



VTRAK

E-Class

E610f, E610s, E310f, E310s

PRODUCT MANUAL

Version 2.1

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Contents

Chapter 1: Introduction to VTrak	1
About This Manual	1
VTrak Overview	2
Architectural Description	4
Features and Benefits	5
Highlights	5
Subsystem and Controller Features	6
Operational Features	6
Management	7
Specifications	8
E610f and E610s	8
E310f and E310s	8
Warranty and Support	9
CE Statement	9
FCC Statement	9
GOST-R Statement	9
IRAM Statement	9
MIC Statement	10
Chapter 2: VTrak Installation	11
Unpacking the VTrak	11
Mounting VTrak E610f/s in a Rack	12
Mounting VTrak E310f/s in a Rack	14
Installing Disk Drives	17
Drive Slot Numbering	17
AAMUX Adapter	18
Installing Disk Drives	18
Making Management and Data Connections	21
Fibre Channel	21
Serial Attached SCSI	26
Setting Up Serial Cable Connections	32
Connecting the Power	33
Chapter 3: VTrak Setup	35
Setting up the Serial Connection	35
Choosing DHCP or a Static IP Address	36
VTrak Default IP Addresses	36
Virtual Management Port	36
Physical Management Ports	36

Chapter 3: VTrak Setup, cont.

Setting up VTrak with the CLI	37
Setting up VTrak with the CLU	39
Setting system date and time	39
Making Management Port settings	40
Viewing IP address and settings	40
Making Controller Maintenance Mode Settings	40
Exiting the CLU	41
Creating Disk Arrays with WebPAM PROe	42
Logging into WebPAM PROe	42
Selecting a Language	44
Creating a Disk Array	44
Logging out of WebPAM PROe	48
Using WebPAM PROe over the Internet	49
Obtaining a Security Certificate	49

Chapter 4: Management with WebPAM PROe

Logging into WebPAM PROe	52
Selecting a Language	54
Perusing the Interface	55
Using the Header	56
Using Tree View	57
Using Management View	58
Viewing the Event Frame	58
Logging out of WebPAM PROe	59
Working with the Storage Network	60
Viewing Other Subsystems	60
Updating the List of Subsystems	60
Logging into a Subsystem	60
Hiding the Other Subsystems	60
Working with Subsystems	61
Viewing Subsystem Information	61
Saving System Service Report	62
Setting an Alias for the Subsystem	62
Setting Redundancy for the Subsystem	62
Setting Cache Mirroring for the Subsystem	62
Setting Subsystem Date and Time	63
Viewing the Runtime Event Log	63
Saving the Runtime Event Log	64
Clearing the Runtime Event Log	64

Chapter 4: Management with WebPAM PROe, cont.

Working with Subsystems, cont.	
Viewing NVRAM Events	65
Saving NVRAM Events	65
Clearing NVRAM Events	66
Viewing Current Background Activities	66
Making Background Activity Settings	66
Running Background Activities	67
Running Media Patrol	68
Running PDM	68
Viewing Scheduled Activities	68
Scheduling an Activity	69
Deleting a Scheduled Activity	70
Viewing Lock Status	70
Setting the Lock	70
Renewing the Lock	71
Releasing the Lock	71
Managing Users	72
Viewing User Information	72
Making User Settings	72
Making Your Own User Settings	73
Setting-up User Event Subscriptions	73
Changing Another User's Password	74
Changing Your Own Password	74
Creating a User	75
Deleting a User	76
Viewing User Sessions	76
Logging out Other Users	76
Managing the Network Connection	77
Making Subsystem Management Port Settings	77
Making Controller Management Port Settings	77
Managing Fibre Channel Connections	79
Viewing Fibre Channel Node Information	79
Viewing Fibre Channel Port Settings	79
Making Fibre Channel Port Settings	80
Viewing Fibre Channel Port Statistics	81
Viewing SFP Information	82
Viewing Fibre Channel Logged-in Devices	83
Viewing Fibre Channel Initiators	84

Chapter 4: Management with WebPAM PROe, cont.

Managing SAS Connections . . . . .	.85
Viewing SAS Port Information . . . . .	.85
Making SAS Port Settings . . . . .	.85
Viewing SAS Port Statistics . . . . .	.86
Viewing SAS Initiators . . . . .	.86
Managing Storage Services . . . . .	.88
Adding an Initiator . . . . .	.88
Deleting an Initiator . . . . .	.89
Viewing the LUN Map . . . . .	.89
Enabling LUN Masking . . . . .	.89
Adding a LUN Map . . . . .	.89
Editing a LUN Map . . . . .	.90
Managing Software Services . . . . .	.91
Making Email Settings . . . . .	.91
Making SLP Settings . . . . .	.92
Making Web Server Settings . . . . .	.92
Making Telnet Settings . . . . .	.94
Making SNMP Settings . . . . .	.94
Making CIM Settings . . . . .	.96
Making Netsend Settings . . . . .	.97
Exporting the User Database . . . . .	.99
Importing a User Database	100
Importing a Configuration Script	101
Updating the Firmware	102
Viewing Flash Image Information	103
Restoring Factory Defaults	104
Clearing Statistics	105
Shutting Down the Subsystem	106
Monitoring the Shutdown	106
Restarting the Subsystem	107
Monitoring the Restart	107
Managing Controllers	108
Viewing the Controllers	108
Locating a Controller	108
Viewing Controller Information	109
Viewing Controller Statistics	110
Making Controller Settings	110
Clearing an Orphan Watermark	111

Chapter 4: Management with WebPAM PROe, cont.

Managing Enclosures	113
Viewing the Enclosures	113
Locating an Enclosure	113
Viewing Enclosure Topology	114
Viewing Enclosure Information	115
Making Enclosure Settings	115
Viewing FRU VPD Information	116
Checking the Batteries	116
Reconditioning a Battery	117
Silencing the Buzzer	117
Making Buzzer Settings	118
Testing the Buzzer	118
Managing Physical Drives	119
Viewing a List of Physical Drives	119
Identifying a Physical Drive	119
Making Global Physical Drive Settings	119
Viewing Physical Drive Information	120
Viewing Physical Drive Statistics	121
Making Physical Drive Settings	121
Clearing Stale and PFA Conditions	122
Forcing a Physical Drive Offline or Online	122
Managing Disk Arrays	124
Viewing Disk Arrays	124
Creating a Disk Array	124
Creating a Disk Array – Automatic	125
Creating a Disk Array – Express	125
Creating a Disk Array – Advanced	127
Deleting a Disk Array	129
Viewing Disk Array Information	129
Making Disk Array Settings	130
Creating a Logical Drive	130
Deleting a Logical Drive	132
Migrating a Disk Array	132
Rebuilding a Disk Array	133
Running Media Patrol on a Disk Array	134
Running PDM on a Disk Array	135
Transitioning a Disk Array	135
Preparing a Disk Array for Transport	136

Chapter 4: Management with WebPAM PROe, cont.

Managing Logical Drives	137
Viewing Information for All Logical Drives	137
Viewing Logical Drive Information	138
Viewing Logical Drive Statistics	139
Making Logical Drive Settings	139
Initializing a Logical Drive	140
Running Redundancy Check	140
Viewing the Logical Drive Check Table	141
Making Logical Drive LUN Settings	142
Managing Spare Drives	144
Viewing a List of Spare Drives	144
Locating a Spare Drive	144
Creating a Spare Drive	145
Deleting Spare Drive	146
Making Spare Drive Settings	146
Running Spare Check	147
Working with the Logical Drive Summary	148
Viewing a List of All Logical Drives	148
Viewing Individual Logical Drive Information	148

Chapter 5: Management with the CLU 149

Logging into the CLU	150
Making a Serial Connection	150
Making a Telnet Connection	150
Accessing Online Help	152
Logging out of the CLU	152
Running Quick Setup	153
Managing the Subsystem	154
Setting an Alias for the Subsystem	154
Setting Redundancy for the Subsystem	154
Setting Cache Mirroring for the Subsystem	154
Running Media Patrol	155
Locking or Unlocking the Subsystem	155
Setting Subsystem Date and Time	156
Managing the Controllers	157
Viewing Controller Information	157
Clearing an Orphan Watermark	157
Making Controller Settings	158
Locating the Controller	159

Chapter 5: Management with the CLU, cont.

Managing the Enclosure	160
Viewing Enclosure Information	160
Viewing Power Supply Status	160
Locating a Power Supply	161
Viewing Blower Status	161
Viewing Voltage Sensor Status	161
Viewing Temperature Sensor Status	161
Setting Temperature Thresholds	162
Checking the Batteries	162
Reconditioning a Battery	163
Locating an Enclosure	163
Viewing Enclosure Topology	163
Managing Physical Drives	164
Making Global Physical Drive Settings	164
Setting an Alias	165
Viewing Advanced Information	165
Viewing Physical Drive Statistics	165
Clearing Stale and PFA Conditions	165
Forcing a Physical Drive Offline or Online	166
Locating a Physical Drive	166
Managing Disk Arrays	167
Creating a Disk Array	167
Creating a Disk Array – Automatic	168
Creating a Disk Array – Express	169
Creating a Disk Array – Advanced	170
Deleting a Disk Array	171
Viewing Disk Array Information	172
Setting an Alias for a Disk Array	172
Accepting an Incomplete Array	173
Enabling Media Patrol on a Disk Array	173
Enabling PDM on a Disk Array	173
Preparing the Disk Array for Transport	173
Rebuilding a Disk Array	174
Migrating a Disk Array	174
Running PDM	175
Running Transition on a Disk Array	175
Locating a Disk Array	176
Creating a Logical Drive	176
Deleting a Logical Drive	177

Chapter 5: Management with the CLU, cont.

