

STORAGEWERKS

# SCSI Utility

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## User Guide

**SCSI Utility Development Group, v5.6.8**

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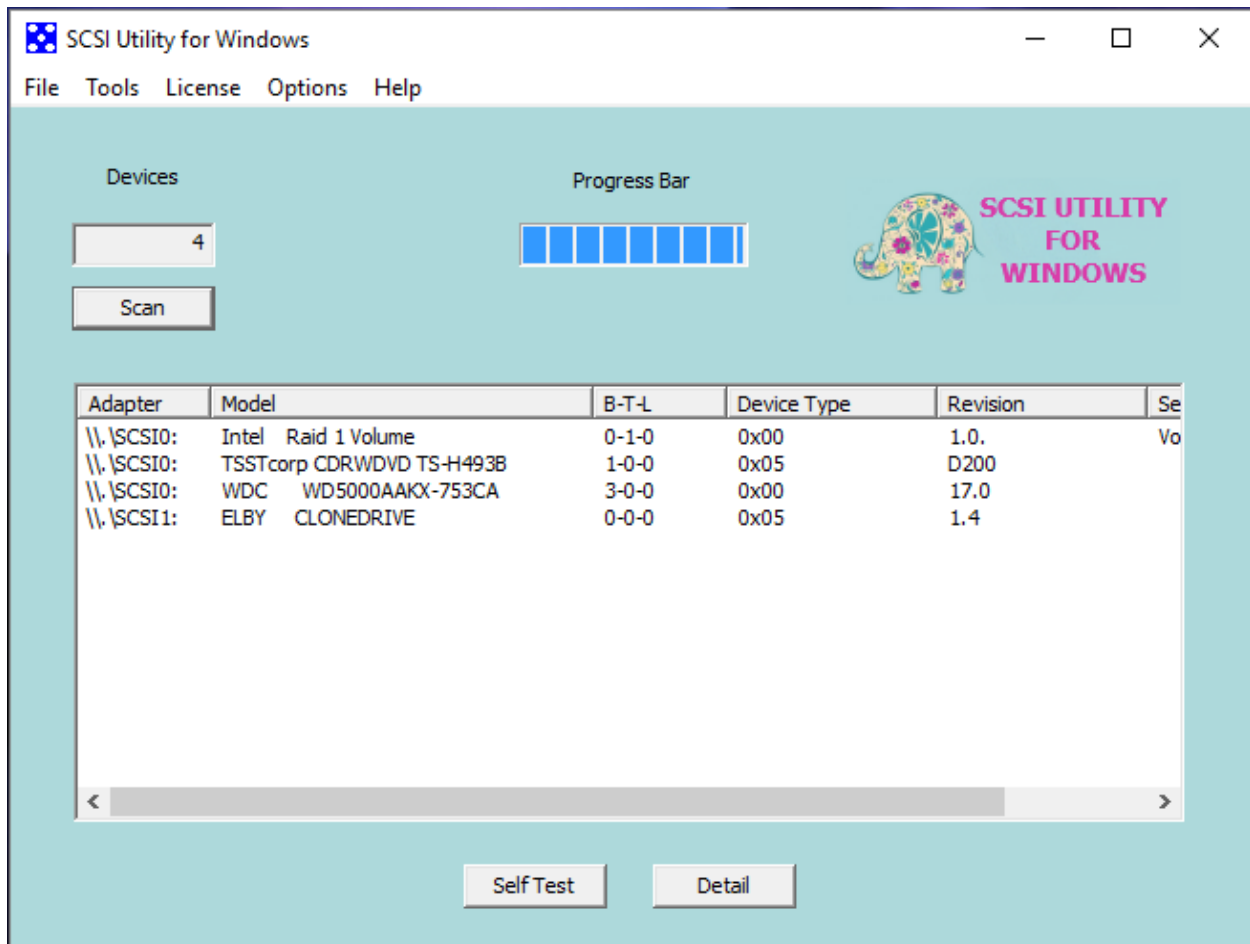
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## Introduction

SCSI Utility (SU) is a general-purpose windows graphical user interface (GUI) application that displays all SCSI, SATA and NVMe devices enumerated by the host. SU is available in a 32-bit version only.

## Screen Shot

The Main Dialog (MD) is shown below:



## Main Dialog Operation

### Menu Items

#### License Import

Locates and opens license file, and registers license enabling SU feature set.

#### License Register

Renews license lease after it expires (only needed when using license server, not needed when using license key)

### **License UnRegister**

Releases a license release on license server.

### **Tools Adapters Information**

Displays the Adapter Information Dialog (AID)

### **Tools Commands Primary INQUIRY VPD Supported Page Codes**

Displays the Inquiry page codes supported by device.

### **Tools Commands Primary INQUIRY VPD View Page Code**

Displays the 255-byte Inquiry data of entered page code.

### **Tools Commands Primary SELF TEST FOREGROUND Short**

Performs foreground short self-test and displays results.

### **Tools Commands Primary SELF TEST FOREGROUND Extended**

Performs foreground extended self-test and displays results.

### **Tools Commands Primary RESERVE (6)**

Performs legacy SPC-2 style Reserve and displays results.

### **Tools Commands Primary RELEASE (6)**

Performs legacy SPC-2 style Release and displays results.

### **Tool Commands Primary CUSTOM**

Displays Custom Command Dialog (CCD)

### **Tools Commands Primary TEST UNIT READY**

Performs test unit ready and displays results.

### **Tools Commands Block READ CAPACITY (16)**

Displays READ Capacity Dialog (RCD) for selected device.

### **Tools SCSI Bus Reset**

Performs SCSI bus reset on selected device.

### **Tools Block Devices Change Sector Size**

Displays Block Size Modification Dialog (BSMD)

### **Tools Block Devices Format Drives**

Displays Format Device Dialog (FDD)

### **Tools All Devices Flash Multiple**

Displays Flash Multiple Device Dialog (FMDD)

### **Tools All Devices Parameters**

Displays Device Parameters Dialog (DPD)

### **Tools All Devices Diagnostics**

Displays Self-Test Device Dialog (STDD)

### **Tools Fibre Channel Statistics**

Displays Fibre Channel Devices Dialog (FCDD)

### **Tools Commands NVMe CUSTOM**

Displays NVMe Custom Command Dialog (NCCD)

### **Tools Commands NVMe FIRMWARE COMMIT**

Displays NVMe Firmware Commit Dialog (NFCD)

### **Tools Commands NVMe TELEMETRY HOST INITIATED [NEW]**

Performs NVMe Get Log Page, Telemetry Host-Initiated and saves results to file.

### **Tools Commands NVMe TELEMETRY HOST INITIATED [OLD]**

Performs NVMe Get Log Page, Telemetry Host-Initiated with Create Telemetry Host-Initiated Data bit set to 1 and saves results to file.

### **Tools Commands ATA Custom**

Displays ATA Custom Command Dialog (ACCD)

### **Tools NVMe Parameters**

Displays the NVMe Device Parameters Dialog (NDPD)

### **Tools NVMe Monitor Health**

Displays the NVMe SMART and Health Monitor Dialog (NSHMD)

## **GUI Items**

### **Devices**

Displays number of SCSI devices enumerated by the host.

### **Scan**

Initiates scan and display of SCSI devices enumerated by the host.

### **Main Device Listing**

Lists the devices enumerated by the host, displaying the following columns:

- Adapter - The SCSI adapter identifier associated with the device; the number of the adapter is equivalent to the SCSI port number.
- Model - The product and model number of the device from Inquiry data
- B-T-L - Bus, target and LUN identifier of device
- Device Type - Device type as defined by Inquiry peripheral qualifier byte.
- Revision – Firmware revision of device.
- Serial Number – Device serial number.

### **Self-Test**

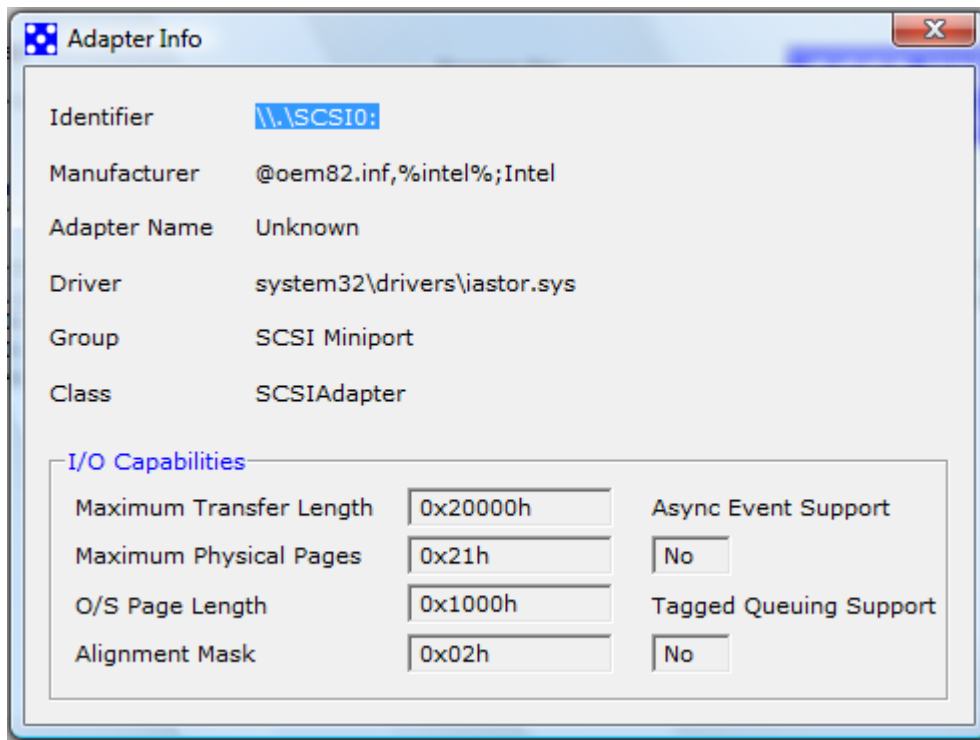
Performs short foreground self-test on selected device.

### **Detail**

Displays SPC-4 style Inquiry data for selected device.

## Adapter Information Dialog (AID)

Displays information on SCSI adapter device is associated with.



### GUI Items

#### Identifier

SCSI adapter associated with device.

