NOT ACCESSIBLE
04h/11h	DT WROMAEB VF	LOGICAL UNIT NOT READY, NOTIFY (ENABLE SPINUP) REQUIRED
04h/12h	V	LOGICAL UNIT NOT READY, OFFLINE
05h/00h	DTL WROMAEBKVF	LOGICAL UNIT DOES NOT RESPOND TO SELECTION
06h/00h	D WROM BK	NO REFERENCE POSITION FOUND
07h/00h	DTL WROM BK	MULTIPLE PERIPHERAL DEVICES SELECTED
08h/00h	DTL WROMAEBKVF	LOGICAL UNIT COMMUNICATION FAILURE
08h/01h	DTL WROMAEBKVF	LOGICAL UNIT COMMUNICATION TIME-OUT
08h/02h	DTL WROMAEBKVF	LOGICAL UNIT COMMUNICATION PARITY ERROR

08h/03h	DT ROM BK	LOGICAL UNIT COMMUNICATION CRC ERROR (ULTRA-DMA/32)
08h/04h	DTLPWRO K	UNREACHABLE COPY TARGET
09h/00h	DT WRO B	TRACK FOLLOWING ERROR
09h/01h	WRO K	TRACKING SERVO FAILURE
09h/02h	WRO K	FOCUS SERVO FAILURE
09h/03h	WRO	SPINDLE SERVO FAILURE
09h/04h	DT WRO B	HEAD SELECT FAULT
0Ah/00h	DTLPWROMAEBKVF	ERROR LOG OVERFLOW
0Bh/00h	DTLPWROMAEBKVF	WARNING
0Bh/01h	DTLPWROMAEBKVF	WARNING - SPECIFIED TEMPERATURE EXCEEDED
0Bh/02h	DTLPWROMAEBKVF	WARNING - ENCLOSURE DEGRADED
0Ch/00h	T R	WRITE ERROR
0Ch/01h	K	WRITE ERROR - RECOVERED WITH AUTO REALLOCATION
0Ch/02h	D W O BK	WRITE ERROR - AUTO REALLOCATION FAILED
0Ch/03h	D W O BK	WRITE ERROR - RECOMMEND REASSIGNMENT
0Ch/04h	DT W O B	COMPRESSION CHECK MISCOMPARE ERROR
0Ch/05h	DT W O B	DATA EXPANSION OCCURRED DURING COMPRESSION
0Ch/06h	DT W O B	BLOCK NOT COMPRESSIBLE
0Ch/07h	R	WRITE ERROR - RECOVERY NEEDED
0Ch/08h	R	WRITE ERROR - RECOVERY FAILED
0Ch/09h	R	WRITE ERROR - LOSS OF STREAMING
0Ch/0Ah	R	WRITE ERROR - PADDING BLOCKS ADDED
0Ch/0Bh	DT WROM B	AUXILIARY MEMORY WRITE ERROR
0Ch/0Ch	DTLPWROMAEBKVF	WRITE ERROR - UNEXPECTED UNSOLICITED DATA
0Ch/0Dh	DTLPWROMAEBKVF	WRITE ERROR - NOT ENOUGH UNSOLICITED DATA
0Dh/00h	DTLPWRO A K	ERROR DETECTED BY THIRD PARTY TEMPORARY INITIATOR
0Dh/01h	DTLPWRO A K	THIRD PARTY DEVICE FAILURE
0Dh/02h	DTLPWRO A K	COPY TARGET DEVICE NOT REACHABLE
0Dh/03h	DTLPWRO A K	INCORRECT COPY TARGET DEVICE TYPE
0Dh/04h	DTLPWRO A K	COPY TARGET DEVICE DATA UNDERRUN
0Dh/05h	DTLPWRO A K	COPY TARGET DEVICE DATA OVERRUN
0Eh/00h	DT PWROMAEBK F	INVALID INFORMATION UNIT
0Eh/01h	DT PWROMAEBK F	INFORMATION UNIT TOO SHORT
0Eh/02h	DT PWROMAEBK F	INFORMATION UNIT TOO LONG
0Eh/03h	DT P R MAEBK F	INVALID FIELD IN COMMAND INFORMATION UNIT
10h/00h	D W O BK	ID CRC OR ECC ERROR
10h/01h	DT W O	DATA BLOCK GUARD CHECK FAILED
10h/02h	DT W O	DATA BLOCK APPLICATION TAG CHECK FAILED
10h/03h	DT W O	DATA BLOCK REFERENCE TAG CHECK FAILED
11h/00h	DT WRO BK	UNRECOVERED READ ERROR
11h/01h	DT WRO BK	READ RETRIES EXHAUSTED
11h/02h	DT WRO BK	ERROR TOO LONG TO CORRECT
11h/03h	DT W O BK	MULTIPLE READ ERRORS
11h/04h	D W O BK	UNRECOVERED READ ERROR - AUTO REALLOCATE FAILED
11h/05h	WRO B	L-EC UNCORRECTABLE ERROR