Managing Spare Drives	178
Viewing a list of Spare Drives	178
Creating a Spare Drive	178
Making Spare Drive Settings	179
Running Spare Check	179
Deleting a Spare Drive	180
Managing Logical Drives	181
Viewing Logical Drive Information	181
Setting an Alias for a Logical Drive	181
Setting Write Cache Policy	181
Setting Read Cache Policy	182
Setting Preferred Controller ID	182
Initializing a Logical Drive	182
Running Redundancy Check	183
Locating a Logical Drive	183
Managing the Network Connection	184
Making Subsystem Management Port Settings	184
Making Controller Maintenance Mode Settings	184
Managing Fibre Channel Connections	186
Viewing Node Information	186
Viewing Fibre Channel Logged-in Devices	186
Making Fibre Channel Port Settings	186
Viewing SFP Information	187
Viewing Fibre Channel Port Statistics	188
Viewing Fibre Channel Initiators	189
Adding a Fibre Channel Initiator	189
Managing SAS Connections	190
Viewing SAS Port Information	190
Making SAS Port Settings	190
Viewing SAS Port Statistics	191
Viewing SAS Initiators	191
Adding a SAS Initiator	191
Managing Background Activity	192
Viewing Current Background Activities	192
Making Background Activity Settings	192
Working with the Event Viewer	194
Viewing Runtime Events	194
Clearing Runtime Events	194
Viewing NVRAM Events	194
Clearing NVRAM Events	195

Chapter 5: Management with the CLU, cont.

Working with LUN Mapping	196
Viewing a List of Initiators	196
Enabling LUN Mapping	196
Creating an Initiator	196
Mapping a LUN to an Initiator	197
Deleting an Initiator	197
Managing Users	199
Viewing User Information	199
Creating a User	199
Changing a User's Password	200
Changing a User's Display Name and Email Address	200
Changing a User's Privilege and Status	201
Deleting a User	201
Working with Software Management	202
Making Email Settings	202
Making SLP Settings	203
Making Webserver Settings	203
Making Telnet Settings	204
Making SNMP Settings	204
Managing SNMP Trap Sinks	205
Making CIM Settings	206
Making Netsend Settings	207
Managing Netsend Recipients	207
Flashing through TFTP	209
Viewing Flash Image Information	210
Clearing Statistics	211
Restoring Factory Defaults	212
Shutting Down the Subsystem	213
Shutting down the VTrak – Telnet Connection	213
Shutting down the VTrak – Serial Connection	213
Restarting the Subsystem	215
Restarting VTrak – Telnet Connection	215
Restarting VTrak – Serial Connection	215
Making Buzzer Settings	216

Chapter 6: Maintenance	217
Updating the Firmware in WebPAM PROe	217
Downloading the Firmware Image File	217
Updating Firmware from TFTP Server	217
Updating Firmware from your PC	218
Restarting the Subsystem	219
Updating the Firmware in the CLU	221
Downloading the Firmware Image File	221
Updating the Firmware	221
Restarting Subsystem over a Telnet Connection	222
Restarting Subsystem over a Serial Connection	222
Replacing a Power Supply	223
Remove the Old Power Supply	223
Install a New Power Supply	223
Replacing a Cooling Unit Fan or Blower	224
Replacing a Cache Battery	229
Replacing a RAID Controller	233
Dual Controller Subsystem	233
Single Controller Subsystem	234
Chapter 7: Technology Background	237
Introduction to RAID	237
RAID 0 – Stripe	238
RAID 1 – Mirror	239
RAID 1E – Enhanced Mirror	240
RAID 5 – Block and Parity Stripe	241
RAID 6 – Block and Double Parity Stripe	242
RAID 10 – Mirror / Stripe	243
RAID 50 – Striping of Distributed Parity	244
RAID 60 – Striping of Double Parity	247
Choosing a RAID Level	250
RAID 0	250
RAID 1	250
RAID 1E	251
RAID 5	251
RAID 6	251
RAID 10	252
RAID 50	252
RAID 60	252
Choosing Stripe Size	253

Chapter 7: Technology Background, cont.	
Choosing Sector Size	253
2 TB Limitation	254
Cache Policy	254
Read Cache Policy	255
Write Cache Policy	255
Adaptive Writeback Cache	255
Cache Mirroring	256
Failover and Failback	256
LUN Affinity	257
Disk Array Creation	257
Logical Drive Settings	258
Failover and Failback	258
Capacity Coercion	258
Initialization	259
Hot Spare Drive(s)	259
Partition and Format the Logical Drive	260
RAID Level Migration	260
RAID 0	261
RAID 1	262
RAID 1E	262
RAID 5	263
RAID 6	263
RAID 10	264
RAID 50	265
RAID 60	265
Ranges of Disk Array Expansion	266
Media Patrol	267
Predictive Data Migration (PDM)	268
PDM Triggers	268
Transition	269
Example	269
Chapter 8: Troubleshooting	273
VTrak is Beeping	274
LEDs Display Amber or Red	275
Front Panel	275
Drive Status Indicators	276
Back of Enclosure	277

Chapter 8: Troubleshooting, cont.	
CLU Reports a Problem	281
Viewing Runtime Events	281
Viewing NVRAM Events	281
Checking a Reported Component	282
WebPAM PROe Reports a Problem	283
Event Notification Response	286
Critical & Offline Disk Arrays	301
When a Physical Drive Fails	301
With a Hot Spare Drive	301
Without a Hot Spare Drive	302
Rebuild Operation	302
Incomplete Array	304
Physical Drive Problems	305
Physical Drive Offline	305
Physical Drive Not Usable	305
Physical Drive Failed	305
Enclosure Problems	307
Controller Enters Maintenance Mode	310
Finding and Correcting the Cause of the Problem	310
Taking a Controller out of Maintenance Mode	311
Connection Problems	313
Serial Connections	313
Network Connections	313
Fibre Channel Connections	314
Browser Does Not Connect to WebPAM PROe	315
Unsaved Data in the Controller Cache	316
Chapter 9: Support	317
Frequently Asked Questions	317
Contacting Technical Support	319
Limited Warranty	322
Returning Product For Repair	323
Appendix A: Useful Information	325
SNMP MIB Files	325
Adding a Second Controller	325
Index	329

Chapter 1: Introduction to VTrak

This chapter covers the following topics:

- About This Manual (below)
- VTrak Overview (page 2)
- Architectural Description (page 4)
- Specifications (page 8)

Thank you for purchasing Promise Technology's VTrak E-Class external disk array subsystem.

About This Manual

This *Product Manual* describes how to setup, use and maintain the VTrak E610f, E610s, E310f, and E310s external disk array subsystems. It also describes how to use the built-in command-line interface (CLI), command-line utility (CLU) and embedded Web-based Promise Array Management—Professional (WebPAM PROe) software.

This manual includes a full table of contents, index, chapter task lists and numerous cross-references to help you find the specific information you are looking for.

Also included are four levels of notices:



Note

A *Note* provides helpful information such as hints or alternative ways of doing a task.



Important

An *Important* calls attention to an essential step or point required to complete a task. Important items include things often missed.



Caution

A *Caution* informs you of possible equipment damage or loss of data and how to avoid them.



Warning

A *Warning* notifies you of probable equipment damage or loss of data, or the possibility of physical injury, and how to avoid them.

VTrak Overview

VTrak provides data storage solutions for applications where high performance and data protection are required. The failure of any single drive will not affect data integrity or accessibility of the data in a RAID protected logical drive.

Figure 1. VTrak E610f/s front view

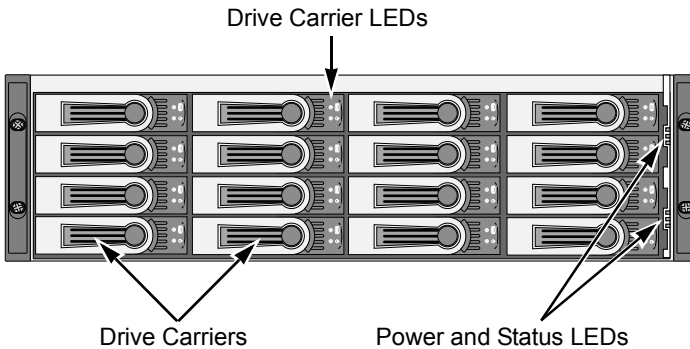
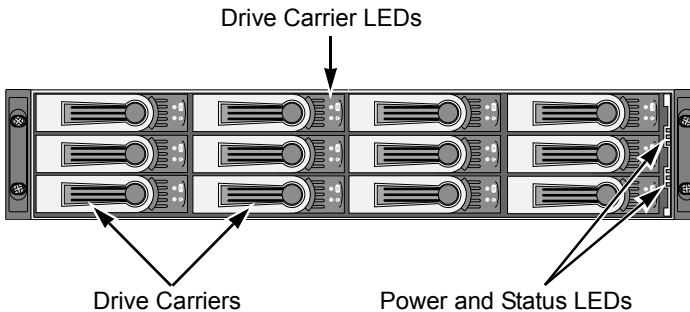


Figure 2. VTrak E310f/s front view with bezel removed



A defective drive may be replaced without interruption of data availability to the host computer. If so configured, a hot spare drive will automatically replace a failed drive, securing the fault-tolerant integrity of the logical drive. The self-contained hardware-based RAID logical drive provides maximum performance in a compact external chassis.