#### Manufacturer

SCSI adapter manufacturer

#### Adapter Name

SCSI adapter name

#### Driver

Name and location of adapter driver

#### Group

Adapter driver group classification

#### Class

Adapter class identification

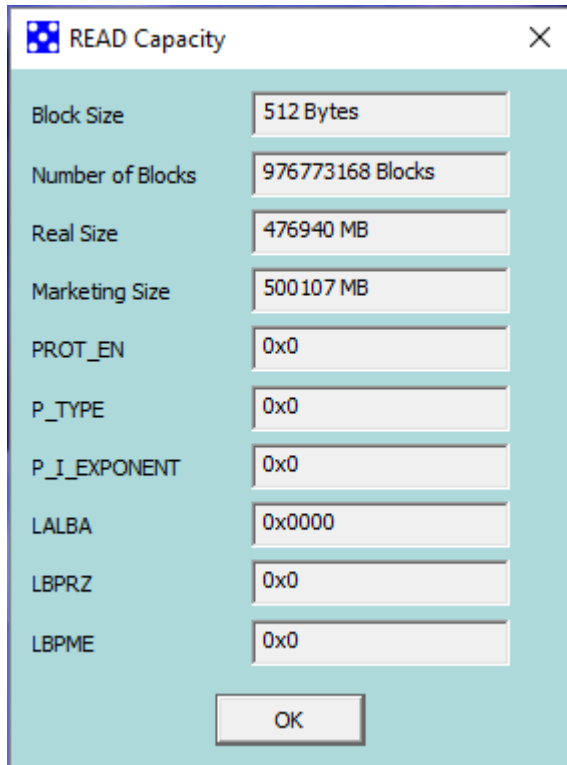
#### I/O Capabilities

- Maximum Transfer Length - Maximum transfer length supported per single SCSI exchange.
- Maximum Physical Pages - Maximum physical pages supported per single SCSI exchange

- O/S Page Length - Virtual memory manager page length
- Alignment Mask - Adapter address alignment requirements
- Async Event Support - Adapter asynchronous event support
- Tagged Queuing Support - Adapter tagged queuing support.

## READ Capacity Dialog (RCD)

Displays information returned in response to READ Capacity Command



The screenshot shows a dialog box titled "READ Capacity" with a close button (X) in the top right corner. The dialog contains several input fields with the following labels and values:

Block Size	512 Bytes
Number of Blocks	976773168 Blocks
Real Size	476940 MB
Marketing Size	500107 MB
PROT_EN	0x0
P_TYPE	0x0
P_I_EXPONENT	0x0
LALBA	0x0000
LBPRZ	0x0
LBPME	0x0

At the bottom center of the dialog is an "OK" button.

## GUI Items

### Block Size

Size of Logical Block Address (LBA) or block

### Number of Blocks

Total number of LBA's or blocks that make up the block device.

### Real Size

Size of block device using base2 numbering (1MiB = 1024KB)

### Marketing Size

Size of block device using base10 numbering (1MB = 1000KB)

**PROT\_EN**

Protection Information format status (0b = not PI formatted, 1b = PI formatted)

**P\_TYPE**

Indicates the type of PI format used (see SBC-3 for more detail)

**P\_I\_EXPONENT**

Indicates the number of protection information intervals placed with each logical block (see SBC-3 for more detail)

**LALBA**

Lowest aligned logical block address (see SBC-3 for more detail)

**LBPRZ**

Logical block provisioning read zeros (see SBC-3 for more detail)

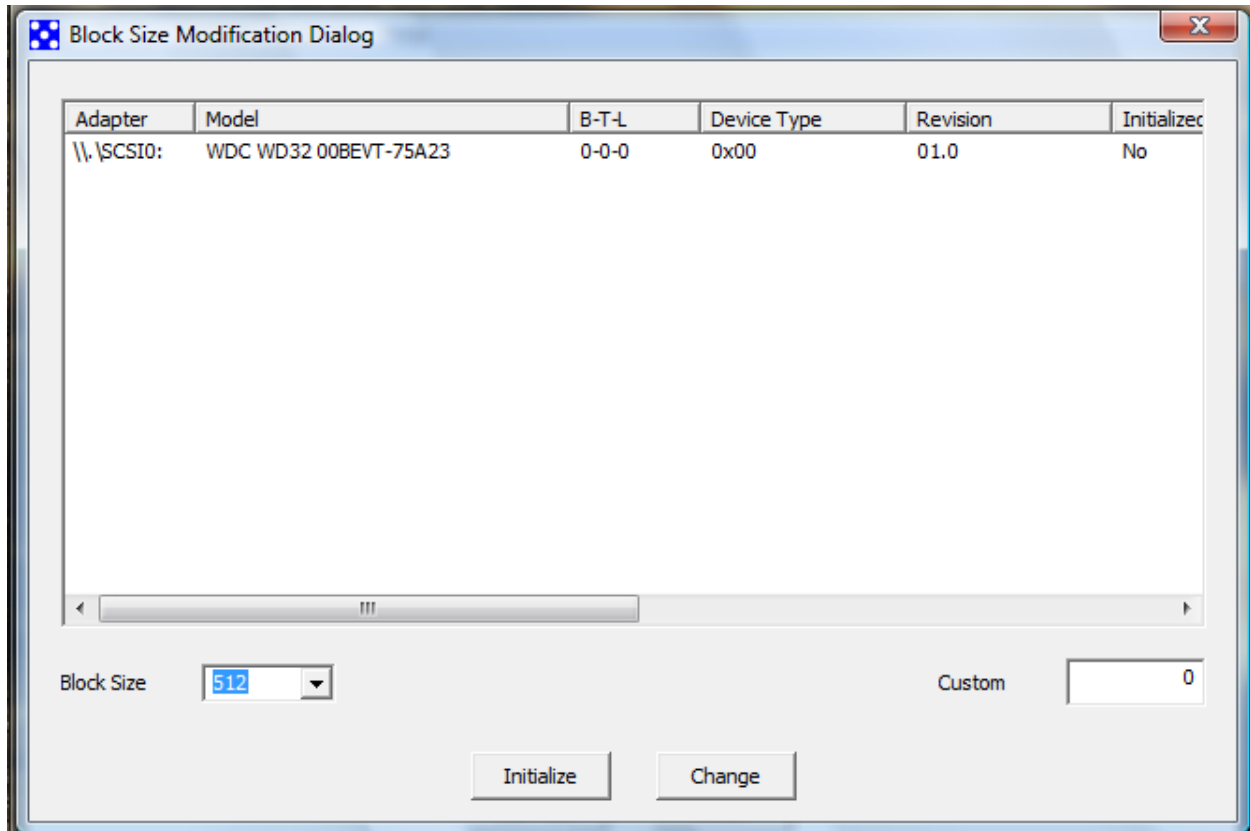
**LBPME**

Logical block provisioning management enabled (see SBC-3 for more detail)



## Block Size Modification Dialog (BSMD)

Dialog used to change the block size of multiple block devices simultaneously. To change block size, the user must select the new block size using, highlight the device(s) to be modified, and selects the Initialize button. If Initialization was successful, user highlights the device(s) to be changed and selects the Change button. After block size is changed, devices must be formatted using the FDD.



## GUI Items

### Device Listing

- Adapter - SCSI adapter associated with device.
- Model - Inquiry product and model strings
- B-T-L - Bus, target and LUN of device
- Device Type - Peripheral qualifier device type byte from Inquiry data
- Revision - Revision string from Inquiry data
- Initialized? - Displays success of initialization step. Yes, means initialization successful, 'No' means initialization has not yet been performed or it was unsuccessful. Default setting is 'No.'
- Formatted Block Size - Reported block size of the device from READ capacity command.
- Number of Blocks - Number of blocks of device from READ capacity command.
- Big Drive? - Did this drive require a 16 byte READ Capacity command? If yes, then this will say 'Yes.' By default, this field will be blank until initialization step is performed.

- Ready for Format? - Displays success or failure of Change step. If change to new block size is successful, this field will say 'Yes.' By default, this field is left blank.
- New Block Size - New block size selected by the user.

### **Block Size**

Dropdown control that allows the user to select the following block sizes: 512B, 520B, 1KiB, 2KiB, 4KiB and Custom.

### **Custom**

If 'Custom' selected in Block Size dropdown control, this text field allows the user to enter the new custom block size

### **Initialize**

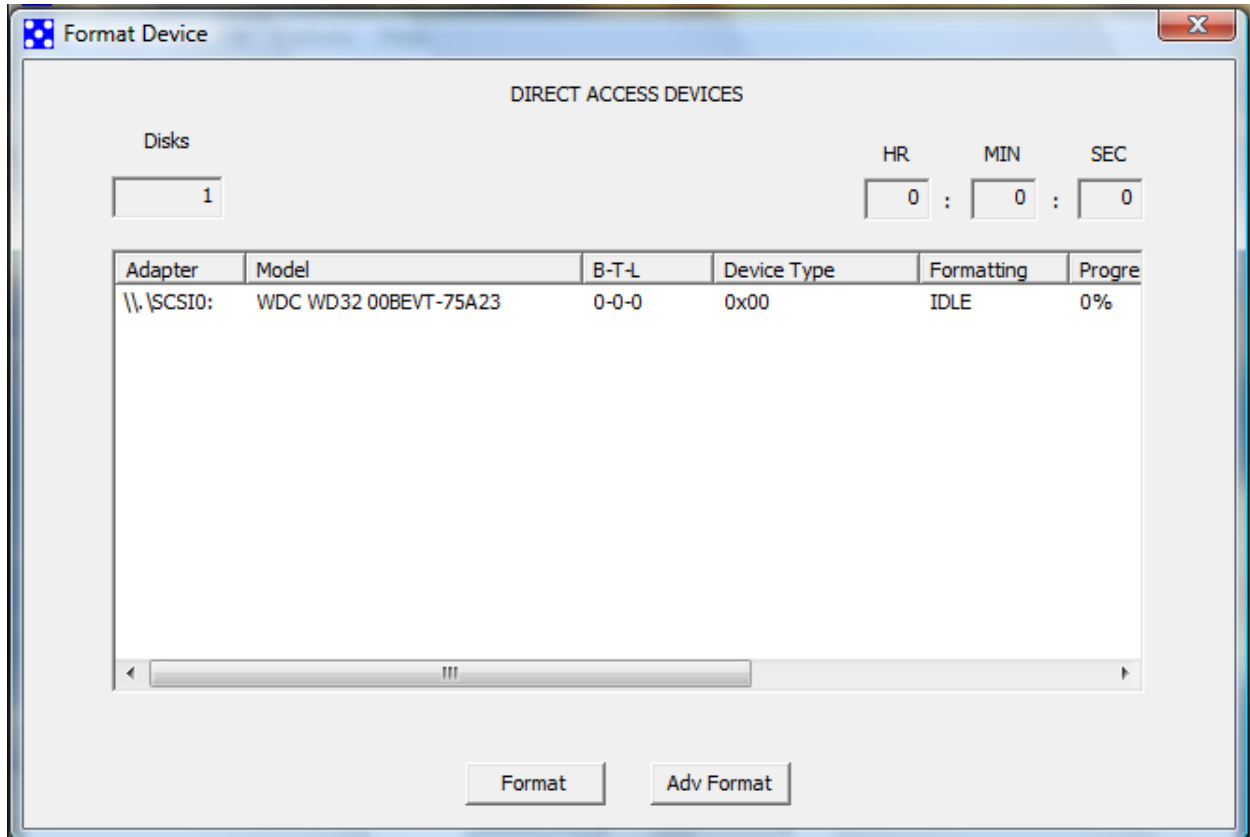
Performs the first step, which is called 'Initialization.'