11h/06h	WRO B	CIRC UNRECOVERED ERROR
11h/07h	W O B	DATA RE-SYNCHRONIZATION ERROR
11h/08h	T	INCOMPLETE BLOCK READ
11h/09h	T	NO GAP FOUND
11h/0Ah	DT O BK	MISCORRECTED ERROR
11h/0Bh	D W O BK	UNRECOVERED READ ERROR - RECOMMEND REASSIGNMENT
11h/0Ch	D W O BK	UNRECOVERED READ ERROR - RECOMMEND REWRITE THE DATA
11h/0Dh	DT WRO B	DE-COMPRESSON CRC ERROR
11h/0Eh	DT WRO B	CANNOT DECOMPRESS USING DECLARED ALGORITHM
11h/0Fh	R	ERROR READING UPC/EAN NUMBER
11h/10h	R	ERROR READING ISRC NUMBER
11h/11h	R	READ ERROR - LOSS OF STREAMING
11h/12h	DT WROM B	AUXILIARY MEMORY READ ERROR
11h/13h	DTLPWROMAEBKVF	READ ERROR - FAILED RETRANSMISSION REQUEST
12h/00h	D W O BK	ADDRESS MARK NOT FOUND FOR ID FIELD
13h/00h	D W O BK	ADDRESS MARK NOT FOUND FOR DATA FIELD
14h/00h	DTL WRO BK	RECORDED ENTITY NOT FOUND
14h/01h	DT WRO BK	RECORD NOT FOUND
14h/02h	T	FILEMARK OR SETMARK NOT FOUND
14h/03h	T	END-OF-DATA NOT FOUND
14h/04h	T	BLOCK SEQUENCE ERROR
14h/05h	DT W O BK	RECORD NOT FOUND - RECOMMEND REASSIGNMENT
14h/06h	DT W O BK	RECORD NOT FOUND - DATA AUTO-REALLOCATED
14h/07h	T	LOCATE OPERATION FAILURE
15h/00h	DTL WROM BK	RANDOM POSITIONING ERROR
15h/01h	DTL WROM BK	MECHANICAL POSITIONING ERROR
15h/02h	DT WRO BK	POSITIONING ERROR DETECTED BY READ OF MEDIUM
16h/00h	D W O BK	DATA SYNCHRONIZATION MARK ERROR
16h/01h	D W O BK	DATA SYNC ERROR - DATA REWRITTEN
16h/02h	D W O BK	DATA SYNC ERROR - RECOMMEND REWRITE
16h/03h	D W O BK	DATA SYNC ERROR - DATA AUTO-REALLOCATED
16h/04h	D W O BK	DATA SYNC ERROR - RECOMMEND REASSIGNMENT
17h/00h	DT WRO BK	RECOVERED DATA WITH NO ERROR CORRECTION APPLIED
17h/01h	DT WRO BK	RECOVERED DATA WITH RETRIES
17h/02h	DT WRO BK	RECOVERED DATA WITH POSITIVE HEAD OFFSET
17h/03h	DT WRO BK	RECOVERED DATA WITH NEGATIVE HEAD OFFSET
17h/04h	WRO B	RECOVERED DATA WITH RETRIES AND/OR CIRC APPLIED
17h/05h	D WRO BK	RECOVERED DATA USING PREVIOUS SECTOR ID
17h/06h	D W O BK	RECOVERED DATA WITHOUT ECC - DATA AUTO-REALLOCATED
17h/07h	D WRO BK	RECOVERED DATA WITHOUT ECC - RECOMMEND REASSIGNMENT
17h/08h	D WRO BK	RECOVERED DATA WITHOUT ECC - RECOMMEND REWRITE

17h/09h	D WRO BK	RECOVERED DATA WITHOUT ECC - DATA REWRITTEN
18h/00h	DT WRO BK	RECOVERED DATA WITH ERROR CORRECTION APPLIED
18h/01h	D WRO BK	RECOVERED DATA WITH ERROR CORR. & RETRIES APPLIED
18h/02h	D WRO BK	RECOVERED DATA - DATA AUTO-REALLOCATED
18h/03h	R	RECOVERED DATA WITH CIRC
18h/04h	R	RECOVERED DATA WITH L-EC
18h/05h	D WRO BK	RECOVERED DATA - RECOMMEND REASSIGNMENT
18h/06h	D WRO BK	RECOVERED DATA - RECOMMEND REWRITE
18h/07h	D W O BK	RECOVERED DATA WITH ECC - DATA REWRITTEN
18h/08h	R	RECOVERED DATA WITH LINKING
19h/00h	D O K	DEFECT LIST ERROR
19h/01h	D O K	DEFECT LIST NOT AVAILABLE
19h/02h	D O K	DEFECT LIST ERROR IN PRIMARY LIST
19h/03h	D O K	DEFECT LIST ERROR IN GROWN LIST
1Ah/00h	DTLPWROMAEBKVF	PARAMETER LIST LENGTH ERROR
1Bh/00h	DTLPWROMAEBKVF	SYNCHRONOUS DATA TRANSFER ERROR
1Ch/00h	D O BK	DEFECT LIST NOT FOUND
1Ch/01h	D O BK	PRIMARY DEFECT LIST NOT FOUND
1Ch/02h	D O BK	GROWN DEFECT LIST NOT FOUND
1Dh/00h	DT WRO BK	MISCOMPARE DURING VERIFY OPERATION
1Eh/00h	D W O BK	RECOVERED ID WITH ECC CORRECTION
1Fh/00h	D O K	PARTIAL DEFECT LIST TRANSFER
20h/00h	DTLPWROMAEBKVF	INVALID COMMAND OPERATION CODE
20h/01h	DT PWROMAEBK	ACCESS DENIED - INITIATOR PENDING-ENROLLED
20h/02h	DT PWROMAEBK	ACCESS DENIED - NO ACCESS RIGHTS
20h/03h	DT PWROMAEBK	ACCESS DENIED - INVALID MGMT ID KEY
20h/04h	T	ILLEGAL COMMAND WHILE IN WRITE CAPABLE STATE
20h/05h	T	Obsolete
20h/06h	T	ILLEGAL COMMAND WHILE IN EXPLICIT ADDRESS MODE
20h/07h	T	ILLEGAL COMMAND WHILE IN IMPLICIT ADDRESS MODE
20h/08h	DT PWROMAEBK	ACCESS DENIED - ENROLLMENT CONFLICT
20h/09h	DT PWROMAEBK	ACCESS DENIED - INVALID LU IDENTIFIER
20h/0Ah	DT PWROMAEBK	ACCESS DENIED - INVALID PROXY TOKEN
20h/0Bh	DT PWROMAEBK	ACCESS DENIED - ACL LUN CONFLICT
21h/00h	DT WROM BK	LOGICAL BLOCK ADDRESS OUT OF RANGE
21h/01h	DT WROM BK	INVALID ELEMENT ADDRESS
21h/02h	R	INVALID ADDRESS FOR WRITE
22h/00h	D	ILLEGAL FUNCTION (USE 20 00, 24 00, OR 26 00)
24h/00h	DTLPWROMAEBKVF	INVALID FIELD IN CDB
24h/01h	DTLPWROMAEBKVF	CDB DECRYPTION ERROR
24h/02h	T	Obsolete
24h/03h	T	Obsolete
24h/04h	F	SECURITY AUDIT VALUE FROZEN
24h/05h	F	SECURITY WORKING KEY FROZEN
24h/06h	F	NONCE NOT UNIQUE