Figure 3. VTrak E610f rear view

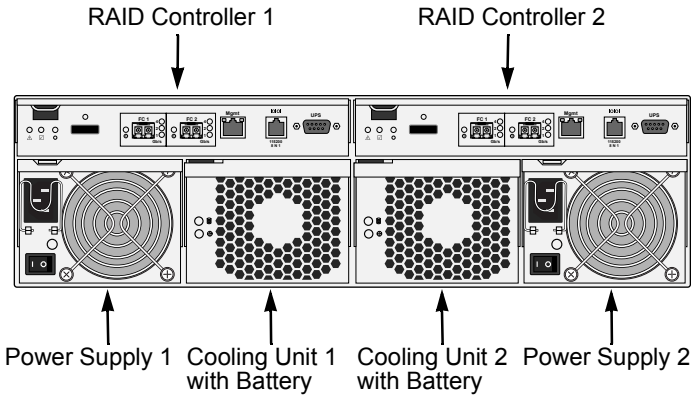


Figure 4. VTrak E610s rear view

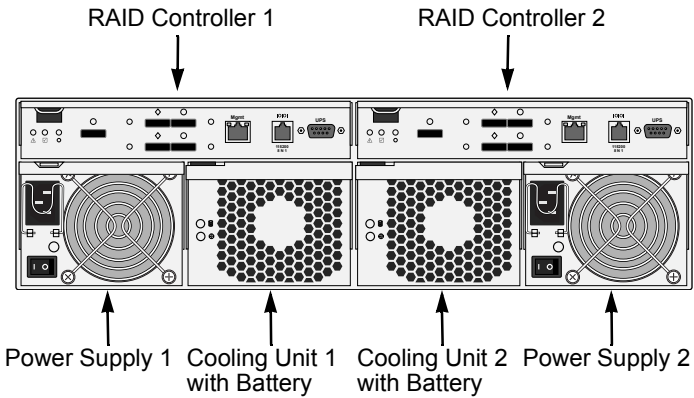


Figure 5. VTrak E310f rear view

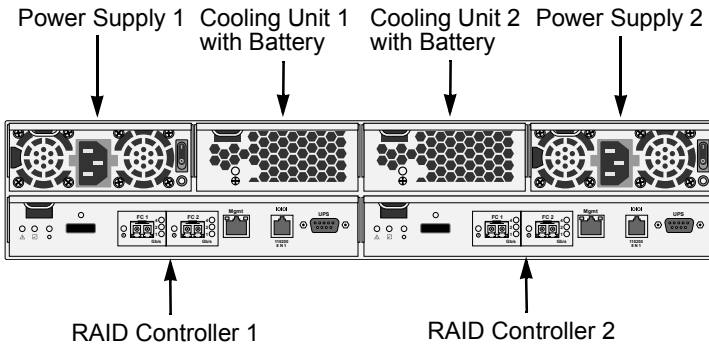
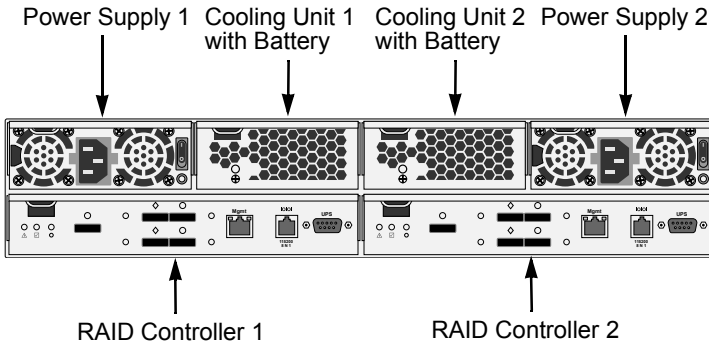


Figure 6. VTrak E310s rear view



Architectural Description

The VTrak E610f and E310f are Fibre Channel subsystems suitable for Direct Attached Storage (DAS), Storage Area Network (SAN), and Expanded Storage.

The VTrak E610s and E310s are Serial Attached SCSI (SAS) subsystems suitable for Direct Attached Storage (DAS), Cascaded Storage, and Expanded Storage.

The E-Class subsystems support:

- 1.5 Gb/s SATA disk drives
- 3.0 Gb/s SATA disk drives
- 3.0 Gb/s SAS disk drives

All E-Class enclosures include a mid-plane, RAID controller, power and cooling units, and enclosure processor all in one cable-less chassis design. Multiple fans and power supplies provide redundancy to ensure continued usage during component failure. The RAID controller is hardware based and controls all logical drive functions transparently to the host system. VTrak appears to the computer's operating system as a standard SCSI drive or drives.

Features and Benefits

Highlights

- Dual channel active/active, failover/failback RAID controllers
- E610f/s: 16 hot-swappable drive bays in a robust 3U rackmount chassis with redundant, hot-swappable power and cooling modules
- E310f/s: 12 hot-swappable drive bays in a robust 2U rackmount chassis with redundant, hot-swappable power and cooling modules
- Supports for Serial Attached SCSI (SAS) and Serial ATA (SATA) 3 Gb/s drives simultaneously in the same system—choose the drive that is best suited to your application
- Direct SATA LED support with AAMUX adapter
- Dual 4 Gb/s Fibre Channel or four 3 Gb/s SAS x4 host ports provide high-availability SAN and cluster-friendly platform
- JBOD expansion support through a 3 Gb/s SAS x4 port—up to four VTrak JBOD systems
- Simplified remote management with a comprehensive embedded web-based management via Ethernet—WebPAM PROe. Command Line Interface/Utility via RJ-11 Serial Port
- Three years complete system limited warranty includes 24 x 7 email and phone support with highly experienced technical support technicians and an advanced replacements program
- Support for the latest RAID technology—RAID 6 and 60—Protection from a catastrophic double drive failure
- Resilient data protection features such as Predictive Data Migration™ and PerfectRAID™ provide rock solid data protection
- LUN Mapping and Masking bring flexibility for multiple application and OS support on the same storage subsystem
- Open architecture, industry's most comprehensive support for SAS and SATA hard drives and standards-based management interfaces including SNMP, CIM, and WBEM

- Support for the industry standard Disk Data Format (DDF from SNIA) ensures interoperability and drive roaming even among different RAID vendors
- Compatible with leading SAS hard drives, host bus adapters and RAID controllers

Subsystem and Controller Features

Controllers: Dual-controller configuration or single-controller configuration, upgradeable to dual. Dual-controller subsystems feature Active/Active, Failover/Failback.

Drive Support: Up to 16 (E610f/s) or 12 (E310f/s) 3.5" x 1" hard disk drives: SAS 3Gb/s, SATA II 3Gb/s and 1.5Gb/s. SATA drives require an AAMUX Adapter in dual I/O module configuration (dual-controller) subsystems.

Supports any mix of SAS and SATA II 3Gb/s or 1.5Gb/s drives simultaneously in the same system. Staggered physical drive spin-up.

External I/O Ports (per controller): Dual 4-Gb Fibre Channel host port; One external 3 Gb/s SAS x4 ports for JBOD expansion (up to four VTrak JBOD Systems).

Data Cache: Shared 512 MB predictive data cache (expandable to 2 GB); Automatic write cache destaging; 72-hour battery backup (for 512 MB cache).

Command Queue Depth: 512 commands per VTrak system (up to 1024 commands with 512 MB memory).

Operational Features

RAID Levels: RAID 0, 1, 1E, 5, 6, 10, 50, and 60 – Any combination of these RAID levels can exist at the same time.

Configurable RAID stripe size: 64 KB, 128 KB, 256 KB, 512 KB, and 1 MB stripe size per logical drive.

Background task priority tuning: Adjustment of minimum I/O reserved for server use during all background tasks.

Hot spares: Multiple global or dedicated hot-spare drives with revert option.

Maximum LUNs per subsystem: 256 in any combination of RAID levels.

Maximum LUNs per array: 32 logical drives (LUNs). Supports LUN carving by allowing an array to be divided into multiple logical drives. Supports out-of-order logical drive deletion and re-creation.

Max LUNs per Target ID: Up to 256, depending on host side driver and operating system.

LUN Masking and Mapping: Supports multiple hosts.

Disk Data Formats: Supports Disk Data Format (DDF) for industry-wide standardization and drive roaming between VTrak systems.

Background Activities: Media Patrol, background synchronizing, disk array rebuild, Redundancy Check, SMART condition pooling, Online Capacity Expansion (OCE), RAID Level Migration (RLM). Includes priority control, rate control, and watermarking per BGA in disk and NVRAM.

Foreground Activities: Disk array initialization.