### **Change**

Perform the second step, which is called 'Change.' Initialization step must be performed first.

## Format Device Dialog (FDD)

SU performs basic format and advanced format operations. For advanced format operations, please refer to the T10 SBC specification. For basic format, SU enables the 'IP' bit and uses 0xFFh as the data pattern for initialization.



## GUI Items

### Disks

The number of block devices displayed in this dialog.

### HR: MIN: SEC

Timer that displays the elapsed time since format was started in hours, minutes and seconds.

### Device Listing

- Adapter - SCSI adapter associated with device.
- Model - Inquiry product and model strings
- B-T-L - Bus, target and LUN of device
- Device Type - Peripheral qualifier device type byte from Inquiry data
- Formatting - Displays the status of the current format operation. Default setting is 'IDLE.'
- Progress - Percentage completion of current format operation
- Status - Final success of format operation. If fail, see Sense Key and ASC/ASCQ fields

- Sense Key - Sense key for format unit failure
- ASC/ASCQ - Additional sense code and additional sense code qualifier of failed format operation

## Format

Begins format operations on highlighted device(s), after format begins, no other devices may be selected, and dialog cannot be exited.

## Adv Format

Displays the Advanced Format Dialog (AFD). Please refer to SBC-4 for detailed operation.

**Advanced Format**

**Command**

FMTPINFO: 00b (type 0) DEFECT LIST FORMAT: 000b (short) FFMT: 00b

☐ LONGLIST ☐ FMTDATA ☐ CMPLIST

**Parameter List Header**

☐ FOV ☐ DPRY ☐ DCRT ☐ STPF ☐ IP ☒ IMMED

PROT FIELD USAGE: 000b P\_I\_INFORMATION: 1 PROT INTERVAL EXP: 0

**Initialization Pattern Descriptor**

IP MODIFIER: 00b INIT PATTERN TYPE: 00h INIT PATTERN LENGTH: 00B

INIT PATTERN: FF ☐ SI

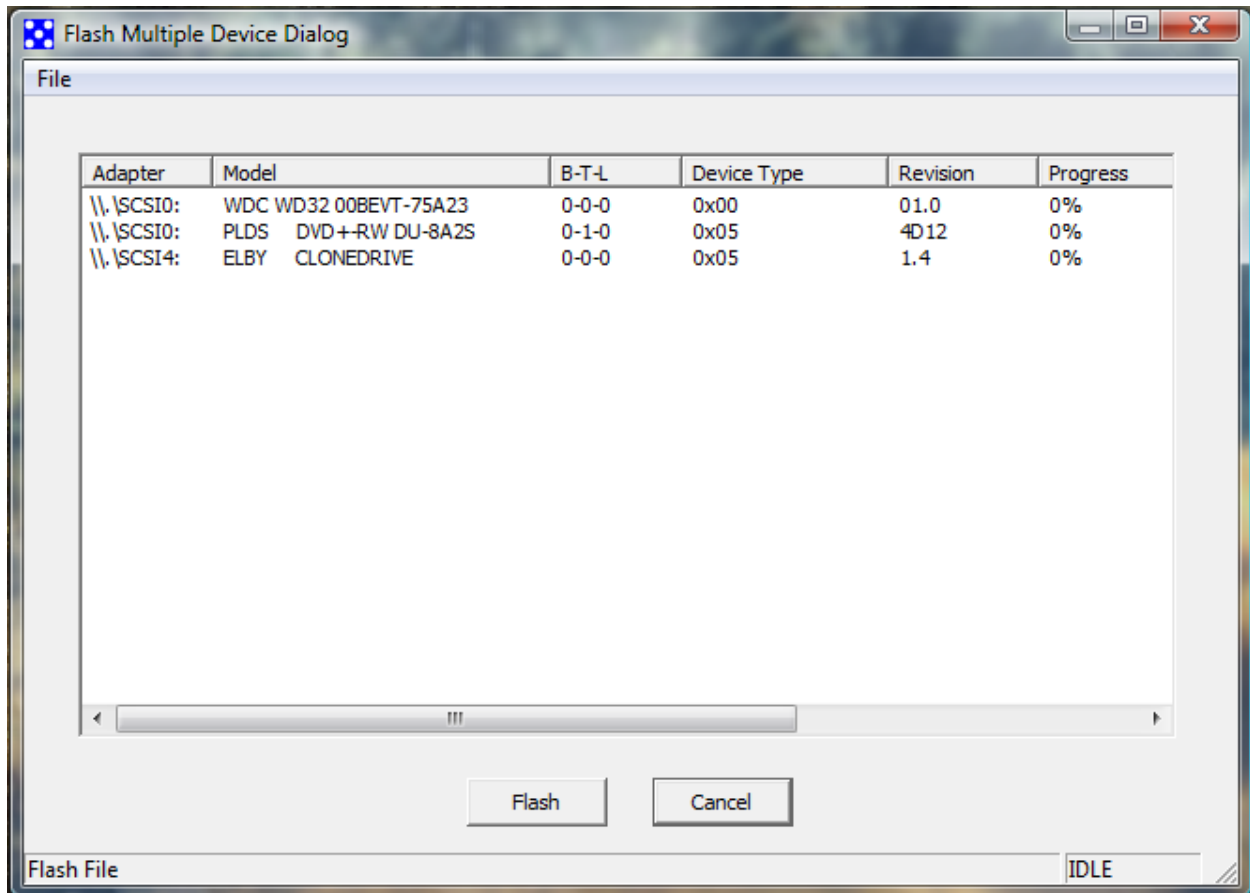
**Defect List**

Create DFL Clear DFLs DFL Count: 0

Cancel OK

## Flash Multiple Device Dialog (FMDD)

The FMDD allows a device to be flashed using well-known variations of the WRITE BUFFER command. NVMe devices are also supported (see NVMe Support section for additional details).



## Menu Items

### File Open

This menu item used to locate and open the flash file.

## GUI Items

### Device Listing

- Adapter - The SCSI adapter identifier associated with the device.
- Model - The product and model number of the device from Inquiry data
- B-T-L - Bus, target and LUN identifier of device
- Device Type - Device type as defined by Inquiry peripheral qualifier byte.
- Revision - Revision from Inquiry data
- Progress - Displays the progress of the flashing operation.
- Status - Displays the status of flashing operation.
- Sense Key - If flashing operation fails, displays the sense key information.

- ASC/ASCQ - If flashing operation fails, displays the additional sense code and additional sense code qualifier.

### **Flash**

Starts the flashing operation with selected file and highlighted device(s), flash file must be previously selected for flashing to begin. Once flash operations begin, the FMDD cannot be exited.

### **Cancel**

Does not cancel flash operation once they begin, exits FMDD if no flash operations are in progress.

### **Flash File Name**

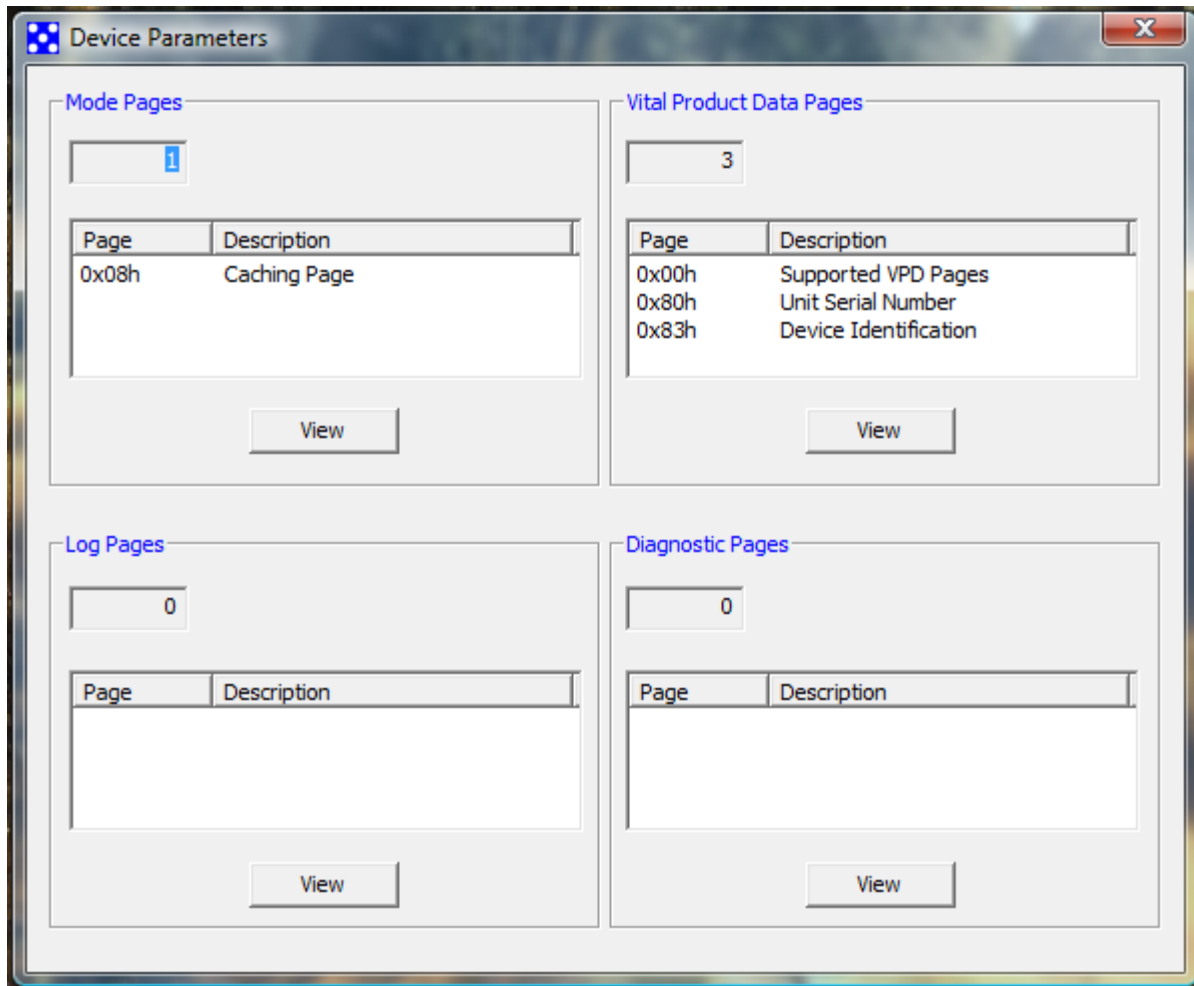
Displays the location and name of flash file selected.