24h/07h	F	NONCE TIMESTAMP OUT OF RANGE
25h/00h	DTLPWROMAEBKVF	LOGICAL UNIT NOT SUPPORTED
26h/00h	DTLPWROMAEBKVF	INVALID FIELD IN PARAMETER LIST
26h/01h	DTLPWROMAEBKVF	PARAMETER NOT SUPPORTED
26h/02h	DTLPWROMAEBKVF	PARAMETER VALUE INVALID
26h/03h	DTLPWROMAE K	THRESHOLD PARAMETERS NOT SUPPORTED
26h/04h	DTLPWROMAEBKVF	INVALID RELEASE OF PERSISTENT RESERVATION
26h/05h	DTLPWROMA BK	DATA DECRYPTION ERROR
26h/06h	DTLPWRO K	TOO MANY TARGET DESCRIPTORS
26h/07h	DTLPWRO K	UNSUPPORTED TARGET DESCRIPTOR TYPE CODE
26h/08h	DTLPWRO K	TOO MANY SEGMENT DESCRIPTORS
26h/09h	DTLPWRO K	UNSUPPORTED SEGMENT DESCRIPTOR TYPE CODE
26h/0Ah	DTLPWRO K	UNEXPECTED INEXACT SEGMENT
26h/0Bh	DTLPWRO K	INLINE DATA LENGTH EXCEEDED
26h/0Ch	DTLPWRO K	INVALID OPERATION FOR COPY SOURCE OR DESTINATION
26h/0Dh	DTLPWRO K	COPY SEGMENT GRANULARITY VIOLATION
26h/0Eh	DTLPWROMAEBK	INVALID PARAMETER WHILE PORT IS ENABLED
26h/0Fh	F	INVALID DATA-OUT BUFFER INTEGRITY CHECK VALUE
27h/00h	DT WRO BK	WRITE PROTECTED
27h/01h	DT WRO BK	HARDWARE WRITE PROTECTED
27h/02h	DT WRO BK	LOGICAL UNIT SOFTWARE WRITE PROTECTED
27h/03h	T R	ASSOCIATED WRITE PROTECT
27h/04h	T R	PERSISTENT WRITE PROTECT
27h/05h	T R	PERMANENT WRITE PROTECT
27h/06h	R	CONDITIONAL WRITE PROTECT
28h/00h	DTLPWROMAEBKVF	NOT READY TO READY CHANGE, MEDIUM MAY HAVE CHANGED
28h/01h	DT WROM B	IMPORT OR EXPORT ELEMENT ACCESSED
29h/00h	DTLPWROMAEBKVF	POWER ON, RESET, OR BUS DEVICE RESET OCCURRED
29h/01h	DTLPWROMAEBKVF	POWER ON OCCURRED
29h/02h	DTLPWROMAEBKVF	SCSI BUS RESET OCCURRED
29h/03h	DTLPWROMAEBKVF	BUS DEVICE RESET FUNCTION OCCURRED
29h/04h	DTLPWROMAEBKVF	DEVICE INTERNAL RESET
29h/05h	DTLPWROMAEBKVF	TRANSCEIVER MODE CHANGED TO SINGLE-ENDED
29h/06h	DTLPWROMAEBKVF	TRANSCEIVER MODE CHANGED TO LVD
29h/07h	DTLPWROMAEBKVF	I_T NEXUS LOSS OCCURRED
2Ah/00h	DTL WROMAEBKVF	PARAMETERS CHANGED
2Ah/01h	DTL WROMAEBKVF	MODE PARAMETERS CHANGED
2Ah/02h	DTL WROMAE K	LOG PARAMETERS CHANGED
2Ah/03h	DTLPWROMAE K	RESERVATIONS PREEMPTED
2Ah/04h	DTLPWROMAE	RESERVATIONS RELEASED
2Ah/05h	DTLPWROMAE	REGISTRATIONS PREEMPTED
2Ah/06h	DTLPWROMAEBKVF	ASYMMETRIC ACCESS STATE CHANGED
2Ah/07h	DTLPWROMAEBKVF	IMPLICIT ASYMMETRIC ACCESS STATE TRANSITION FAILED
2Ah/08h	DT WROMAEBKVF	PRIORITY CHANGED
2Ah/09h	D	CAPACITY DATA HAS CHANGED

2Ah/10h	DT M E V	TIMESTAMP CHANGED
2Bh/00h	DTLPWRO K	COPY CANNOT EXECUTE SINCE HOST CANNOT DISCONNECT
2Ch/00h	DTLPWROMAEBKVF	COMMAND SEQUENCE ERROR
2Ch/01h		TOO MANY WINDOWS SPECIFIED
2Ch/02h		INVALID COMBINATION OF WINDOWS SPECIFIED
2Ch/03h	R	CURRENT PROGRAM AREA IS NOT EMPTY
2Ch/04h	R	CURRENT PROGRAM AREA IS EMPTY
2Ch/05h	B	ILLEGAL POWER CONDITION REQUEST
2Ch/06h	R	PERSISTENT PREVENT CONFLICT
2Ch/07h	DTLPWROMAEBKVF	PREVIOUS BUSY STATUS
2Ch/08h	DTLPWROMAEBKVF	PREVIOUS TASK SET FULL STATUS
2Ch/09h	DTLPWROM EBKVF	PREVIOUS RESERVATION CONFLICT STATUS
2Ch/0Ah	F	PARTITION OR COLLECTION CONTAINS USER OBJECTS
2Ch/0Bh	T	NOT RESERVED
2Dh/00h	T	OVERWRITE ERROR ON UPDATE IN PLACE
2Eh/00h	R	INSUFFICIENT TIME FOR OPERATION
2Fh/00h	DTLPWROMAEBKVF	COMMANDS CLEARED BY ANOTHER INITIATOR
30h/00h	DT WROM BK	INCOMPATIBLE MEDIUM INSTALLED
30h/01h	DT WRO BK	CANNOT READ MEDIUM - UNKNOWN FORMAT
30h/02h	DT WRO BK	CANNOT READ MEDIUM - INCOMPATIBLE FORMAT
30h/03h	DT R K	CLEANING CARTRIDGE INSTALLED
30h/04h	DT WRO BK	CANNOT WRITE MEDIUM - UNKNOWN FORMAT
30h/05h	DT WRO BK	CANNOT WRITE MEDIUM - INCOMPATIBLE FORMAT
30h/06h	DT WRO B	CANNOT FORMAT MEDIUM - INCOMPATIBLE MEDIUM
30h/07h	DTL WROMAEBKVF	CLEANING FAILURE
30h/08h	R	CANNOT WRITE - APPLICATION CODE MISMATCH
30h/09h	R	CURRENT SESSION NOT FIXATED FOR APPEND
30h/0Ah	DT WROMAEBK	CLEANING REQUEST REJECTED
30h/0Ch	T	WORM MEDIUM - OVERWRITE ATTEMPTED
30h/10h	R	MEDIUM NOT FORMATTED
31h/00h	DT WRO BK	MEDIUM FORMAT CORRUPTED
31h/01h	D L RO B	FORMAT COMMAND FAILED
31h/02h	R	ZONED FORMATTING FAILED DUE TO SPARE LINKING
32h/00h	D W O BK	NO DEFECT SPARE LOCATION AVAILABLE
32h/01h	D W O BK	DEFECT LIST UPDATE FAILURE
33h/00h	T	TAPE LENGTH ERROR
34h/00h	DTLPWROMAEBKVF	ENCLOSURE FAILURE
35h/00h	DTLPWROMAEBKVF	ENCLOSURE SERVICES FAILURE
35h/01h	DTLPWROMAEBKVF	UNSUPPORTED ENCLOSURE FUNCTION
35h/02h	DTLPWROMAEBKVF	ENCLOSURE SERVICES UNAVAILABLE
35h/03h	DTLPWROMAEBKVF	ENCLOSURE SERVICES TRANSFER FAILURE
35h/04h	DTLPWROMAEBKVF	ENCLOSURE SERVICES TRANSFER REFUSED
35h/05h	DTL WROMAEBKVF	ENCLOSURE SERVICES CHECKSUM ERROR
36h/00h	L	RIBBON, INK, OR TONER FAILURE
37h/00h	DTL WROMAEBKVF	ROUNDED PARAMETER
38h/00h	B	EVENT STATUS NOTIFICATION
38h/02h	B	ESN - POWER MANAGEMENT CLASS EVENT
38h/04h	B	ESN - MEDIA CLASS EVENT