Physical Drive Error Recovery: Predictive Data Migration (PDM), replaces unhealthy disk member in array, while maintaining normal array status during the data transition. Bad Sector Mapping, Media Patrol, SMART, Hard/Soft Reset to recover HD from bad status, HD Power-control to recover HD from hung status.

Array Error Recovery: Data recovery from bad sector or failed HD for redundant RAID, RAID 5/6 inconsistent data Prevent (Write Hole Table), Data content Error Prevent (Read/Write Check Table) NVRAM event logging.

SCSI Commands: Supports extensive SCSI command set equivalent to SCSI/FC hard disk drives. Variable sector size (512 byte to 4 KB) to break OS 2TB limitation. 16 byte CDB support for 64-bit LBA addressing.

Management

Supported Operating Systems: Windows 2000 Server, Windows 2003 Server, Linux (Red Hat, SuSE), Macintosh OS X, Solaris.

Management Tools: WebPAM PROe via out-of-band Ethernet. OS independent, localized in multiple languages, SSL Security support. Command Line Interface (CLI) and Command Line Utility (CLU) via RJ-11 Serial Port or Telnet.

Standard Management Protocols: SNMP, WBEM/CIM

RAID Creation: Automatic, Express, and Advanced configuration support for novice to skilled users.

Management Interfaces: WebPAM PROe, CLU, CLI, audible (buzzer) and visible (LEDs) alarms.

Management Protocols: Embedded web server and management support—no host agent needed. Ethernet, RJ-11 serial port, SNMP, SSL, Telnet, Email.

Specifications

E610f and E610s

Voltage: 100–240 VAC Auto-ranging.

Current (maximum): 8 A @ 100 VAC or 4 A @ 240 VAC Current rating with two power cords.

Power Consumption (not including disk drives): E610f, 142.12 W. E610s, 151.42 W.

Power Consumption (including disk drives): E610f, 562.65 W. E610s, 566.95 W.

Power Supply: Dual 500 W, 100-240 VAC auto-ranging, 50-60 Hz, dual hot swap and redundant with PFC, N+1 design.

Operating Temperature: 5° to 40°C operational (-40° to 60°C non-operational)

Relative Humidity: Maximum 95 percent.

Vibration: Random, 0.21 grms, 5-500 Hz, 30 Mins, X, Y, Z axis.

Dimensions (H x W x D): 13.1 x 44.6 x 56.1 cm (5.2 x 17.6 x 22.1 in)

Net Weight: 30.5 kg (67.2 lb) without drives, 38.5 kg (84.9 lb) with 16 drives, assuming 0.5 kg (1.1 lb) per drive.

Gross Weight (including carton): 37.5 kg (82.7 lb) without drives.

Safety: CE, FCC Class A, VCCI, C-Tick, cUL, TUV, CB, BSMI, MIC.

E310f and E310s

Voltage: 100–240 VAC Auto-ranging.

Current (maximum): 8 A @ 100 VAC or 4 A @ 240 VAC Current rating with two power cords.

Power Consumption (not including disk drives): E310f, 141.68 W. E310s, 157.84 W.

Power Consumption (including disk drives): E310f, 453.32 W. E310s, 469.48 W.

Power Supply: Dual 400 W, 100-240 VAC auto-ranging, 50-60 Hz, dual hot swap and redundant with PFC, N+1 design.

Operating Temperature: 5° to 40°C operational (-40° to 60°C non-operational)

Relative Humidity: Maximum 95 percent.

Vibration: Random, 0.21 grms, 5-500 Hz, 30 Mins, X, Y, Z axis.

Dimensions (H x W x D): 8.8 x 44.4 x 56.1 cm (3.5 x 17.5 x 22.1 in)

Net Weight: 22 kg (49 lb) without drives, 28 kg (62 lb) with 12 drives, assuming 0.5 kg (1.1 lb) per drive.

Gross Weight (including carton): 30 kg (66 lb) without drives.

Safety: CE, FCC Class A, VCCI, C-Tick, cUL, TUV, CB, BSMI, MIC.

Warranty and Support

Warranty: Three years complete system limited warranty.

Support: 24x7 email and phone support (English only). 24x7 access to Promise support site for drivers, firmware, and compatibility.

CE Statement

Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

GOST-R Statement

Предупреждение. Данный продукт относится к классу А. В домашних условиях он может быть причиной возникновения радиопомех, в этом случае пользователю, возможно, потребуется принять соответствующие меры.

IRAM Statement

Advertencia: Este es un producto de clase A. En un ambiente doméstico, este producto puede causar interferencia de las ondas de radio, en cuyo caso se podría requerir que el usuario tome las medidas adecuadas.

MIC Statement

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약 잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Chapter 2: VTrak Installation

This chapter covers the following topics:

- Unpacking the VTrak (below)
- Mounting VTrak E610f/s in a Rack (page 12)
- Mounting VTrak E310f/s in a Rack (page 14)
- Installing Disk Drives (page 17)
- Making Management and Data Connections (page 21)
- Setting Up Serial Cable Connections (page 32)
- Connecting the Power (page 33)

Unpacking the VTrak

The VTrak box contains the following items:

- VTrak Unit
- *Quick Start Guide*
- Front bezel and key (E310f and E310s only)
- Left and right center-mount brackets
- Left and right mounting rails
- RJ11-to-DB9 serial data cable
- Screws for disk drives (E610f/s: 70, including 6 spares) (E310f/s: 50, including 2 spares)
- 1.5m (4.9 ft) Power cords (2)
- CD with SNMP files, *Product Manual* and *Quick Start Guide*



Warning

The electronic components within the VTrak disk array are sensitive to damage from Electro-Static Discharge (ESD). Observe appropriate precautions at all times when handling the VTrak or its subassemblies.



Important

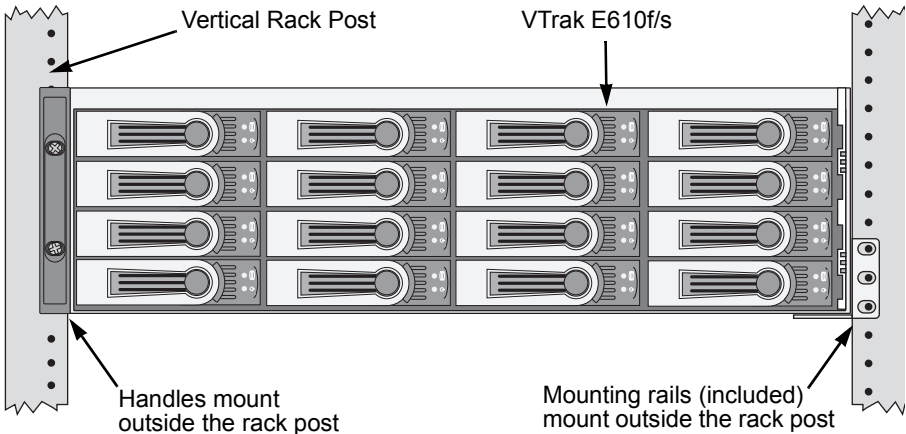
Use the following categories of network cables with VTrak:

- Cat 6, preferred
 - Cat 5E, minimum
-

Mounting VTrak E610f/s in a Rack

The E610f/s subsystem installs to the rack using the supplied mounting rails. You can also use your existing rails.

Figure 1. VTrak E610f/s mounted in a rack with the supplied rails



Cautions

- At least two persons are required to safely lift, place, and attach the VTrak subsystem into a rack system.
 - Do not lift or move the VTrak subsystem by the handles, power supplies or the controller units. Hold the subsystem itself.
 - Do not install the VTrak subsystem into a rack without rails to support the subsystem.
 - Only a qualified electrician who is familiar with the installation procedure should mount and install the VTrak subsystem.
 - Be sure all switches are OFF before installing the VTrak subsystem or exchanging components.
-

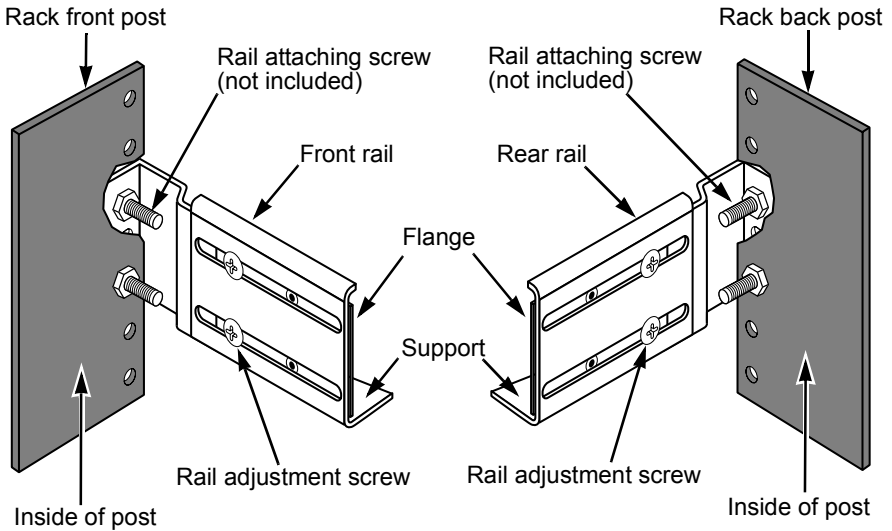
To install the E610f/s subsystem into a rack with the supplied mounting rails:

1. Check the fit of the mounting rails in your rack system. See Figure 2.
2. Adjust the length of the mounting rails as needed.
3. Attach the mounting rail assemblies to the outside of the rack posts, using the attaching screws from your rack system.