### **Status**

Status of the ongoing flash operations, default is 'IDLE.'

## Device Parameters Dialog (DPD)

Displays the mode pages, log pages, diagnostic pages and vital product data pages supported by the device, if SU supports reporting of page, user may select to view page contents.



## GUI Items

### Mode Pages

Displays the number of pages supported and a listing showing page code and description of page supported, user may highlight a listing in window and select View to view page details.

### Log Pages

Displays the number of pages supported and a listing showing page code and description of page supported, user may highlight a listing in window and select View to view page details.

### Diagnostic Pages

Displays the number of pages supported and a listing showing page code and description of page supported, user may highlight a listing in window and select View to view page details.

### **Vital Product Data Pages**

Displays the number of pages supported and a listing showing page code and description of page supported, user may highlight a listing in window and select View to view page details.



## NVMe Device Parameters Dialog (NDPD)

Displays NVMe log pages, features, namespaces, and Controller Identify supported by the device.

The screenshot shows the 'NVMe Parameters' dialog box with a close button (X) in the top right corner. The dialog is divided into four main sections, each with a title and a 'View' button at the bottom.

- Options**: Located at the top left of the dialog.
- Features**: Contains a numeric input field with the value '0' and a table with two columns: 'Identifier' and 'Description'. Below the table is a 'View' button.
- Identify Active Namespaces**: Contains a numeric input field with the value '1' and a table with four columns: 'ID', 'Size', 'Capacity', and an empty column. The first row shows '1', '0000000...', and '0000000...'. Below the table is a 'View' button.
- Log Pages**: Contains a numeric input field with the value '14' and a table with two columns: 'Identifier' and 'Description'. The first three rows are '0x01h Error Information Page', '0x02h SMART / Health Information Page', and '0x03h Firmware Slot Page'. Below the table is a 'View' button.
- Identify Controller**: Contains several labels and corresponding input fields: 'VID:SSVID', 'Serial Number', 'Model Number', 'Firmware Revision', 'IEEE OUI', 'CMIC', and 'MDTS'. Below these fields is a 'View' button.

### GUI Items

#### Features

Displays the NVMe features supported by the device, user may highlight a listing in window and select View to display feature details.

#### Identify Active Namespaces

Displays the number of active namespaces configured on the device, user may highlight a listing in window and select View to display namespace details.

## Log Pages

Displays the NVMe log pages supported by the device, user may highlight a listing in window and select View to display log page details.

## Identify Controller

Displays some of the major fields associated with the NVMe Identify Controller data, user may highlight a listing in window and select View to display identify controller details.

## Menu Items

### Options -> Generate Report

User will be prompted to select a file location for the report. All NVMe features, log pages, namespaces and identify controller are included in the report.

## Mode Page Dialog (MPD)

This dialog page is displayed when a device is selected in the Mode Page section of DPD.

The screenshot shows the 'Mode Page - Caching Page pc = 08 spc = 00' dialog box. It features a 'Page Control' dropdown set to 'current'. Below this are two sections: 'Save Page' with checkboxes for 'SP' and 'PF' and a 'Save' button; and 'Get Page' with a checked 'DBD' checkbox and a 'Get' button. The main area contains two tables, 'PAGE' and 'MASK', each with columns for 'Byte', 'Data', and 'Ascii'. The 'PAGE' table shows data for bytes 0 through 14, with some values in red and others in blue. The 'MASK' table shows data for bytes 0 through 14, with values in blue. At the bottom are 'OK' and 'Cancel' buttons.

Byte	Data	Ascii
0	00	
1	2A	*
2	00	
3	10	
4	01	
5	00	
6	00	
7	10	
8	00	
9	00	
10	00	
11	00	
12	3A	:
13	38	8
14	60	'

Byte	Data
0	00
1	2A
2	00
3	10
4	01
5	00
6	00
7	10
8	00
9	00
10	00
11	00
12	3A
13	38
14	60

## GUI Items

### Page Control

Dropdown that allows user to select current, changeable, default and saved values.

### Save Page – SP

SP bit in Mode Select Command

### Save Page – PF

PF bit in Mode Select Command

### Save Page – Save

Performs a Mode Select based on page control, save page settings and contents of PAGE buffer.

### Get Page – DBD

Device Block Descriptor bit in Mode Sense Command

### Get Page – Get

Performs a Mode Sense based on get page and page control settings and displays results in PAGE buffer.

## PAGE

Mode Page results of Mode Sense Command (default on dialog open is current mode page results with DBD bit set to one). Red text is mode page header, blue text is device block descriptor and black text is mode page data. All data fields are editable. To edit, user must double click on data cell to be modified.

## MASK

This buffer displays the changeable bit mask associated with give page code and sub-page code. Red text is mode page header, blue text is device block descriptor and black text is mode page data. This buffer is not editable.

## OK

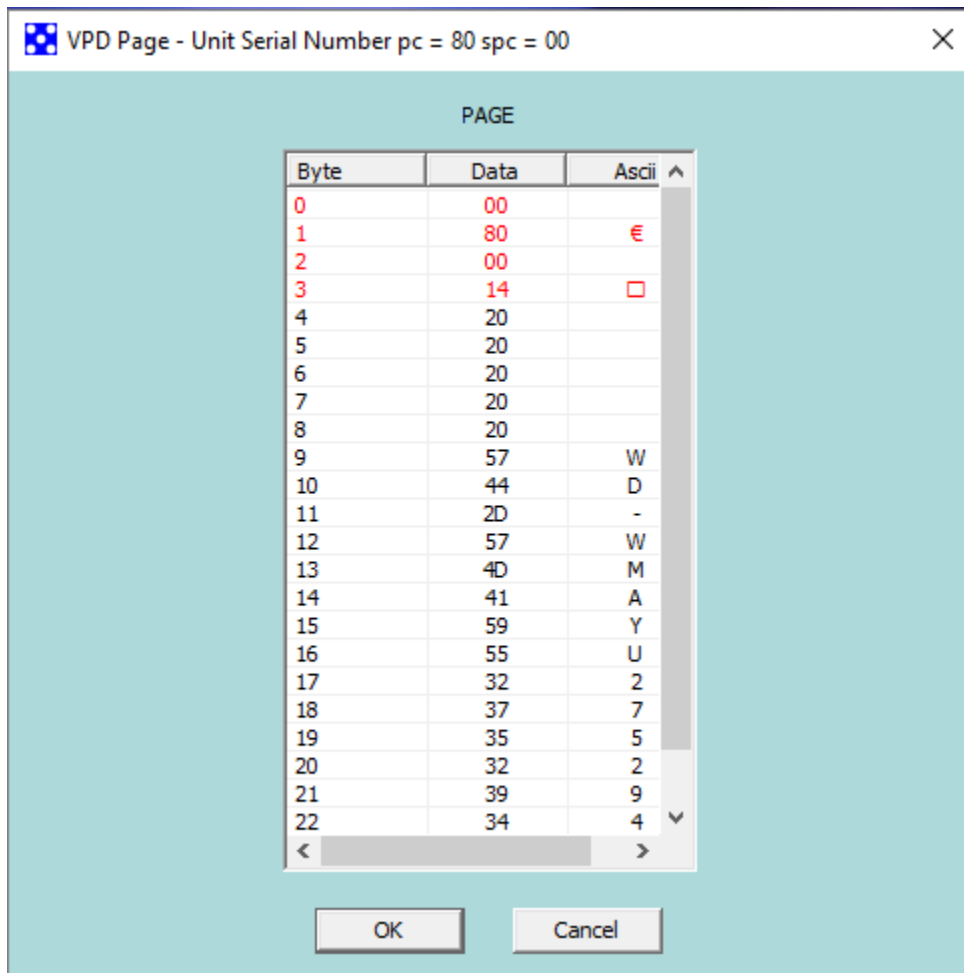
Closes dialog.

## Cancel

Close dialog

## VPD Page Dialog (VPDD)

This dialog page is displayed when a device is selected in the Vital Product Data Pages section of DPD.



## GUI Items

### PAGE

Vital Product Data Page results of Inquiry command with EVPD bit set to one. Red text is VPD page header, and black text is VPD page data.

### OK

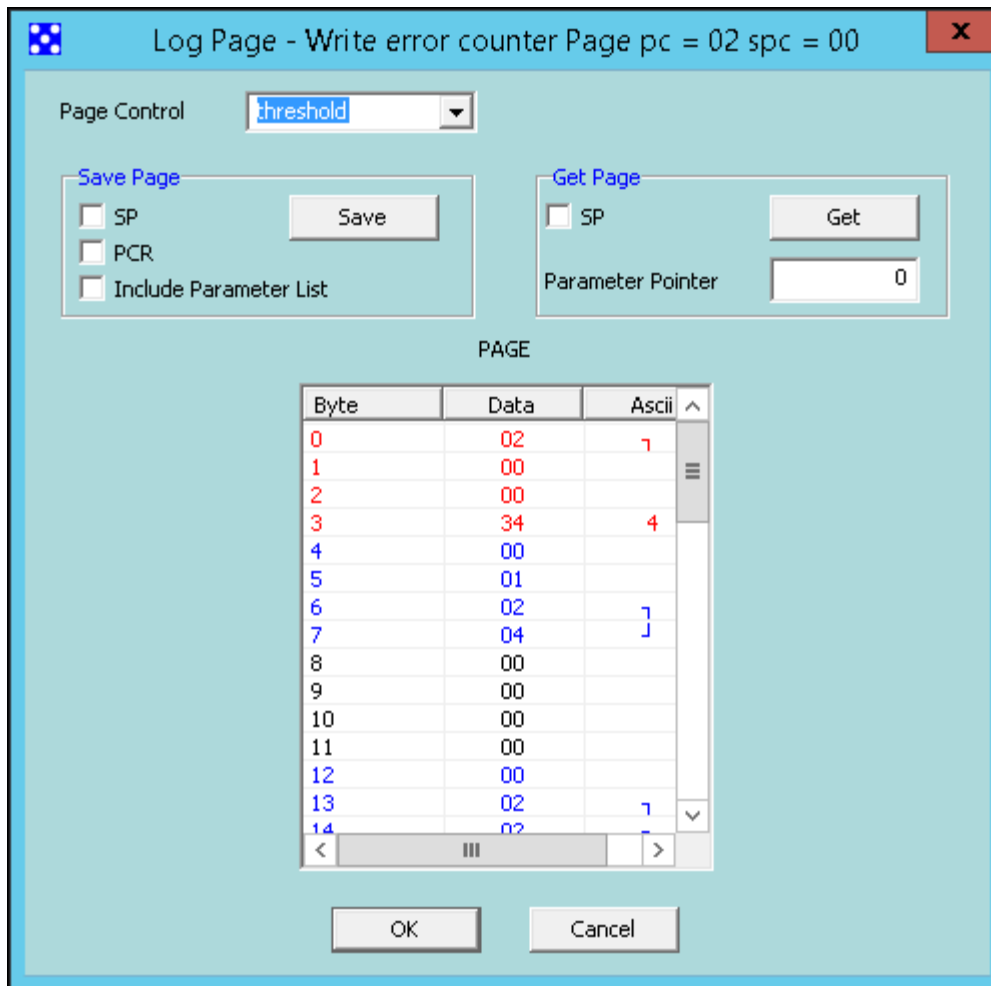
Closes Dialog.