38h/06h	B	ESN - DEVICE BUSY CLASS EVENT
39h/00h	DTL WROMAE K	SAVING PARAMETERS NOT SUPPORTED
3Ah/00h	DTL WROM BK	MEDIUM NOT PRESENT
3Ah/01h	DT WROM BK	MEDIUM NOT PRESENT - TRAY CLOSED
3Ah/02h	DT WROM BK	MEDIUM NOT PRESENT - TRAY OPEN
3Ah/03h	DT WROM B	MEDIUM NOT PRESENT - LOADABLE
3Ah/04h	DT WROM B	MEDIUM NOT PRESENT - MEDIUM AUXILIARY MEMORY ACCESSIBLE
3Bh/00h	TL	SEQUENTIAL POSITIONING ERROR
3Bh/01h	T	TAPE POSITION ERROR AT BEGINNING-OF-MEDIUM
3Bh/02h	T	TAPE POSITION ERROR AT END-OF-MEDIUM
3Bh/03h	L	TAPE OR ELECTRONIC VERTICAL FORMS UNIT NOT READY
3Bh/04h	L	SLEW FAILURE
3Bh/05h	L	PAPER JAM
3Bh/06h	L	FAILED TO SENSE TOP-OF-FORM
3Bh/07h	L	FAILED TO SENSE BOTTOM-OF-FORM
3Bh/08h	T	REPOSITION ERROR
3Bh/09h		READ PAST END OF MEDIUM
3Bh/0Ah		READ PAST BEGINNING OF MEDIUM
3Bh/0Bh		POSITION PAST END OF MEDIUM
3Bh/0Ch	T	POSITION PAST BEGINNING OF MEDIUM
3Bh/0Dh	DT WROM BK	MEDIUM DESTINATION ELEMENT FULL
3Bh/0Eh	DT WROM BK	MEDIUM SOURCE ELEMENT EMPTY
3Bh/0Fh	R	END OF MEDIUM REACHED
3Bh/11h	DT WROM BK	MEDIUM MAGAZINE NOT ACCESSIBLE
3Bh/12h	DT WROM BK	MEDIUM MAGAZINE REMOVED
3Bh/13h	DT WROM BK	MEDIUM MAGAZINE INSERTED
3Bh/14h	DT WROM BK	MEDIUM MAGAZINE LOCKED
3Bh/15h	DT WROM BK	MEDIUM MAGAZINE UNLOCKED
3Bh/16h	R	MECHANICAL POSITIONING OR CHANGER ERROR
3Bh/17h	F	READ PAST END OF USER OBJECT
3Dh/00h	DTLPWROMAE K	INVALID BITS IN IDENTIFY MESSAGE
3Eh/00h	DTLPWROMAEBKVF	LOGICAL UNIT HAS NOT SELF-CONFIGURED YET
3Eh/01h	DTLPWROMAEBKVF	LOGICAL UNIT FAILURE
3Eh/02h	DTLPWROMAEBKVF	TIMEOUT ON LOGICAL UNIT
3Eh/03h	DTLPWROMAEBKVF	LOGICAL UNIT FAILED SELF-TEST
3Eh/04h	DTLPWROMAEBKVF	LOGICAL UNIT UNABLE TO UPDATE SELF-TEST LOG
3Fh/00h	DTLPWROMAEBKVF	TARGET OPERATING CONDITIONS HAVE CHANGED
3Fh/01h	DTLPWROMAEBKVF	MICROCODE HAS BEEN CHANGED
3Fh/02h	DTLPWROM BK	CHANGED OPERATING DEFINITION
3Fh/03h	DTLPWROMAEBKVF	INQUIRY DATA HAS CHANGED
3Fh/04h	DT WROMAEBK	COMPONENT DEVICE ATTACHED
3Fh/05h	DT WROMAEBK	DEVICE IDENTIFIER CHANGED
3Fh/06h	DT WROMAEB	REDUNDANCY GROUP CREATED OR MODIFIED
3Fh/07h	DT WROMAEB	REDUNDANCY GROUP DELETED
3Fh/08h	DT WROMAEB	SPARE CREATED OR MODIFIED
3Fh/09h	DT WROMAEB	SPARE DELETED
3Fh/0Ah	DT WROMAEBK	VOLUME SET CREATED OR MODIFIED