Be sure the support is on the bottom facing inward.

4. Square the rail assemblies in the rack.
5. Tighten the adjustment screws and the attaching screws.
6. Place the VTrak subsystem onto the rails.
7. Secure the VTrak subsystem to the rack through each handle, using the attaching screws from your rack system.

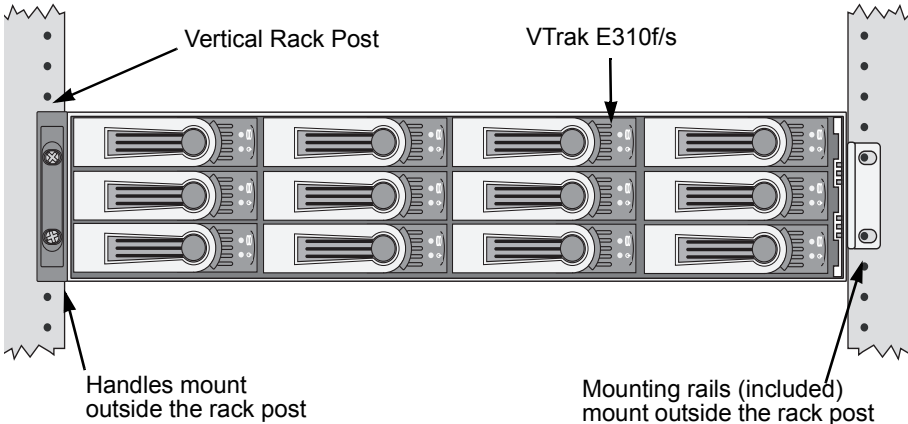
Figure 2. Rack mount assembly diagram



Mounting VTrak E310f/s in a Rack

The E-Class subsystems install to the rack using the supplied mounting rails. You can also use your existing rails.

Figure 3. VTrak E310f/s mounted in a rack with the supplied rails



Cautions

- At least two persons are required to safely lift, place, and attach the VTrak subsystem into a rack system.
- Do not lift or move the VTrak subsystem by the handles, power supplies or the controller units. Hold the subsystem itself.
- Do not install the VTrak subsystem into a rack without rails to support the subsystem.
- Only a qualified electrician who is familiar with the installation procedure should mount and install the VTrak subsystem.
- Be sure all switches are OFF before installing the VTrak subsystem or exchanging components.

To install the VTrak subsystem into a rack with the supplied mounting rails:

1. Check the fit of the mounting rails in your rack system. See Figure 5.
2. Slide the plates out of the mounting rails.
3. Attach one plate to each side of the VTrak subsystem.

Line-up the six holes in the plate with the corresponding holes in the subsystem. Attach each plate with six screws (included). See Figure 4.

4. Slide one of the rails over the plate on one side of the enclosure.

- The rail is designed to slide freely over the plate.
5. Attach a flange to each end of the rail, with the rail on the opposite side of the flange from the two-hole bracket.
 6. Install the rail adjustment screws (included) through the flange into the rail. There are four screws for each flange. See Figure 5.
 7. Place the subsystem with mounting rails into your rack system.
 8. Attach the mounting rail assemblies to the outside of the rack posts, using the attaching screws from your rack system.
 9. Square the rail assemblies in the rack.
 10. Tighten the adjustment screws and the attaching screws.
 11. Place the VTrak subsystem onto the rails.
 12. Secure the VTrak subsystem to the rack through each handle, using the attaching screws from your rack system.

Figure 4. Sliding flange installation

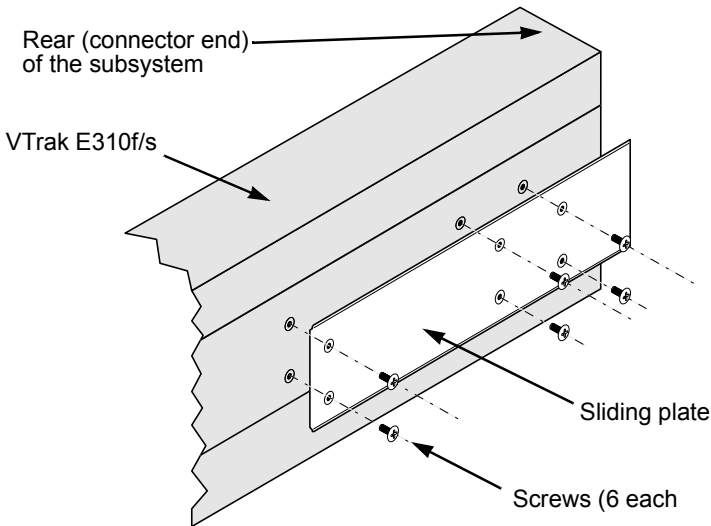
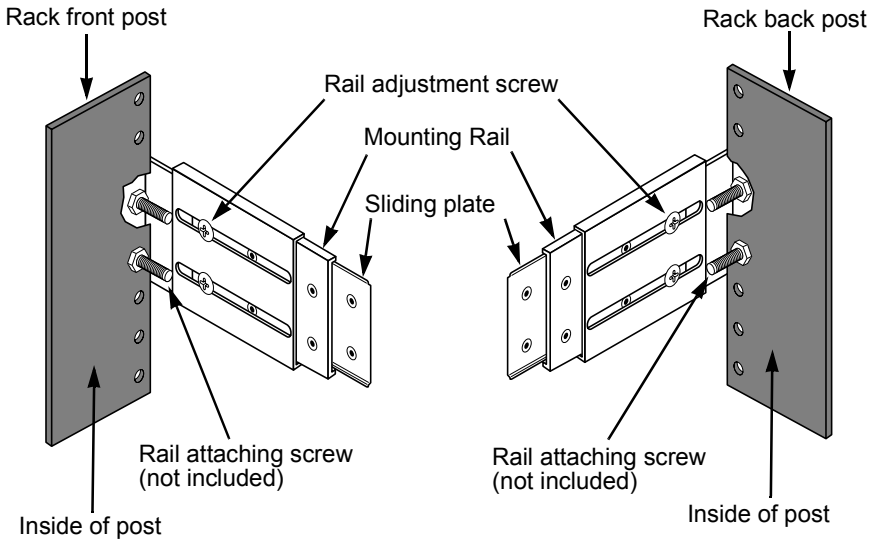


Figure 5. Mounting rail installation



Installing Disk Drives

You can populate the VTrak with SAS or SATA hard disk drives. For optimal performance, install physical drives of the same model and capacity. The drives' matched performance allows the logical drive to function better as a single drive. The table below shows the number of drives required for each RAID level.

Level	Number of Drives	Level	Number of Drives
RAID 0	1 or more	RAID 6	4 to 16*
RAID 1	2 only	RAID 10	4 or more**
RAID 1E	2 or more	RAID 50	6 or more
RAID 5	3 to 16*	RAID 60	8 or more

* E310f/s: Drive counts above 12 require an expansion unit.
 ** Must be an even number of drives.

Drive Slot Numbering

You can install any suitable disk drive into any slot in the enclosure. The diagram below shows how VTrak's drive slots are numbered. Slot numbering is reflected in the WebPAM PROe and CLU user interfaces.

Figure 6. VTrak E610f/s drive slot numbering

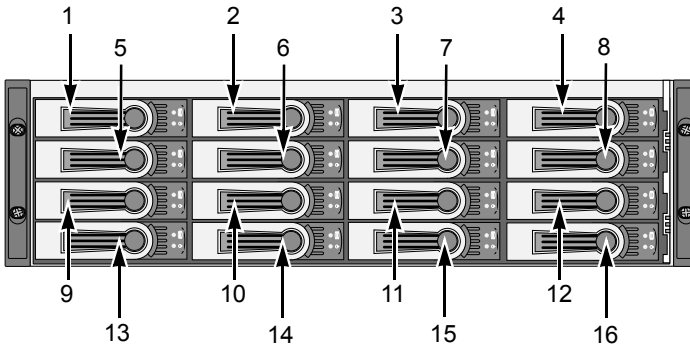
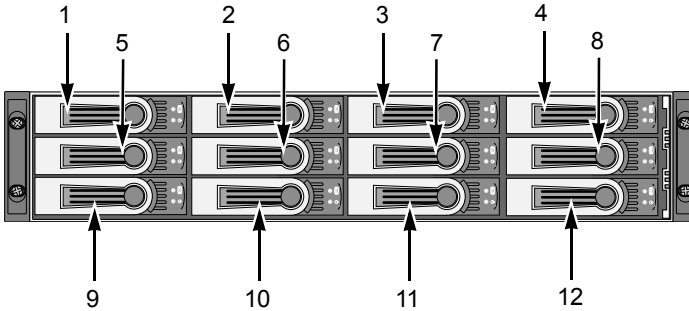


Figure 7. VTrak E310f/s drive slot numbering

Install all of the drive carriers into the VTrak enclosure to ensure proper airflow, even if you do not populate all the carriers with disk drives.