### Cancel

Closes Dialog.

## Log Page Dialog (LPD)

This dialog page is displayed when a device is selected in the Log Page section of DPD.



The screenshot shows the 'Log Page - Write error counter Page pc = 02 spc = 00' dialog. It features a 'Page Control' dropdown set to 'threshold'. There are two sections: 'Save Page' with checkboxes for 'SP', 'PCR', and 'Include Parameter List', and a 'Save' button; and 'Get Page' with a 'Get' button and a 'Parameter Pointer' field set to '0'. Below these is a 'PAGE' table with columns 'Byte', 'Data', and 'Ascii'. The table contains 15 rows of data. At the bottom are 'OK' and 'Cancel' buttons.

Byte	Data	Ascii
0	02	7
1	00	
2	00	
3	34	4
4	00	
5	01	
6	02	7
7	04	7
8	00	
9	00	
10	00	
11	00	
12	00	
13	02	7
14	02	7

## GUI Items

### Page Control

Page Control (PC) field used in Log Sense and Log Select Commands (see SPC-4 for more detail)

### Save Page – SP

SP bit used in Log Select Command (see SPC-4 for more detail)

### Save Page – PCR

PCR bit used in Log Select Command (see SPC-4 for more detail)

### Save Page – Include Parameter List

Contents of PAGE buffer will be sent with Log Select Command (see SPC-4 for more detail)

### Save Page – Save

Sends Log Select Command

### **Get Page – SP**

SP bit used in Log Sense Command (see SPC-4 for more detail)

### **Get Page – Get**

Sends Log Sense Command

### **Get Page – Parameter Pointer**

Page Parameter field used in Log Sense Command (in HEX) (see SPC-4 for more detail)

### **PAGE**

Log Page results of Log Sense Command (default on dialog open is threshold log page results). Red text is log page header, and black text is mode page data. All data fields are editable. To edit, user must double click on data cell to be modified.

### **OK**

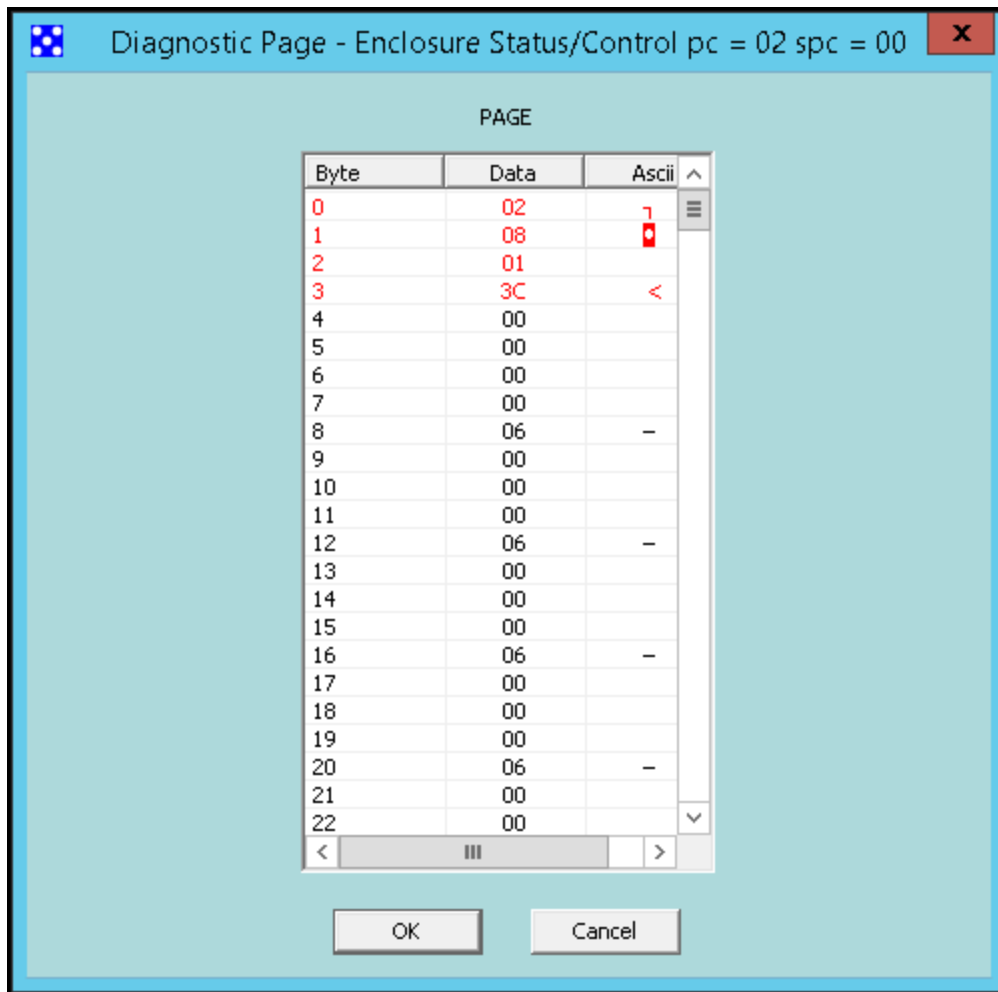
Closes dialog.

### **Cancel**

Closes dialog.

## Diagnostic Page Dialog (DiagPD)

This dialog page is displayed when a device is selected in the Diagnostic Page section of DPD.



### GUI Items

#### PAGE

Diagnostic Page results returned by Receive Diagnostics Command. Red text is diagnostic page header, and black text is parameter data.

#### OK

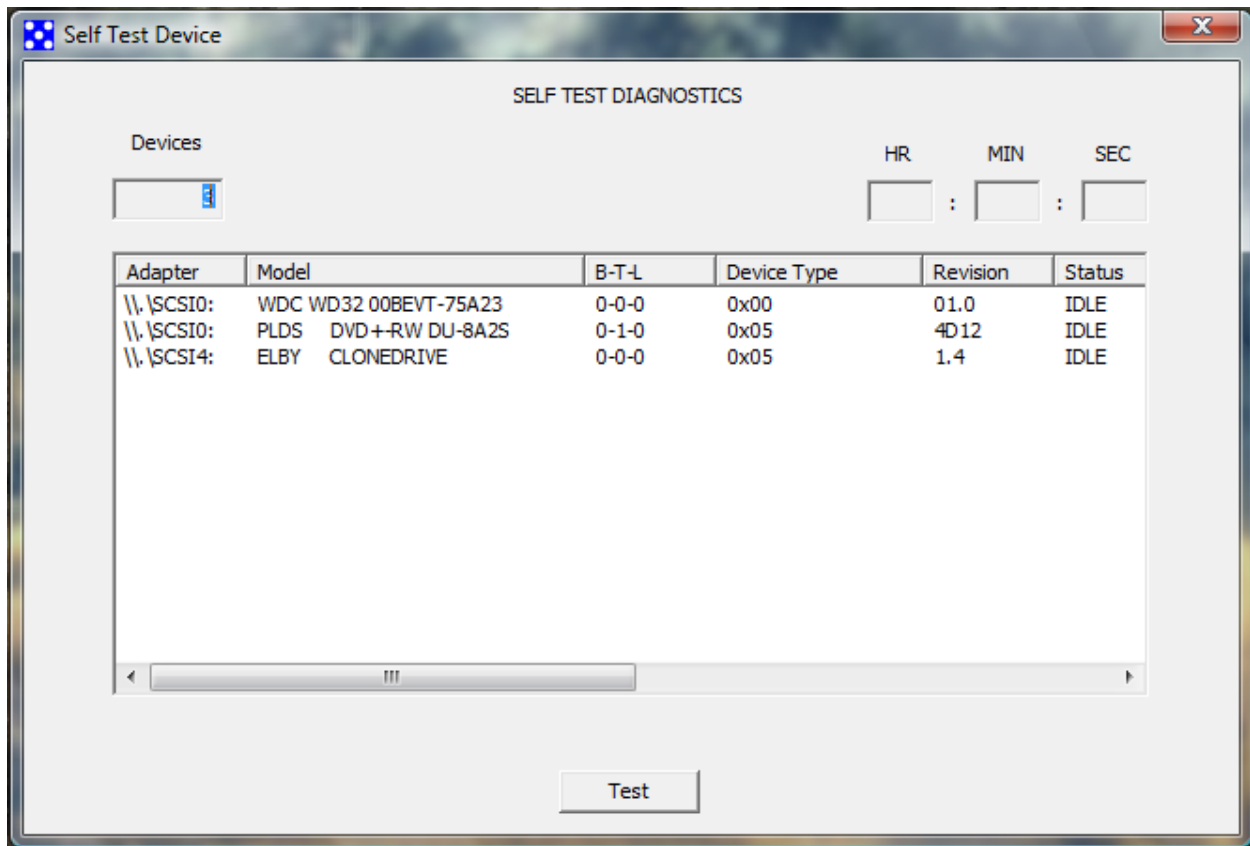
Closes dialog.

#### Cancel

Closes dialog.

## Self-Test Device Dialog (STDD)

This dialog performs the short and extended built-in self-test (BIST) of the one or multiple devices.



### GUI Items

#### Devices

The number of block devices displayed in this dialog.

#### HR: MIN:SEC

Timer that displays the elapsed time since format was started in hours, minutes and seconds

#### Device Listing

- Adapter - SCSI adapter associated with device.
- Model - Inquiry product and model strings
- B-T-L - Bus, target and LUN of device
- Device Type - Peripheral qualifier device type byte from Inquiry data
- Revision - Revision from Inquiry data
- Status - Displays the status of the self-test operation.
- Progress - Displays the progress of the self-test operation.
- What Failed? - If the BIST fails, this field displays what stage of BIST failed.
- Sense Key - If self-test operation fails, displays the sense key information.



- ASC/ASCQ - If self-test operation fails, displays the additional sense code and additional sense code qualifier.
- Self-Test Error - If the BIST fails, this field displays the error code.
- Stage - Current BIST stage in progress

## Test

After highlighting device(s), this button starts the BIST operations.

## Fibre Channel Devices Dialog (FCDD)

This dialog displays information pertaining to fibre channel HBA's installed in the system and devices enumerated by the HBA's.