3Fh/0Bh	DT WROMAEBK	VOLUME SET DELETED
3Fh/0Ch	DT WROMAEBK	VOLUME SET DEASSIGNED
3Fh/0Dh	DT WROMAEBK	VOLUME SET REASSIGNED
3Fh/0Eh	DTLPWROMAE	REPORTED LUNS DATA HAS CHANGED
3Fh/0Fh	DTLPWROMAEBKVF	ECHO BUFFER OVERWRITTEN
3Fh/10h	DT WROM B	MEDIUM LOADABLE
3Fh/11h	DT WROM B	MEDIUM AUXILIARY MEMORY ACCESSIBLE
40h/00h	D	RAM FAILURE (SHOULD USE 40 NN)
40h/NNh	DTLPWROMAEBKVF	DIAGNOSTIC FAILURE ON COMPONENT NN (80H-FFH)
41h/00h	D	DATA PATH FAILURE (SHOULD USE 40 NN)
42h/00h	D	POWER-ON OR SELF-TEST FAILURE (SHOULD USE 40 NN)
43h/00h	DTLPWROMAEBKVF	MESSAGE ERROR
44h/00h	DTLPWROMAEBKVF	INTERNAL TARGET FAILURE
45h/00h	DTLPWROMAEBKVF	SELECT OR RESELECT FAILURE
46h/00h	DTLPWROM BK	UNSUCCESSFUL SOFT RESET
47h/00h	DTLPWROMAEBKVF	SCSI PARITY ERROR
47h/01h	DTLPWROMAEBKVF	DATA PHASE CRC ERROR DETECTED
47h/02h	DTLPWROMAEBKVF	SCSI PARITY ERROR DETECTED DURING ST DATA PHASE
47h/03h	DTLPWROMAEBKVF	INFORMATION UNIT iuCRC ERROR DETECTED
47h/04h	DTLPWROMAEBKVF	ASYNCHRONOUS INFORMATION PROTECTION ERROR DETECTED
47h/05h	DTLPWROMAEBKVF	PROTOCOL SERVICE CRC ERROR
47h/06h	DT MAEBKVF	PHY TEST FUNCTION IN PROGRESS
47h/7Fh	DT PWROMAEBK	SOME COMMANDS CLEARED BY ISCSI PROTOCOL EVENT
48h/00h	DTLPWROMAEBKVF	INITIATOR DETECTED ERROR MESSAGE RECEIVED
49h/00h	DTLPWROMAEBKVF	INVALID MESSAGE ERROR
4Ah/00h	DTLPWROMAEBKVF	COMMAND PHASE ERROR
4Bh/00h	DTLPWROMAEBKVF	DATA PHASE ERROR
4Bh/01h	DT PWROMAEBK	INVALID TARGET PORT TRANSFER TAG RECEIVED
4Bh/02h	DT PWROMAEBK	TOO MUCH WRITE DATA
4Bh/03h	DT PWROMAEBK	ACK/NAK TIMEOUT
4Bh/04h	DT PWROMAEBK	NAK RECEIVED
4Bh/05h	DT PWROMAEBK	DATA OFFSET ERROR
4Bh/06h	DT PWROMAEBK	INITIATOR RESPONSE TIMEOUT
4Ch/00h	DTLPWROMAEBKVF	LOGICAL UNIT FAILED SELF-CONFIGURATION
4Dh/NNh	DTLPWROMAEBKVF	TAGGED OVERLAPPED COMMANDS (NN = TASK TAG)
4Eh/00h	DTLPWROMAEBKVF	OVERLAPPED COMMANDS ATTEMPTED
50h/00h	T	WRITE APPEND ERROR
50h/01h	T	WRITE APPEND POSITION ERROR
50h/02h	T	POSITION ERROR RELATED TO TIMING
51h/00h	T RO	ERASE FAILURE
51h/01h	R	ERASE FAILURE - INCOMPLETE ERASE OPERATION DETECTED
52h/00h	T	CARTRIDGE FAULT
53h/00h	DTL WROM BK	MEDIA LOAD OR EJECT FAILED
53h/01h	T	UNLOAD TAPE FAILURE

53h/02h	DT WROM BK	MEDIUM REMOVAL PREVENTED
54h/00h	P	SCSI TO HOST SYSTEM INTERFACE FAILURE
55h/00h	P	SYSTEM RESOURCE FAILURE
55h/01h	D O BK	SYSTEM BUFFER FULL
55h/02h	DTLPWROMAE K	INSUFFICIENT RESERVATION RESOURCES
55h/03h	DTLPWROMAE K	INSUFFICIENT RESOURCES
55h/04h	DTLPWROMAE K	INSUFFICIENT REGISTRATION RESOURCES
55h/05h	DT PWROMAEBK	INSUFFICIENT ACCESS CONTROL RESOURCES
55h/06h	DT WROM B	AUXILIARY MEMORY OUT OF SPACE
55h/07h	F	QUOTA ERROR
57h/00h	R	UNABLE TO RECOVER TABLE-OF-CONTENTS
58h/00h	O	GENERATION DOES NOT EXIST
59h/00h	O	UPDATED BLOCK READ
5Ah/00h	DTLPWROM BK	OPERATOR REQUEST OR STATE CHANGE INPUT
5Ah/01h	DT WROM BK	OPERATOR MEDIUM REMOVAL REQUEST
5Ah/02h	DT WRO A BK	OPERATOR SELECTED WRITE PROTECT
5Ah/03h	DT WRO A BK	OPERATOR SELECTED WRITE PERMIT
5Bh/00h	DTLPWROM K	LOG EXCEPTION
5Bh/01h	DTLPWROM K	THRESHOLD CONDITION MET
5Bh/02h	DTLPWROM K	LOG COUNTER AT MAXIMUM
5Bh/03h	DTLPWROM K	LOG LIST CODES EXHAUSTED
5Ch/00h	D O	RPL STATUS CHANGE
5Ch/01h	D O	SPINDLES SYNCHRONIZED
5Ch/02h	D O	SPINDLES NOT SYNCHRONIZED
5Dh/00h	DTLPWROMAEBKVF	FAILURE PREDICTION THRESHOLD EXCEEDED
5Dh/01h	R B	MEDIA FAILURE PREDICTION THRESHOLD EXCEEDED
5Dh/02h	R	LOGICAL UNIT FAILURE PREDICTION THRESHOLD EXCEEDED
5Dh/03h	R	SPARE AREA EXHAUSTION PREDICTION THRESHOLD EXCEEDED
5Dh/10h	D B	HARDWARE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/11h	D B	HARDWARE IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/12h	D B	HARDWARE IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/13h	D B	HARDWARE IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/14h	D B	HARDWARE IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/15h	D B	HARDWARE IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/16h	D B	HARDWARE IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/17h	D B	HARDWARE IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/18h	D B	HARDWARE IMPENDING FAILURE CONTROLLER DETECTED
5Dh/19h	D B	HARDWARE IMPENDING FAILURE THROUGHPUT PERFORMANCE

5Dh/1Ah	D	B	HARDWARE IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/1Bh	D	B	HARDWARE IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/1Ch	D	B	HARDWARE IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/20h	D	B	CONTROLLER IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/21h	D	B	CONTROLLER IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/22h	D	B	CONTROLLER IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/23h	D	B	CONTROLLER IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/24h	D	B	CONTROLLER IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/25h	D	B	CONTROLLER IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/26h	D	B	CONTROLLER IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/27h	D	B	CONTROLLER IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/28h	D	B	CONTROLLER IMPENDING FAILURE CONTROLLER DETECTED
5Dh/29h	D	B	CONTROLLER IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/2Ah	D	B	CONTROLLER IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/2Bh	D	B	CONTROLLER IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/2Ch	D	B	CONTROLLER IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/30h	D	B	DATA CHANNEL IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/31h	D	B	DATA CHANNEL IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/32h	D	B	DATA CHANNEL IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/33h	D	B	DATA CHANNEL IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/34h	D	B	DATA CHANNEL IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/35h	D	B	DATA CHANNEL IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/36h	D	B	DATA CHANNEL IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/37h	D	B	DATA CHANNEL IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/38h	D	B	DATA CHANNEL IMPENDING FAILURE CONTROLLER DETECTED