AAMUX Adapter

If your VTrak has dual controllers—Fibre Channel or SAS—and you plan to install SATA drives, you **must** install an AAMUX adapter with each SATA drive. AAMUX adapters are available from Promise Technology.

Installing Disk Drives

1. Remove a disk drive carrier.
2. SATA drives only. Place the AAMUX adapter into the disk drive carrier and attach it with the four screws. See Figure 9.
 - Install only the screws supplied with the adapter.
 - The adapter fits into the carrier with the SAS connector at the back.
 - Snug each screw. Be careful not to over-tighten.
3. Carefully lay the disk drive into the drive carrier at the front, so that the screw holes on the bottom line up.

If you installed an AAMUX adapter, lay the SATA disk drive into the carrier and slide it so the power and data connectors insert in to the adapter.
4. Insert the screws through the holes in the drive carrier and into the bottom of the disk drive. See Figure 8.
 - Install only the counter-sink screws supplied with the VTrak.
 - Install four screws per drive.
 - Snug each screw. Be careful not to over-tighten.
5. Reinstall the drive carrier into the VTrak chassis.

Repeat steps 2 through 5 until all of your disk drives are installed.

Figure 8. Disk drive mounting holes in the drive carrier

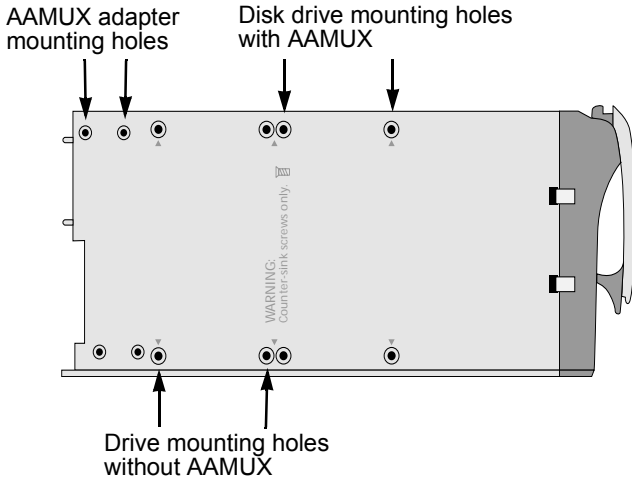


Figure 9. SATA drive mounted in a drive carrier with the AAMUX adapter

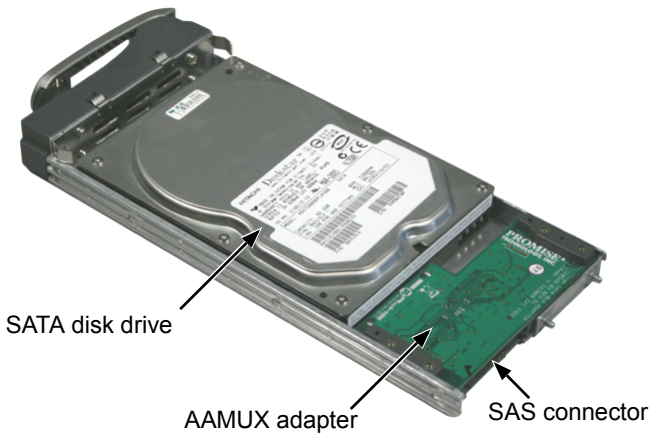


Figure 10. SAS drive mounted in a drive carrier



Making Management and Data Connections

For Serial Attached SCSI setup, go to page 26.

Fibre Channel

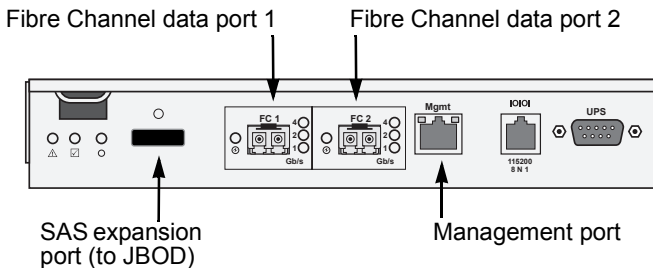
VTrak models can have one or two RAID controllers. Each controller has an Ethernet (RJ45) Management Port connector that enables you to monitor the VTrak over your network using the WebPAM PROe Software. VTrak supports HTTP(S) and Telnet protocols.

The VTrak E610f and E310f RAID controllers have two 4-Gb Fibre Channel (FC) connections for the data ports. See Figure 11.

You can configure your VTrak for:

- Storage Area Network (SAN)
- Direct Attached Storage (DAS)
- JBOD Expansion using a SAS data connection

Figure 11. VTrak E610f and E310f controller data and management connectors



Configuring a Storage Area Network

A storage area network (SAN) requires:

- A Fibre Channel switch
- A Fibre Channel HBA card in each Host PC or Server
- A network switch
- A network interface card (NIC) in each Host PC or Server

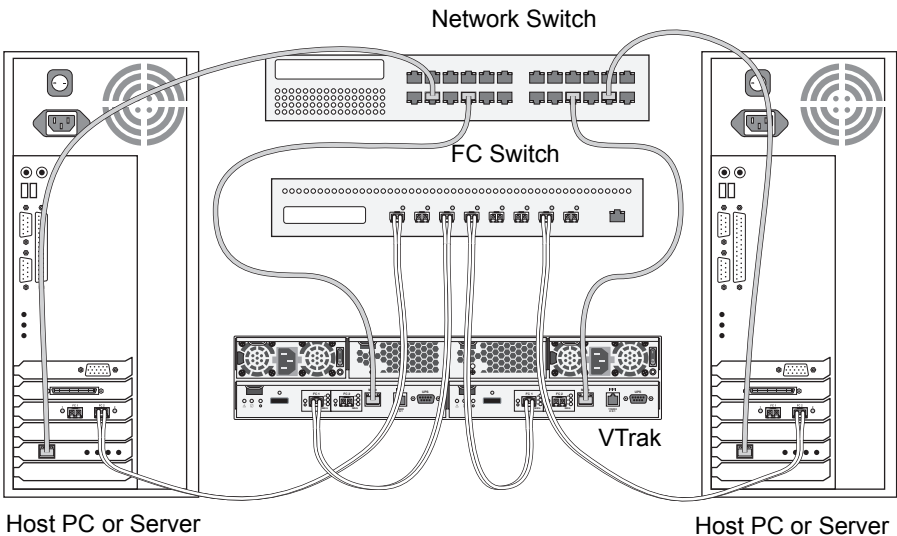
To establish the data path:

Connect one of the Fibre Channel data ports on the VTrak controller to your Fibre Channel switch.

To establish the management path:

1. Connect the Management port on the VTrak controller to your network switch. Figure 12.
2. Connect each Host PC's or Server's standard NIC to your network switch.

Figure 12. SAN data and management connections. The E310f is shown. The E610f is similar



Configuring Direct Attached Storage

Direct attached storage (DAS) requires:

- Two Fibre Channel HBA cards in the Host PC or Server
- A network switch
- A network interface card (NIC) in the Host PC or Server

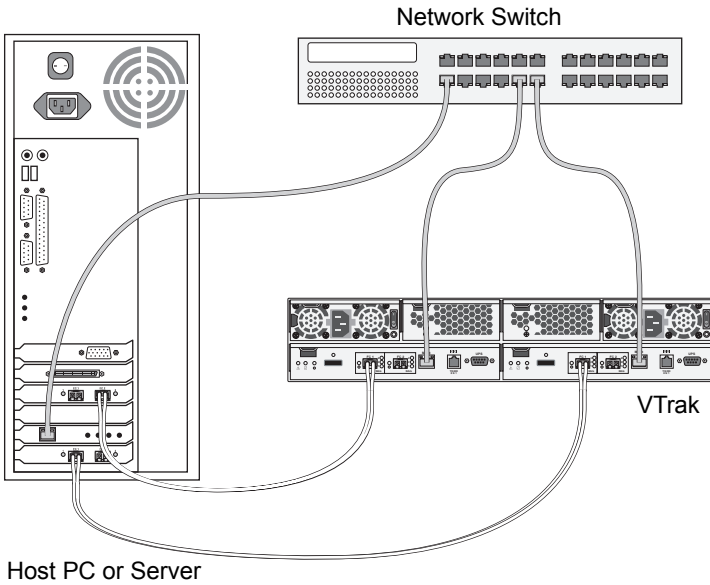
To establish the data path:

Connect one of the Fibre Channel data ports on the VTrak controller to your Fibre Channel switch. See Figure 13.

To establish the management path:

1. Connect the Management port on the VTrak controller to your network switch. See Figure 13.
2. Connect the Host PC's or Server's standard NIC to your network switch.