**Fibre Channel Devices**

File Tools

Devices: 64

**SCSI Utility**  
by The Moojit

☒ Adapter Port ☐ Node

Adapter	WWNN	WWPNN	FCID
\\.\HBA0:	5000D31000FB2901	5000D31000FB2905	0x011
\\.\HBA0:	5000D31000FB2901	5000D31000FB2906	0x011
\\.\HBA0:	5000D31000FB2901	5000D31000FB2907	0x011

**Port Attributes**

Domain ID: 0x01h  
Area ID: 0x04h  
Port ID: 0x00h  
O/S Name: \\.\Scsi7:  
Symbolic Name:  
Type: NPORT  
State: ONLINE  
CoS: 3  
Speed: UNKNOWN  
Supp Speed: UNKNOWN  
Frame Size: 2048 Byte(s)

**FC4 Types**

	Supported	Active
WORD 0	00010000	00010000
WORD 1	00000000	00000000
WORD 2	00000000	00000000
WORD 3	00000000	00000000
WORD 4	00000000	00000000
WORD 5	00000000	00000000
WORD 6	00000000	00000000
WORD 7	00000000	00000000

WWNN: 2000000E1E09F620  
WWPNN: 2001000E1E09F620  
FCID: 0x010400h  
Discovered Ports: 16

OK

## Menu Items

### File Exit

Exits FCDD.

### Tools Adapters Information

Displays the HBA Statistics and Information Dialog (HSID) when a device is highlighted in the FCDD device listing.

### Tools Adapters List All

Displays the SNIA Adapters Dialog (SAD) when a device in the FCDD device listing is highlighted.

## GUI Items

### Devices

Number of fibre channel nodes enumerated by host.

### Device

- Adapter - The HBA that discovered FC node.
- WWNN - World Wide Node Name of FC node
- WWPN - World Wide Port Name of FC node
- FCID - FC address of node (24 bits)

### Adapter Port

Selecting this radio button switches FCDD to display information about the FC HBA (adapter)

### Node

Selecting this radio button switch FCDD to display information about the FC node enumerated by FC HBA

### Port Attributes

Please refer to T11 specification for more detail on these parameters

### FC4 Types

Please refer to T11 specification for more detail on these parameters

This display shows detailed information pertaining to the FC HBA selected by the user. Please refer to the T11 specification for more details on the parameters displayed.

### Adapter Attributes

Manufacturer	QLogic Corporation-RFE1315I
Serial Number	F98518
Model	QLE2662
Model Description	QLogic QLE2662 Fibre Channel
WWNN	2000000E1E09F621
Symbolic Name	
Hardware Version	
Driver Version	9.1.11.20
Option ROM Version	3.17
Firmware Version	6.04.00
Vendor Specific ID	0x00000001h
Number of Ports	1
Driver Name	ql2300.sys

Adapter	Port	WWPN	FCID
\\.\HBA0:	0	2001000E1E09F620	0x01C
\\.\HBA1:	0	2001000E1E09F621	0x01C
\\.\HBA2:	0	2001000E1E09F5A6	0x01C

### Adapter Port Statistics

Secs Since Last Reset	-1
TxFrames	-1
TxWords	-1
RxFrames	-1
RxWords	-1
LIP Count	-1
NOS Count	-1
Error Frames	-1
Dumped Frames	-1
Link Failure Count	0
Loss Of Sync Count	0
Loss Of Signal Count	0
Primitive Sequence Error Count	0
Invalid TxWord Count	0
Invalid CRC Count	0
Baseline Enabled	NO

### FC-4 Statistics

InputRequests	171808950
OutputRequests	175159015
ControlRequests	84
InputMegabytes	6021934
OutputMegabytes	5827915

### FC-4 Performance

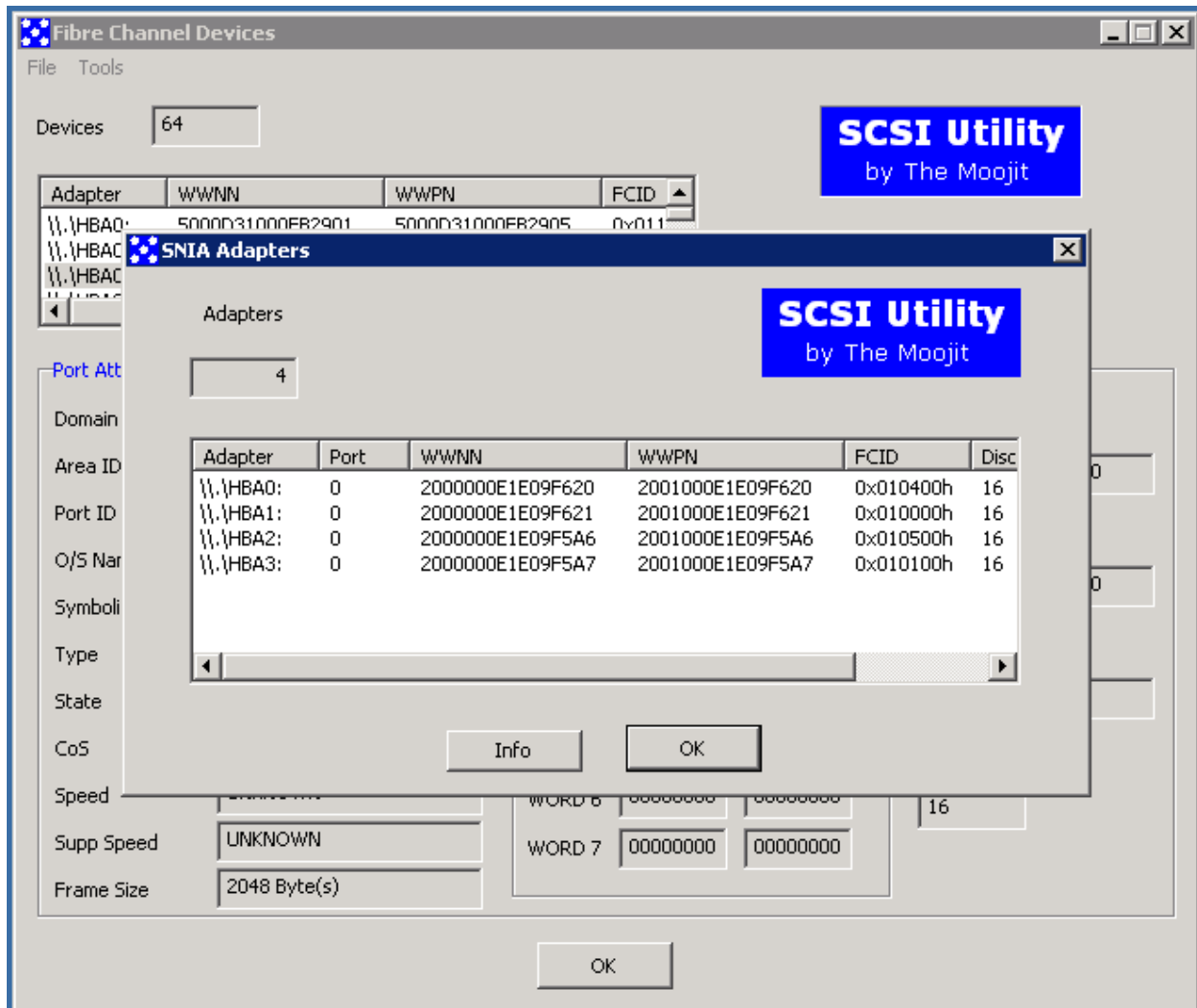
	IN	OUT
Maximum (MB/s)	0	0
Current (MB/s)	0	0
Minimum (MB/s)	0	0

### FC-1 Performance

	IN	OUT
Maximum (MB/s)	0	0
Current (MB/s)	0	0
Minimum (MB/s)	0	0

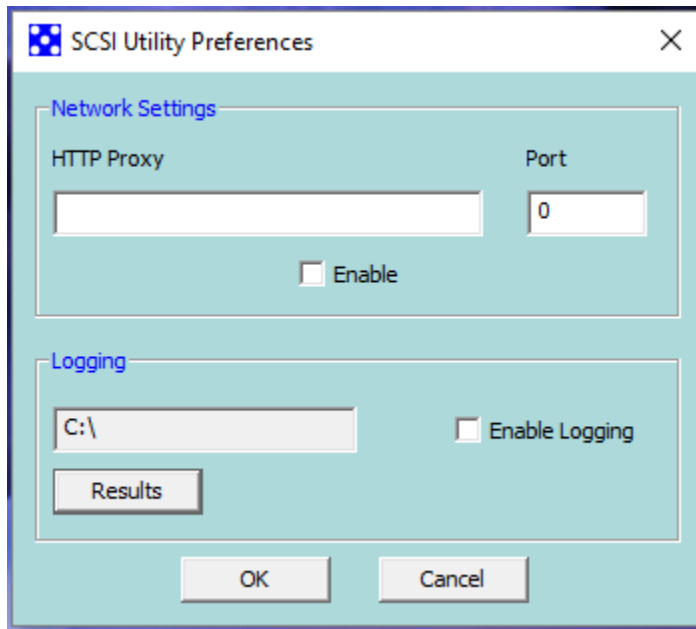
## SNIA Adapters Dialog (SAD)

This display summarizes the FC HBA ports enumerated in the host and displays the number of FC nodes enumerated by each HBA port.



## Preferences Dialog (PrefD)

The PrefD dialog allows the user to set HTTP PROXY information if required for remote server licensing and enable or disable logging.



### GUI Items

#### Network Settings - HTTP Proxy

HTTP proxy string (e.g. myproxy.foo.com)

#### Network Settings – Port

HTTP proxy tcp port (e.g. 80)

#### Network Settings – Enable

If checked, HTTP proxy will be used for license server communications.

#### Logging – Results

Opens a dialog that allows the user to select destination for log file.

#### Logging – Enable Logging

If checked, logging will be enabled on all SCSI I/O's. Log file will be saved in Results directory.

#### OK

Accepts all changes made in dialog and closes dialog.

#### Cancel

Ignores all changes made in dialog and closes dialog.

## Inquiry Information Dialogs

The Detail button on the main dialog page will display the INQUIRY DATA (SPC-4 FORMAT) dialog shown on the left. The EXTENDED INQUIRY DATA (SPC-4 FORMAT) dialog shown on the right can be displayed by selecting the “More -> Extended Inquiry” menu item.