5Dh/39h	D	B	DATA CHANNEL IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/3Ah	D	B	DATA CHANNEL IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/3Bh	D	B	DATA CHANNEL IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/3Ch	D	B	DATA CHANNEL IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/40h	D	B	SERVO IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/41h	D	B	SERVO IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/42h	D	B	SERVO IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/43h	D	B	SERVO IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/44h	D	B	SERVO IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/45h	D	B	SERVO IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/46h	D	B	SERVO IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/47h	D	B	SERVO IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/48h	D	B	SERVO IMPENDING FAILURE CONTROLLER DETECTED
5Dh/49h	D	B	SERVO IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/4Ah	D	B	SERVO IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/4Bh	D	B	SERVO IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/4Ch	D	B	SERVO IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/50h	D	B	SPINDLE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/51h	D	B	SPINDLE IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/52h	D	B	SPINDLE IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/53h	D	B	SPINDLE IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/54h	D	B	SPINDLE IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/55h	D	B	SPINDLE IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/56h	D	B	SPINDLE IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/57h	D	B	SPINDLE IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/58h	D	B	SPINDLE IMPENDING FAILURE CONTROLLER DETECTED
5Dh/59h	D	B	SPINDLE IMPENDING FAILURE THROUGHPUT PERFORMANCE

5Dh/5Ah	D B	SPINDLE IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/5Bh	D B	SPINDLE IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/5Ch	D B	SPINDLE IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/60h	D B	FIRMWARE IMPENDING FAILURE GENERAL HARD DRIVE FAILURE
5Dh/61h	D B	FIRMWARE IMPENDING FAILURE DRIVE ERROR RATE TOO HIGH
5Dh/62h	D B	FIRMWARE IMPENDING FAILURE DATA ERROR RATE TOO HIGH
5Dh/63h	D B	FIRMWARE IMPENDING FAILURE SEEK ERROR RATE TOO HIGH
5Dh/64h	D B	FIRMWARE IMPENDING FAILURE TOO MANY BLOCK REASSIGNS
5Dh/65h	D B	FIRMWARE IMPENDING FAILURE ACCESS TIMES TOO HIGH
5Dh/66h	D B	FIRMWARE IMPENDING FAILURE START UNIT TIMES TOO HIGH
5Dh/67h	D B	FIRMWARE IMPENDING FAILURE CHANNEL PARAMETRICS
5Dh/68h	D B	FIRMWARE IMPENDING FAILURE CONTROLLER DETECTED
5Dh/69h	D B	FIRMWARE IMPENDING FAILURE THROUGHPUT PERFORMANCE
5Dh/6Ah	D B	FIRMWARE IMPENDING FAILURE SEEK TIME PERFORMANCE
5Dh/6Bh	D B	FIRMWARE IMPENDING FAILURE SPIN-UP RETRY COUNT
5Dh/6Ch	D B	FIRMWARE IMPENDING FAILURE DRIVE CALIBRATION RETRY COUNT
5Dh/FFh	DTLPWROMAEBKVF	FAILURE PREDICTION THRESHOLD EXCEEDED (FALSE)
5Eh/00h	DTLPWRO A K	LOW POWER CONDITION ON
5Eh/01h	DTLPWRO A K	IDLE CONDITION ACTIVATED BY TIMER
5Eh/02h	DTLPWRO A K	STANDBY CONDITION ACTIVATED BY TIMER
5Eh/03h	DTLPWRO A K	IDLE CONDITION ACTIVATED BY COMMAND
5Eh/04h	DTLPWRO A K	STANDBY CONDITION ACTIVATED BY COMMAND
5Eh/41h	B	POWER STATE CHANGE TO ACTIVE
5Eh/42h	B	POWER STATE CHANGE TO IDLE
5Eh/43h	B	POWER STATE CHANGE TO STANDBY
5Eh/45h	B	POWER STATE CHANGE TO SLEEP
5Eh/47h	BK	POWER STATE CHANGE TO DEVICE CONTROL
60h/00h		LAMP FAILURE
61h/00h		VIDEO ACQUISITION ERROR
61h/01h		UNABLE TO ACQUIRE VIDEO
61h/02h		OUT OF FOCUS
62h/00h		SCAN HEAD POSITIONING ERROR
63h/00h	R	END OF USER AREA ENCOUNTERED ON THIS TRACK
63h/01h	R	PACKET DOES NOT FIT IN AVAILABLE SPACE

64h/00h	R	ILLEGAL MODE FOR THIS TRACK
64h/01h	R	INVALID PACKET SIZE
65h/00h	DTLPWROMAEBKVF	VOLTAGE FAULT
66h/00h		AUTOMATIC DOCUMENT FEEDER COVER UP
66h/01h		AUTOMATIC DOCUMENT FEEDER LIFT UP
66h/02h		DOCUMENT JAM IN AUTOMATIC DOCUMENT FEEDER
66h/03h		DOCUMENT MISS FEED AUTOMATIC IN DOCUMENT FEEDER
67h/00h	A	CONFIGURATION FAILURE
67h/01h	A	CONFIGURATION OF INCAPABLE LOGICAL UNITS FAILED
67h/02h	A	ADD LOGICAL UNIT FAILED
67h/03h	A	MODIFICATION OF LOGICAL UNIT FAILED
67h/04h	A	EXCHANGE OF LOGICAL UNIT FAILED
67h/05h	A	REMOVE OF LOGICAL UNIT FAILED
67h/06h	A	ATTACHMENT OF LOGICAL UNIT FAILED
67h/07h	A	CREATION OF LOGICAL UNIT FAILED
67h/08h	A	ASSIGN FAILURE OCCURRED
67h/09h	A	MULTIPLY ASSIGNED LOGICAL UNIT
67h/0Ah	DTLPWROMAEBKVF	SET TARGET PORT GROUPS COMMAND FAILED
68h/00h	A	LOGICAL UNIT NOT CONFIGURED
69h/00h	A	DATA LOSS ON LOGICAL UNIT
69h/01h	A	MULTIPLE LOGICAL UNIT FAILURES
69h/02h	A	PARITY/DATA MISMATCH
6Ah/00h	A	INFORMATIONAL, REFER TO LOG
6Bh/00h	A	STATE CHANGE HAS OCCURRED
6Bh/01h	A	REDUNDANCY LEVEL GOT BETTER
6Bh/02h	A	REDUNDANCY LEVEL GOT WORSE
6Ch/00h	A	REBUILD FAILURE OCCURRED
6Dh/00h	A	RECALCULATE FAILURE OCCURRED
6Eh/00h	A	COMMAND TO LOGICAL UNIT FAILED
6Fh/00h	R	COPY PROTECTION KEY EXCHANGE FAILURE - AUTHENTICATION FAILURE
6Fh/01h	R	COPY PROTECTION KEY EXCHANGE FAILURE - KEY NOT PRESENT
6Fh/02h	R	COPY PROTECTION KEY EXCHANGE FAILURE - KEY NOT ESTABLISHED
6Fh/03h	R	READ OF SCRAMBLED SECTOR WITHOUT AUTHENTICATION
6Fh/04h	R	MEDIA REGION CODE IS MISMATCHED TO LOGICAL UNIT REGION
6Fh/05h	R	DRIVE REGION MUST BE PERMANENT/REGION RESET COUNT ERROR
70h/NNh	T	DECOMPRESSION EXCEPTION SHORT ALGORITHM ID OF NN
71h/00h	T	DECOMPRESSION EXCEPTION LONG ALGORITHM ID
72h/00h	R	SESSION FIXATION ERROR
72h/01h	R	SESSION FIXATION ERROR WRITING LEAD-IN
72h/02h	R	SESSION FIXATION ERROR WRITING LEAD-OUT