Figure 13. DAS data and management connections. The E310f is shown. The E610f is similar

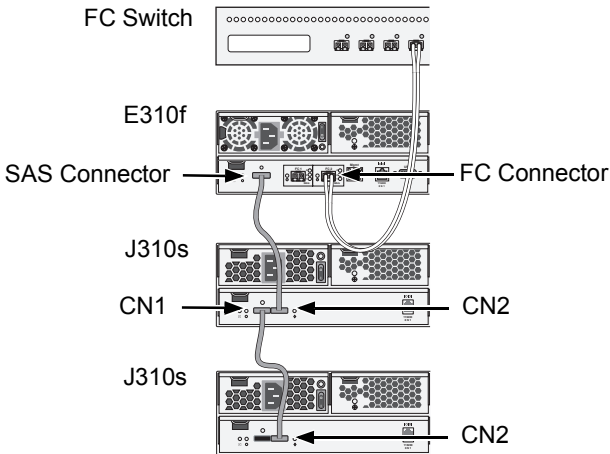


Configuring JBOD Expansion

To expand the number of disk drives:

1. Connect the SAS expansion port on the E610f or E310f controller to the CN2 port (with a diamond icon) on the I/O module of the first J610s or J310s unit. See Figure 14.
2. Connect CN1 port (with a circle icon) on the first J310s unit to CN2 the port (with a diamond icon) on the I/O module of the next J610s or J310s unit.
3. Connect the remaining J610s or J310s units in the same manner.
Be sure to connect circle icon to diamond icon or vice versa.
You can combine J610s and J310s units in the JBOD expansion.

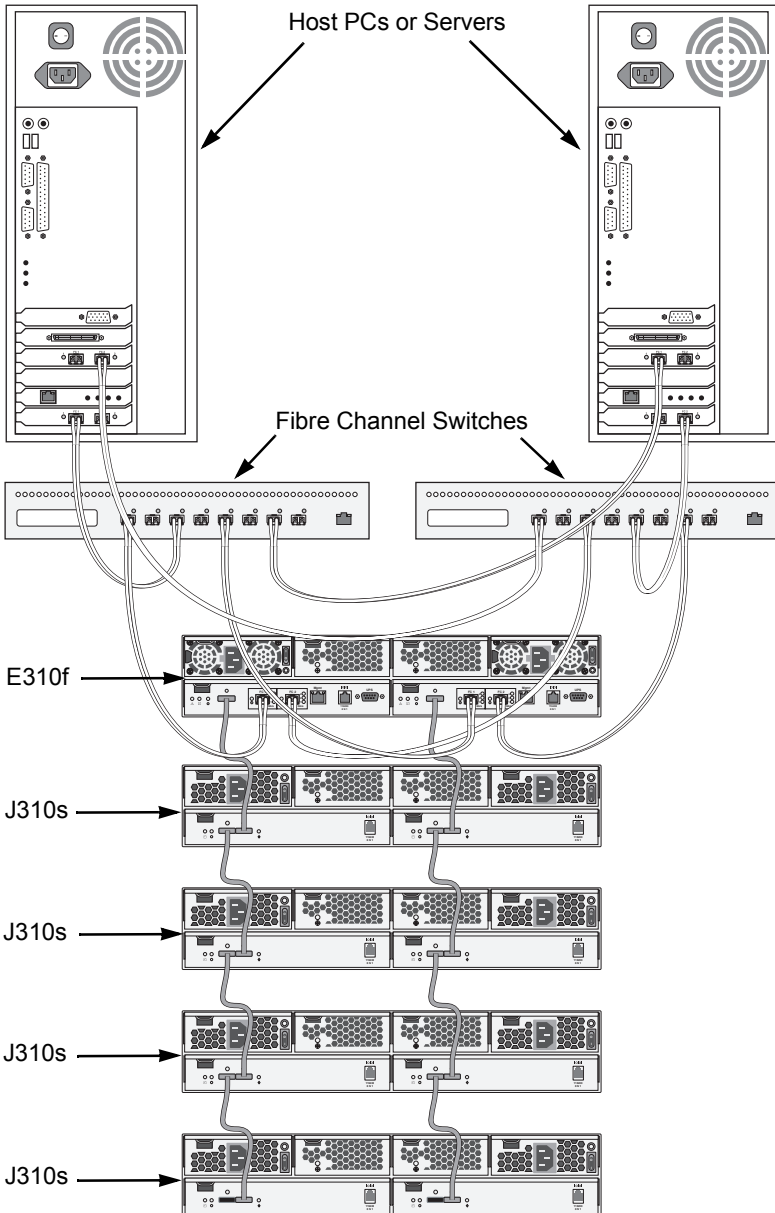
Figure 14. JBOD data connections. The E310f and J310s are shown. The E610f and J610s are similar



You can expand a SAN system with no single point of failure. See Figure 15. Such an arrangement requires:

- Two Fibre Channel switches
- Two Fibre Channel HBA cards in each Host PC or Server
- A network switch (not shown)
- A network interface card (NIC) in each Host PC or Server

Figure 15. JBOD expansion with no single point of failure



This completes management and data connections for VTrak E610f and E310f. Go to See “Setting Up Serial Cable Connections” on page 32.

Serial Attached SCSI

VTrak models can have one or two RAID controllers. Each controller has an Ethernet (RJ45) Management Port connector that enables you to monitor the VTrak over your network using the WebPAM PROe Software. VTrak supports HTTP(S) and Telnet protocols.

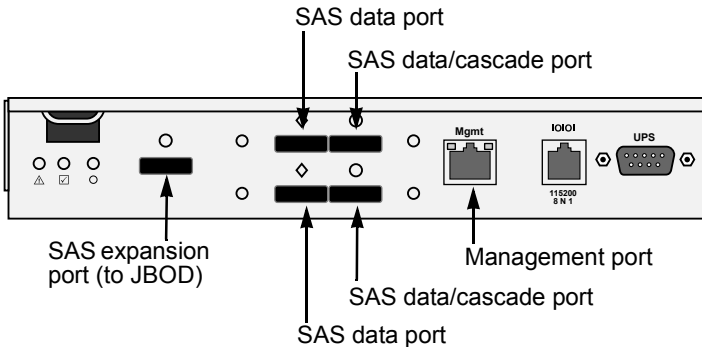
The standard VTrak E610s and E310s controllers have five SAS ports:

- Data ports (2) – Connects to the Host PC or Server
- Data/Cascade ports (2) – Connects to the data port of a second E610s or E310s controller or to the Host PC or Server
- SAS Expansion port (1) – Connects to a VTrak J610s or J310s JBOD expansion subsystem

You can configure your VTrak for:

- Direct Attached Storage (DAS)
- Cascaded Storage (Multiple E610s or E310s subsystems)
- JBOD Expansion using a SAS data connection

Figure 16. VTrak E610s and E310s controller data and management connectors



Configuring Direct Attached Storage

Direct attached storage (DAS) requires:

- Two SAS HBA cards in the Host PC or Server
- A network switch
- A network interface card (NIC) in the Host PC or Server

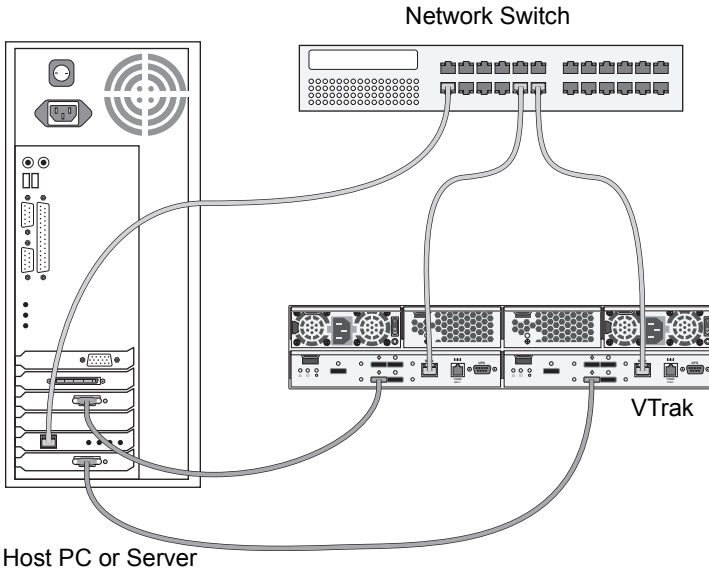
To establish the data path:

On the VTrak controller, connect a SAS data port or a SAS data/cascade port to one of your SAS HBA cards. See Figure 17.

To establish the management path:

1. Connect the Management port on each Controller to your network switch. See Figure 17.
2. Connect the Host PC's or Server's standard NIC to your network switch.

Figure 17. DAS data and management connections. The E310s is shown. The E610s is similar



Configuring Cascaded Storage

Cascaded storage requires:

- One SAS HBA card in the Host PC or Server
- A network switch
- A network interface card (NIC) in the Host PC or Server

To establish the data path:

1. Connect a SAS data port or a SAS data/cascade port on the VTrak controller to your SAS HBA card. See Figure 18.
2. Connect the remaining port of the first VTrak to the next VTrak. Be sure to connect circle icon to diamond icon or vice versa.
3. Connect the remaining VTrak controllers in the same manner. You can cascade up to eight VTrak subsystems. Be sure to connect circle icon to diamond icon or vice versa.

To establish the management path:

1. On the VTrak controller, connect the Management Port on each Controller to your network switch. See Figure 19.
2. Connect the Host PC's or Server's standard NIC to your network switch.