INQUIRY DATA (SPC-4 FORMAT)										
Bit Byte	7	6	5	4	3	2	1	0		
PERIPHERAL QUALIFIER					PERIPHERAL DEVICE TYPE					
0	0x0				0x00					
RMB					Reserved					
1	0	0x00								
VERSION										
2	0x05									
AERC	Obsolete	NormACA	HISUP	RESPONSE DATA FORMAT						
3	0	0	0	0	0x2					
ADDITIONAL LENGTH (n-4)										
4	0x41									
SCCS	ACC	TPGS	3PC	Reserved			PROTECT			
5	0	0	0x0	0	0x0					
BQUE	ENCSERV	VS	MULTIP	MCHNGR	Obsolete	Obsolete	ADDR16			
6	0	0	0	0	0	0	0	0	0	
RELADR	Obsolete	WBUS16	SYNC	LINKED	Obsolete	CMDQUE	VS			
7	0	0	0	0	0	0	1	0		
VENDOR ID										
8-15	WDC									
PRODUCT ID										
16-31	WD5000AAHX-753CA									
PRODUCT REVISION LEVEL										
32-35	17.0									
Vendor Specific										
36	0x41									
Vendor Specific										
37	0x54									
Vendor Specific										
38	0x41									
Vendor Specific										
39	0x00									
Vendor Specific										
40	0x00									
Vendor Specific										
41	0x00									
Vendor Specific										
42	0x00									

EXTENDED INQUIRY DATA (SPC-4 FORMAT)										
Bit Byte	7	6	5	4	3	2	1	0		
PERIPHERAL QUALIFIER					PERIPHERAL DEVICE TYPE					
0	0x0				0x0					
PAGE CODE										
1	0x00									
PAGE LENGTH (MSB)										
2	0x0									
PAGE LENGTH (LSB)										
3	0x0									
ACT MICROCODE			SPT		GRD_CHK		APP_CHK		REF_CHK	
4	0x0		0x0		0		0		0	
Reserved			UASK_SUP		GRP_SUP		PRI_SUP	HEADSUP	ORDSUP	
5	0x0		0		0		0		0	
Reserved			WU_SUP		CRD_SUP		NV_SUP	V_SUP		
6	0x0		0		0		0		0	
Reserved			PII_SUP		Reserved			LUICLR		
7	0		0		0x0			0		
Reserved			R_SUP		Reserved			CBCS		
8	0		0		0			0		
Reserved			MULTI_IT_NEXUS_DL							
9	0		0x0							
EXTENDED SELF-TEST COMPLETION MINUTES (MSB)										
10	0x00									
EXTENDED SELF-TEST COMPLETION MINUTES (LSB)										
11	0x00									
POA_SUP			HRA_SUP		VSA_SUP		Reserved			
12	0	0	0	0x00						

Byte	Data
13	00
14	00
15	00
16	00
17	00
18	00
19	00
<	>

OK

## Custom Command Dialog (CCD)

The CCD allows the user to create, save and send any SCSI CDB to the selected device.

Custom Command

Options

Device: ELBY CLONEDRIVE 1.4

Attributes:

- Command Length: CDB6LENGTH
- Data Direction: OUT
- Timeout (ms): 16000

Buffer:

- Length (bytes): 255
- Allocate

Command Name:

CDB

Byte	Data
0	00
1	00
2	00
3	00
4	00
5	00
6	00
7	00
8	00
9	00
10	00
11	00
12	00

Buffer

Byte	Data
0	00
1	00
2	00
3	00
4	00
5	00
6	00
7	00
8	00
9	00
10	00
11	00
12	00

Buttons: Send, Reset CDB, Reset Buffer, OK, Cancel

## Menu Items

### Options – Import Buffer

Imports any file and uses its contents for Buffer. Buffer listing will be updated on import.

### Options – Import Command

Imports a previously saved command (includes buffer also)

### **Options – Save Command**

Save current CDB settings and Buffer to SCSI Utility .cmd file.

### **Options – Exit**

Closes Dialog

## **GUI Items**

### **Device**

Displays selected device's SCSI Inquiry vendor, model and revision strings.

### **Attributes – Command Length**

Dropdown that allows user to select CDB length.

### **Attributes – Data Direction**

Dropdown that allows user to select data direction. IN = device server to application client; OUT = application client to device server; UNSPECIFIED = no data will be transferred with command and BIDIRECTIONAL = data will be transferred from application client to device server and device server to application client.

### **Attributes – Timeout**

SCSI I/O timeout in milliseconds (default setting is 16000 ms)

### **Buffer – Length (bytes)**

Length of Buffer to allocate (default setting is 255). When CCD dialog is opened, a 255 Buffer will be pre-allocated.

### **Buffer – Allocate**

Allocates new Buffer initialized to all zeros equal to Length and populates in Buffer listing. Previous Buffer and its contents will be lost.

### **Command Name**

If command has been saved, this will display the name given.

### **CDB**

CDB contents (maximum length is 32). CDB locations are editable by user double clicking on appropriate Data offset location.

### **Buffer**

Buffer contents (length equal to buffer length setting). Buffer locations are editable by user double clicking on appropriate Data offset location.

### **Send**

Sends the Command and optional buffer to the device.

### **Reset CDB**

Resets CDB listing to all zeros.



**Reset Buffer**

Resets Buffer listing to all zeros

**Save Buffer**

Save the contents of buffer to file.

**OK**

Closes Dialog

**Cancel**

Closes Dialog

## NVMe Custom Command Dialog (NCCD)

The NCCD allows the user to send NVMe pass-through commands to the device. Currently, Microsoft only allows commands that are (a) defined in the Command Effects Log and (b) Vendor Specific. Mandatory commands such as NVMe READ and WRITE are not allowed and will fail.

**NVMe Custom Command**

Options

Device: [Text Box]

**Attributes**

Command Length: CDB64LENGTH  
Data Direction: OUT  
Timeout (ms): 16  
Command Type: NVM

**Buffer and Interface Selection**

Length (bytes): 255  
Allocate  
☒ Microsoft Native ☐ Open Fabric

Command Name: [Text Box]

**CDB**

Dword	Data
0	00000000
1	00000000
2	00000000
3	00000000
4	00000000
5	00000000
6	00000000
7	00000000
8	00000000
9	00000000
10	00000000
11	00000000
12	00000000

**Buffer**

Byte	Data
0	00
1	00
2	00
3	00
4	00
5	00
6	00
7	00
8	00
9	00
10	00
11	00
12	00

Buttons: Send, Reset CDB, Reset Buffer, Save Buffer, OK, Cancel

## Menu Items

### Options - Import Buffer

Imports any file and uses its contents for Buffer. Buffer listing will be updated on import.

### **Options – Import Command**

Imports a previously saved command (includes buffer also)

### **Options – Save Command**

Save current CDB settings and Buffer to SCSI Utility .cmd file.

### **Options – Exit**

Closes Dialog

## **GUI Items**

### **Device**

Displays selected device's SCSI Inquiry vendor, model and revision strings.

### **Attributes – Command Length**

Dropdown that allows user to select the number of DWORDS used in the command. For NVMe, this is fixed at 64 bytes or 16 DWORDs.

### **Attributes – Data Direction**

Dropdown that allows user to select data direction. IN = device server to application client; OUT = application client to device server; UNSPECIFIED = no data will be transferred with command and BIDIRECTIONAL = data will be transferred from application client to device server and device server to application client.

### **Attributes – Timeout**

NVMe I/O timeout in milliseconds (default setting is 16 ms)

### **Command Type**

Dropdown that allows user to select NVM or ADMIN.

### **Buffer – Length (bytes)**

Length of Buffer to allocate (default setting is 255). When NCCD dialog is opened, a 255 Buffer will be pre-allocated.

### **Buffer – Allocate**

Allocates new Buffer initialized to all zeros equal to Length and populates in Buffer listing. Previous Buffer and its contents will be lost.

### **Command Name**

If command has been saved, this will display the name given.

### **CDB**

Command DWORD contents (0 to 15). Command DWORD locations are editable by user double clicking on appropriate DWORD offset location. DWORD bit ordering (reading from LEFT to RIGHT) is MSB to LSB.

### **Buffer**

Buffer contents (length equal to buffer length setting). Buffer locations are editable by user double clicking on appropriate Data offset location.

### **Send**

Sends the Command and optional buffer to the device.

### **Reset CDB**

Resets Command DWORD listing to all zeros.

### **Reset Buffer**

Resets Buffer listing to all zeros

### **Save Buffer**

Save the contents of buffer to file.

### **OK**

Closes Dialog

### **Cancel**

Closes Dialog

## **T10 PI Consistency Check Dialog (T10CCD)**

This dialog allows the user to verify the T10 PI logical guard block on every block of the device. The dialog provides the option of allowing either SCSI Utility or the device server to perform the GRD tag check. In addition, this dialog allows the user to correct GRD tag mismatches if found. The original user data will be maintained if GRD correction is enabled. All PI Types are supported, if the block device is not formatted with PI protection enabled, the test will not run and exit for that device. Multiple block devices can be tested at the same time, detailed logging information is provided.

Running this test provides a method to verify that user data has not changed since it was originally written to the block device. If a GRD tag mismatch is found, there are three possibilities: (a) the user data has changed since the block was written and now the GRD tag does not match the data indicating a silent data mis compare, (b) the device is not initializing the PI fields correctly during format or its manufacturing process and generating false errors or (c) the device is not calculating the GRD tag correctly.

Running this test provides a method to determine the number of blocks that have not been written too since the device's last format operation. Since the GRD tag will always be calculated and updated for any legacy WRITE operation, blocks with a GRD tag not equal to 0xFFFF indicate that a write operation has been performed.

## GUI Items

### Device Listing

Lists all block devices enumerated by SCSI Utility. Some of the more important fields for each device are listed below:

### *Progress*

Percentage of drive that has been checked.

### *Status*

Status of PI check operations – COMPLETE, RUNNING, PI DISABLED and FAIL.

### *Sense Key*

Sense key if error occurs.

### *ASC/ASCQ*

ASC/ASCQ codes associated with error (in hex).

### *PI Status*

Status of PI check operation – PASS, FAIL or CANCELLED.

### *Block Guard Errors*

Number of GRD tag mismatches found.

### *% of Errors*

Number of GRD tag mismatches found with respect to total blocks reported by block device.

### *UnWritten Blocks*

Number of blocks that have 0xFFFFh for GRD tag signifying the number of blocks that have not been written too. Per T10, a PI formatted block device will always update the GRD tag for any non-PI WRITE.

### *% UnWritten Blocks*

Number of UnWritten blocks with respect to total blocks reported by block device.

### *PI Type*

PI type drive has been formatted with.

### *Corrected Blocks*

If REPLAIR BLOCK GUARD enabled, the number of blocks with GRD tag mismatch that have been corrected.

### *Total Blocks*

Total blocks reported in READ CAPACITY (16) data returned by the block device.

### **Formatted Blocks**

Number of blocks where all PI fields for a given block are 0xFF. Per T10, when a block device is formatted with one of the PI types enabled, all PI fields must be initialized to 0xFF. In this case, GRD tag would be 0xFFFF, APP tag would be 0xFFFF, and REF tag would be 0xFFFF FFFF.

### **Repair Block Guard**

When checked, SCSI Utility will attempt to repair the GRD tag mismatch by calculating the correct T10 PI CRC16, updating the GRD tag field, and finally copying the entire block with PI fields (APP and REF tags are not modified) to the block device. The user should take normal precautions before attempting this procedure – perform a backup of the block device prior to performing this step and place the system on a UPS to prevent a power outage from causing a possible loss of data.