72h/03h	R	SESSION FIXATION ERROR - INCOMPLETE TRACK IN SESSION
72h/04h	R	EMPTY OR PARTIALLY WRITTEN RESERVED TRACK
72h/05h	R	NO MORE TRACK RESERVATIONS ALLOWED
73h/00h	R	CD CONTROL ERROR
73h/01h	R	POWER CALIBRATION AREA ALMOST FULL
73h/02h	R	POWER CALIBRATION AREA IS FULL
73h/03h	R	POWER CALIBRATION AREA ERROR
73h/04h	R	PROGRAM MEMORY AREA UPDATE FAILURE
73h/05h	R	PROGRAM MEMORY AREA IS FULL
73h/06h	R	RMA/PMA IS ALMOST FULL

A.5 SATA ASC/ASCQ Codes

/* These are the additional sense codes used by the sata low level driver */

```
typedef enum
{
SATA_ASC_NO_SENSE = 0x00,
SATA_ASC_CAUSE_NOT_REPORTABLE = 0x04,
SATA_ASC_UNC_MEDIA_ERROR = 0x11,
SATA_ASC_INVALID_OPCODE = 0x20,
SATA_ASC_LBA_TOO_BIG = 0x21,
SATA_ASC_INVALID_CDB_FIELD = 0x24,
SATA_ASC_INVALID_PARAMETER = 0x26,
SATA_ASC_INTERNAL_TARGET_FAILURE = 0x44,
SATA_ASC_SELECTION_TIMEOUT = 0x45,
SATA_ASC_PARITY_ERROR = 0x47,
SATA_ASC_BUFFER_SIZE_MISMATCH = 0x4B,
SATA_ASC_DRIVE_NOT_SIGNED = 0x88,
SATA_ASC_COMMAND_LOCK_VIOLATION = 0x91,
SATA_ASC_MEDIUM_NOT_PRESENT = 0x3A,
SATA_ASC_VENDOR_UNIQUE = 0xE1,
} SataASC_t;
/* ASCQ codes for sata driver unique errors */
typedef enum
{
SATA_ASCQ_VU_PCI_MASTER_ABORT_CDB = 0x00,
SATA_ASCQ_VU_FINAL_CRC_RETRY_FAILED = 0x01,
SATA_ASCQ_VU_EXCESS_PRD_TABLE = 0x02,
SATA_ASCQ_VU_DEFICIENT_PRD_TABLE = 0x03,
SATA_ASCQ_VU_ATA_COMMAND_ERROR = 0x04,
SATA_ASCQ_VU_PCI_BUS_ERROR_DMA = 0x05,
SATA_ASCQ_VU_UNKNOWN_ERROR = 0x06,
SATA_ASCQ_VU_DSTRW_NOT_FOUND = 0x07,
SATA_ASCQ_VU_CONTROL_IOCTL_RELEASE = 0x08,
SATA_ASCQ_VU_IOCTL_DST_RELEASE = 0x09,
SATA_ASCQ_VU_IOS_RELEASE = 0x0A,
SATA_ASCQ_VU_IOS_NOTIFY_CALLER = 0x0B,
SATA_ASCQ_VU_ABORT_ACK_INTERRUPT = 0x0C,
SATA_ASCQ_VU_HDD_SILENT_CDB_ABORT = 0x0D,
SATA_ASCQ_VU_HDD_RELEASE_BUF = 0x0E,
SATA_ASCQ_VU_RETRY_ATA_ERROR_ABORT = 0x0F,
SATA_ASCQ_VU_PATH_CONTROLLER_FAULT = 0x10,
SATA_ASCQ_VU_WRITE_SIGNATURE_FAILED = 0x11,
} SataVuAscq_t;
```

Subject Index – Volume 1

A

acsAutoCodeSync · 27
 appware
 version · 30, 70
arrayPrint · 12, 25
arrayPrintSummary · 12, 26, 70
 avtHostShow · 46

B

Bad blocks · 57
 bootware
 version · 30, 70

C

cache commands
 cacheAnalyze · 27
 cacheAnalyze · 27
 ccmStateAnalyze · 28
 cfgConfigVdisk · 54
 cfgDd · 24
cfgDelVdisk · 12, 24
cfgFailDrive · 12, 24
 cfgMarkDriveHotSpare · 56
cfgPbDev · 12, 13, 53
cfgPh · 12, 13, 53
cfgPhy · 12, 14, 55
cfgPhydevAll · 14
 cfgPhyList · 16
cfgPhyList · 12
cfgPrepareDrive · 12, 24, 53
 cfgRefreshVdisk · 24
 cfgRemoveHotSpare · 56
cfgReplaceDrive · 12, 24, 53
cfgSetDevOper · 12, 24, 53
 cfgSetReconParams · 56
cfgShow · 12, 23
 cfgSundTab · 23
cfgUnit · 12, 16, 53
cfgUnitList · 12, 19
 cfgWipe1 · 55
 ch · 93
 chall · 93
 chall 4 · 98
 Controller Flags · 29

D

Dead Volume · 53

Debug · 13
 deleteHostPort · 54
 drive capacity · 98, 103
 Drive Flags · 16
 Drive State Values · 15
 Drive Status Values · 13, 15
dstDebugExecCDB · 58
 dstEnablePrintDriveSense · 57