### **Device Server Check**

When checked, SCSI Utility will instruct the block device to perform the GRD tag check instead of SCSI Utility.

### **Enable Detailed Logging**

When checked, if a GRD tag mismatch is found, SCSI Utility will post an event for every block with error which will include LBA location along with user data and PI fields.

### **Single Block Ops**

When checked, if Repair Block Guard is enabled, SCSI Utility will perform single block updates versus the normal multiple block update. StorageWerks has found that some device with GRD tag mismatches may not be able process multi-block updates and return error.

### **Check**

Starts the test on one or more selected block devices.

### **Cancel**

Closes the dialog when no tests are running.

### **Stop**

Stops tests running on selected block devices.

## **NVMe Support**

SCSI Utility has added support for NVMe devices on Windows 10, Server 2016 and later releases from Microsoft. Prior to these Operating System versions, SCSI Utility can enumerate and display NVMe devices, and has limited capability. Starting with these later Operating Systems, SCSI Utility can perform the following operations specific to NVMe:

- Send NVMe Pass-through Commands per the Microsoft restrictions, namely, only vendor specific commands.
- Perform Firmware Downloads
- Perform Firmware Commits

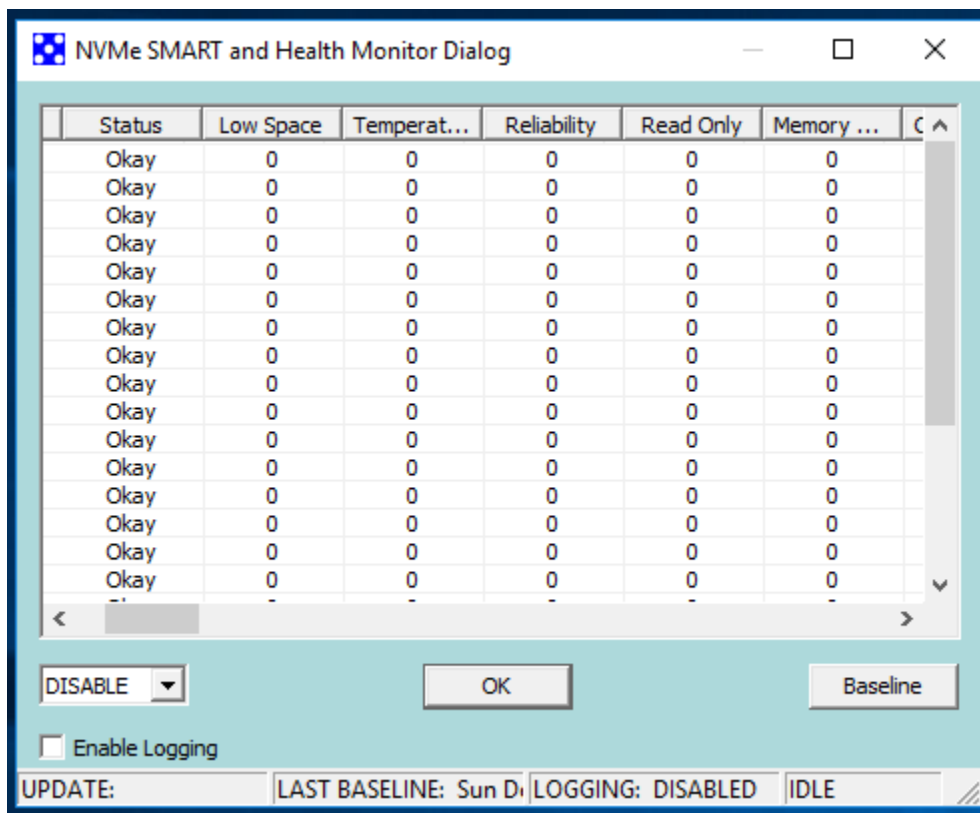
- Display all Log Pages.
- Display all Features.
- Display Controller and Namespace Identify parameters
- Display, log and monitor SMART parameters.

## NVMe Firmware Download

When performing firmware download, SCSI Utility will maximize the transfer size based on a combination of driver and device capabilities. At the end of firmware download, SCSI Utility automatically sends a Firmware Commit instructing the device to activate on next reset. The firmware slot used is automatically chosen by SCSI Utility.

## NVMe SMART and Health Monitor Dialog (NSHMD)

The NSHMD dialog allows for the monitoring and optional logging of all NVMe SMART attributes for each NVMe device discovered by the application. User may select update frequency; default setting is no updates.



## GUI Items

### SMART Attribute Listing

Displays all SMART attributes supported by the device. For more details, please see latest NVMe Specification. When NSHMD first starts, a baseline is automatically created. When updates are enabled,

latest returned attributes are compared to the baseline. If a threshold is exceeded, status will change to 'Not Okay,' and SCSI Utility will post an event in the application event log when this occurs.

## Update Frequency Dropdown

Default setting is no updates. Dropdown that allows the user to select update frequency. When updates are enabled, a countdown timer will be displayed next to UPDATE.

OK

Closes the dialog.

## Baseline

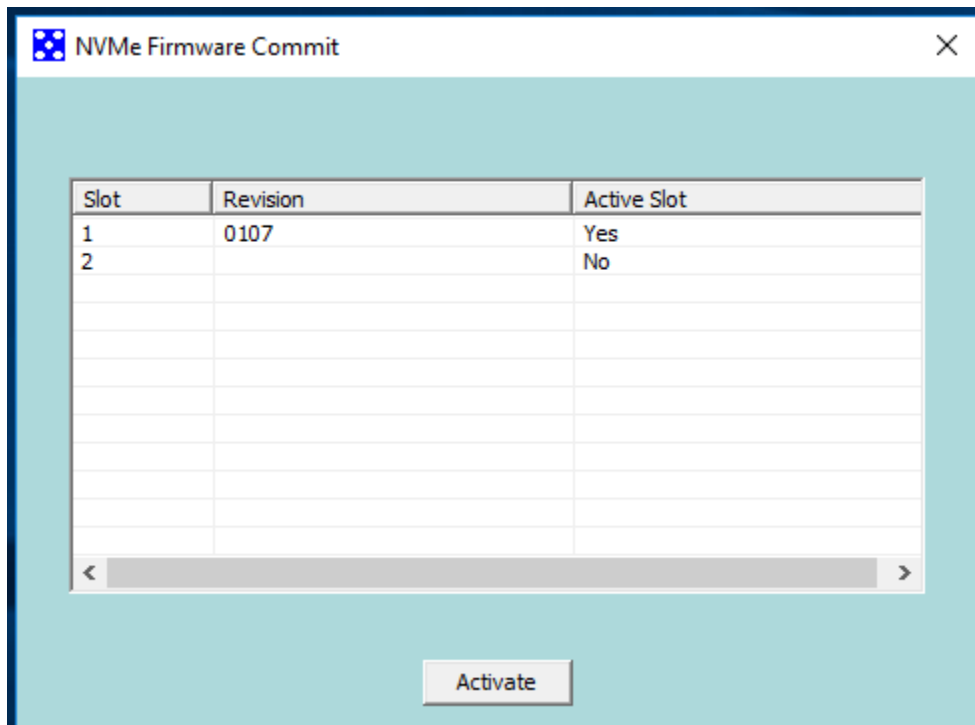
Creates a new baseline for comparisons and updates the LAST BASELINE time stamp.

## Enable Logging Checkbox

Default setting is logging disabled. When checked, SCSI Utility will log all NVMe SMART attributes for each device to the location defined in PrefD, and LOGGING will be changed to ENABLED.

## NVMe Firmware Commit Dialog (NFCD)

This dialog allows the user to activate another NVMe firmware image located in that slot. Activation will occur on next device reset.





## GUI Items

### Firmware Listing

Each row in this listing represents an NVMe firmware slot reported by the device; slot number, firmware revision and currently active slot will be displayed.

### Activate

To activate another firmware image, the user must highlight the row and left click this control. Selected firmware image will become active on next device reset.

### ATA Custom Command Dialog (ACCD)

The ACCD allows the user to send ATA pass-through commands to the device. User will need to reference both T13 ACS-4 specification and MSDN documentation on “ATA\_PASS\_THROUGH\_EX” data structure to understand how to use this dialog. Please also see the pre-built ATA command examples provided in the SCSI Utility accessories package available from download from [www.storagewerks.net](http://www.storagewerks.net).

ATA Custom Command

X

Options

Device

ATA ST1000NM004A-2M CAJ8 WJB00BSJ

Flags

☐ ATA\_FLAGS\_DRDY\_REQUIRED  
☐ ATA\_FLAGS\_DATA\_IN  
☐ ATA\_FLAGS\_DATA\_OUT  
☐ ATA\_FLAGS\_48BIT\_COMMAND  
☐ ATA\_FLAGS\_USE\_DMA  
☐ ATA\_FLAGS\_NO\_MULTIPLE

Buffer

Length (bytes)

255

Allocate

Timeout (ms)

16000

Command Name

Input

Features

Count

LBA

Device

Command

Send

Reset Task

Reset Buffer

Save Buffer

Output

Error

Count

LBA

Device

Status

Buffer

Byte	Data	
0	00	
1	00	
2	00	
3	00	
4	00	
5	00	
6	00	
7	00	
8	00	
9	00	
10	00	
11	00	
12	00	
13	00	
14	00	
15	00	
16	00	
17	00	

<

III

>

OK

Cancel

## Menu Items

### Options – Import Buffer

Imports any file and uses its contents for Buffer. Buffer listing will be updated on import.

### Options – Import Command

Imports a previously saved command (includes buffer also)

### **Options – Save Command**

Save current CDB settings and Buffer to SCSI Utility .cmd file.

### **Options – Exit**

Closes dialogue.

## **GUI Items**

### **Device**

Displays selected device's SCSI Inquiry vendor, model and revision strings.

### **Flags**

See MSDN documentation on "ATA\_PASS\_THROUGH\_EX" data structure.

### **Buffer – Length (bytes)**

Length of Buffer to allocate (default setting is 255). When ACCD dialog is opened, a 255 Buffer will be pre-allocated.

### **Allocate**

Allocates new Buffer initialized to all zeros equal to Length and populates in Buffer listing. Previous Buffer and its contents will be lost.

### **Command Name**

If command has been saved, this will display the name given.

### **Input**

See MSDN documentation on "ATA\_PASS\_THROUGH\_EX" data structure and T13 ACS-4 specification.

### **Output**

See MSDN documentation on "ATA\_PASS\_THROUGH\_EX" data structure and T13 ACS-4 specification.

### **Send**

Sends ATA command to device.

### **Reset Task**

Clears input fields.

### **Reset Buffer**

Clears buffer contents to zero.

### **Save Buffer**

Saves buffer contents to file.