E

eelPrintfs · 57
 ETHERNET (IP) ADDRESS · 59

F

fc · 60
 fc 1 · 78
 fc 10 · 67
 fc 10,10,3 · 68
 fc 100 · 72
 fc 101 · 73
 fc 111 · 73, 74, 97
 fc 12 · 70
 fc 2 · 61
 fc 20 · 70
 fc 3 · 64
 fc 5 · 64
 fc 6 · 65
 fc 7 · 66
 fc 8 · 66
 fc 90 · 71
 fc 91 · 72
 fc commands · 60
 fcAll · 73, 78, 93
 fcAll 10 · 78
 fcAll 100 · 78
 fcAll 101 · 78
 fcAll 102 · 78
 fcAll 103 · 78
 fcAll 110 · 78
 fcAll 112 · 78
 fcAll 13 · 78
 fcAll 2 · 78
 fcAll 20 · 78
 fcAll 3 · 78
 fcAll 43 · 78
 fcAll 49 · 78
 fcAll 6 · 78
 fcAll 8 · 78
 fcAll 90 · 57
 fcChip · 54, 60
 fcDevs 1 · 78
 fcDevs 10 · 83
 fcDevs 11 · 84, 90, 105

fcDevs 12 · 89, 90
 fcDevs 13 · 89, 90
 fcDevs 14 · 90
 fcDevs 2 · 79, 90, 97, 98
 fcDevs 3 · 80, 90, 97
 fcDevs 4 · 81, 90, 94, 95
 fcDevs 5 · 82, 90
 fcDevs 6 · 83, 90
 fcDevs 7 · 83, 90
 fcDevs 8 · 83
 fcDevs 9 · 83
 fcDevs commands · 78
 fcDump · 78
 fcHosts · 74
 fcHosts 1 · 97
 fcN · 103
 fcNames · 72, 73, 74
 fcChannelReport · 106
 fcCMClearCounts · 106
 fcRIs · 105
 fcShow · 103, 104
 fcShow 11 · 84, 105
 fcSend · 54
 fcTail commands · 74
 Fibre Channel · 59
 Cables · 59
 commands · 60
 debugging problems · 59
 firmware
 version · 30, 70
 Flags
 Drive Flags · 16
 LUN Configuration Flags · 18
 LUN Flags · 17

G

getObjectGraph_MT 8 · 35
ghsList · 12, 19
 Global Hot Spare · 19, 56
 Global User Config Region · 13

H

hdd · 57, 99, 103
 hddDump · 90
 hddEnablePrintDriveSense · 57
 hids · 99
 hids 'h' · 100
 hids 1 · 99
 hids 104 · 100
 hids 1-8 · 103
 hids 2 · 101
 hids 32 · 101
 hids 77 · 102

Host Port · 53

I

i · 13
I · 13
 iditn · 95
 iditnall · 95
 iditnall 4 · 98
 incrementCfgGenerationNumber · 24
 ionHelp · 91
 ionShow 11 · 95
 ionShow 12 · 98
 ionShow 99 · 98
 ionShowInquiry · 97
 iopPerfMonRestart · 71
 isp · 24

L

lu · 94
 luall · 94
 luall 4 · 98
 LUN Configuration Flags · 18
 LUN Flags · 17
 LUN State Values · 16

M

m · 57
 Media Scan · 56
 MEL · 53, 54
 memoryShow · 29
 memShow · 29
 mhmPrintFredStatus · 45
 mhmPrintPeanutStatus · 45
 moduleList · 30, 70, 78
 moduleShow · 32
 mon · 56

N

netCfgSet · 46
 netCfgShow · 46
 NVSRAM · 55
 NVSRAM FA Log Region · 13

P

printBatteryAge · 13

R

rdacMgrAltCtlFail · 12, 27
rdacMgrAltCtlReset · 27, 55
rdacMgrAltCtlResetRelease · 12, 27
rdacMgrSetModeActivePassive · 12, 27
rdacMgrSetModeDualActive · 12, 27
reboot · 13
 reboot controller · 27
 resetDriveIdentify · 56
 RLS · 84
rpaGetBatteryAge · 13

S

safeSysWipe · 13
 sasHelp · 107
 sasShowAllExpanders · 111
 sasShowChannels · 108
 sasShowDevices · 109
 sasShowExpanders · 110
 sasShowMiswires · 108
 sasShowPhyErrStats · 108
 setDriveIdentify · 56
 shell commands
 password · 11
 starting the shell · 11

showEnclosures · 13
 showMajorEvents · 54
 SNAP
 version · 30
 SNAP version · 70
 SPM · 58
 spmClearDatabase · 58
 spmShow · 32, 53
 spmShowMaps · 34
 ssmAudibleAlarm · 116
 ssmHelp · 111
 ssmIdentifyDrive · 116
 ssmShow · 113
 ssmShowEnclosures · 114
 Storage Partition Management · 58
 svlShow · 45
sysReboot · 13
sysWipe · 13
sysWipeZero · 13

T

tditn · 97
 tditnall · 97
 tditnall 4 · 98
 Tracing · 57

V

vdAll · 12, 20
 vdReconFixURE · 58
vdShow · 12, 20
 VKI_EDIT_OPTIONS · 51
 VKI_KMZALLOC · 57
 VOLUME Flags · 29

W

Watchdog timer · 59
 writeZerosFlag · 51

Subject Index – Volume 2

A

arrayPrintSummary · 41

B

battery
 expired
 during boot sequence · 6

C

cemStateAnalyze · 41
 cfgPh · 41
 cfgPhy · 41
 cfgShow · 41
 cfgUnitList · 41
 clearEnclosuresPage81 · 11
 Clk Avg · 8
 conAtt count · 8
 Conn Attmpt · 8
 controller
 heartbeat · 5
 led · 5
 CRC Count · 8
 CRCEC · 8
 CRCErr count · 8

F

fcDump · 41

G

ghsList · 41

H

hddDump · 41
 Held Off · 8

hldOff count · 8
 Hub Mode · 9

I

ins count · 7
 ionShow 99 · 41

L

LCC · 8
 LED
 start of day pattern · 5, 6
 swapped controllers · 5
 loop state · 8
 Loop Up Cnt · 8
 loopCy count · 8
 loopUp count · 8
 LS · 8
 LUC · 8

M

moduleList · 41

N

Num LIP · 8

O

OPM · 8
 OSEC · 8
 OSErr count · 8

P

PCAC · 8
 PCHOC · 8
 PIC · 7
 Port Mode · 8

Port Stat · 8
 port state · 7
 Port util · 8
 PS · 7
 PUP · 8

R

relFrq count · 8
 RFDEA · 8
 RM Log · 45, 46

S

Segmented Mode · 9
 Serial Port · 41
 sfpTreeModeMap · 7
 showEnclosuresPage81 · 10, 14, 15
 SOC Num · 8
 SOC Port · 8
 socClearSYMBOLErrorStats · 11
 socInHubMod · 7
 socShow · 11, 13
 String Mode · 9

T

Tree Mode · 9
 tt sodMain · 41
 tt tRAID · 41

U

Util Perc · 8

V

vdAll · 41
 vdShow · 41