Figure 18. Cascaded data connections. The E310s is shown. The E610s is similar

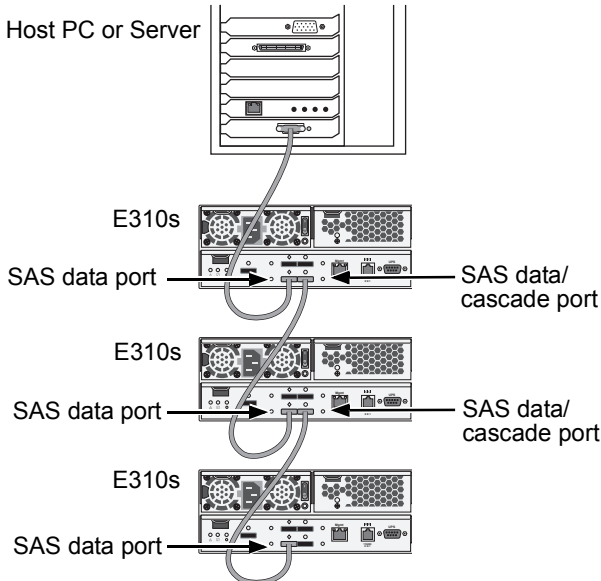
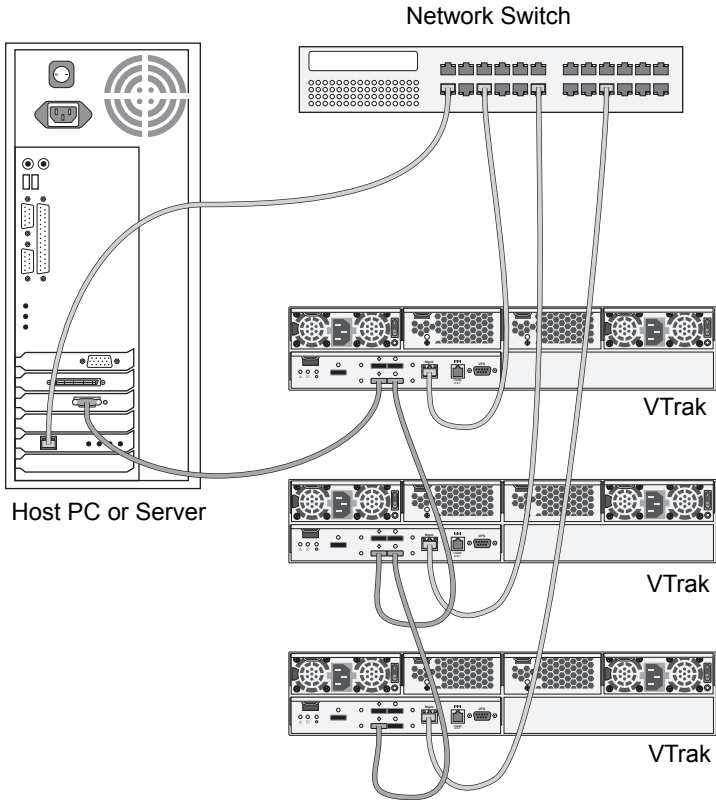


Figure 19. Cascaded management and data connections. The E310s is shown. The E610s is similar

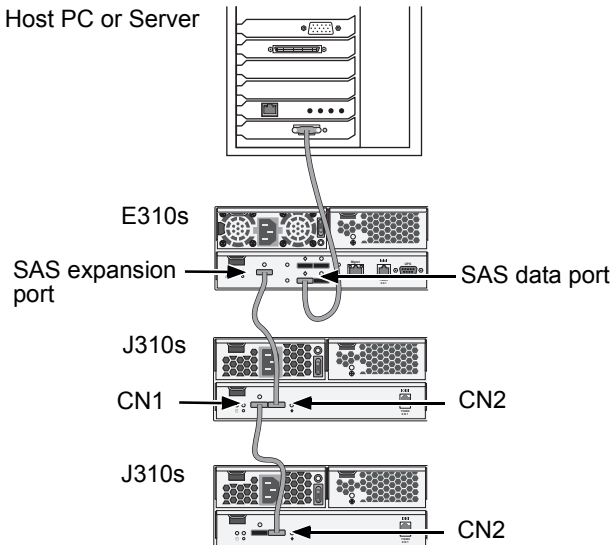


Configuring JBOD Expansion

To expand the number of disk drives:

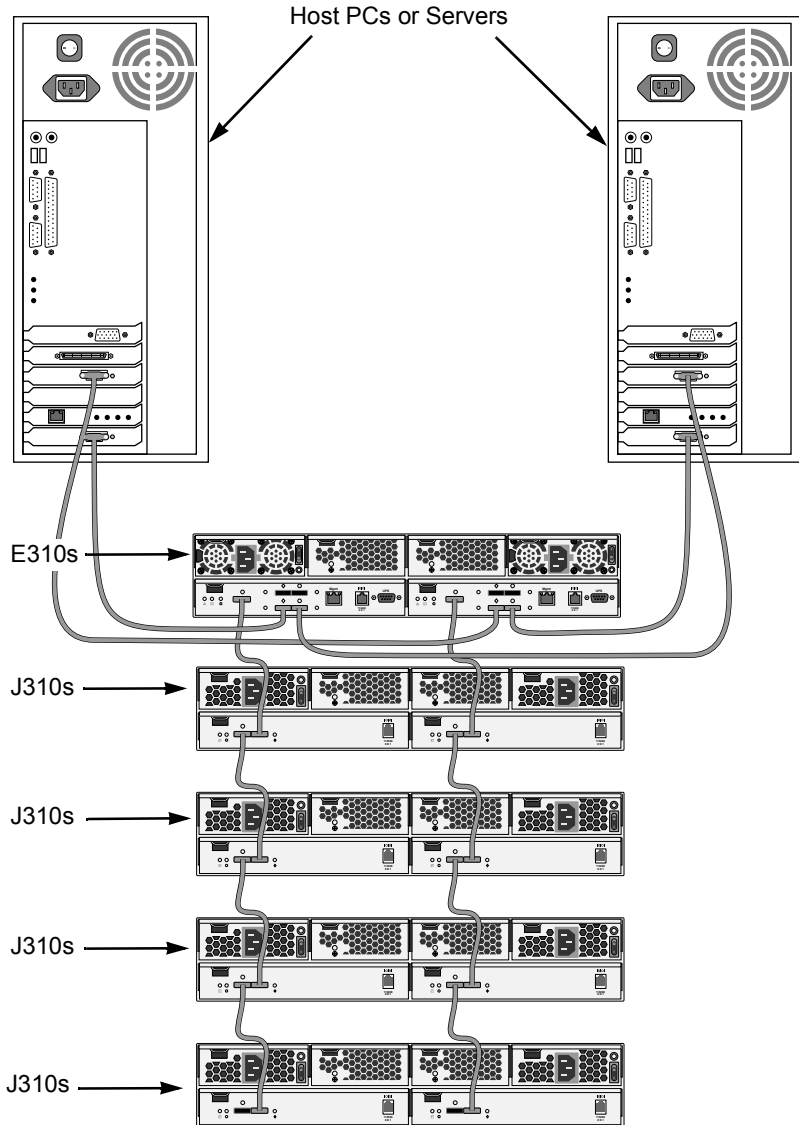
1. Connect the SAS expansion port on the E610s or E310s controller to the CN2 port (with a diamond icon) on the I/O module of the first J610s or J310s unit. See Figure 20.
2. Connect CN1 port (with a circle icon) on the first J310s unit to the CN2 port (with a diamond icon) on the I/O module of the next J610s or J310s unit.
3. Connect the remaining J610s or J310s units in the same manner.
You can combine J610s and J310s units in the JBOD expansion.
Be sure to connect circle icon to diamond icon or vice versa.

Figure 20. JBOD data connections. The E310s and J310s are shown. The E610s and J610s are similar



You can expand a SAN system with no single point of failure. See Figure 21. Such an arrangement requires:

- Two SAS HBA cards in each Host PC or Server
- A network switch (not shown)
- A network interface card (NIC) in each Host PC or Server
- One to four VTrak J610s or J310s JBOD subsystems

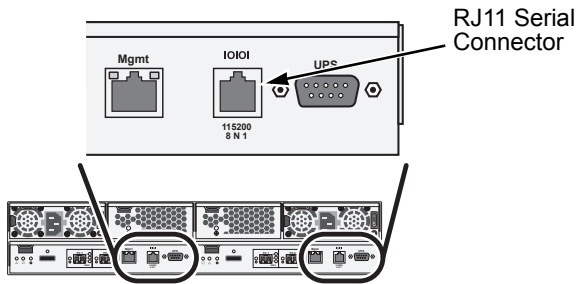
Figure 21. JBOD expansion with no single point of failure

This completes Network and Data connections for VTrak E610s and E310s. Go to See "Setting Up Serial Cable Connections" on page 32.

Setting Up Serial Cable Connections

Serial communication enables the Command Line Interface (CLI) and Command Line Utility (CLU) on your PC to monitor to control the VTrak. The VTrak package includes one RJ11-to-DB9 serial data cable for each controller.

Figure 22. A serial connector is located on the controller. The E310f is shown. The E610f, E610s, and E310s are similar



To set up a serial cable connection:

1. Attach the RJ11 end of the serial data cable to the RJ11 serial connector on one of the I/O modules.
2. Attach the DB9 end of the serial data cable to a serial port on the Host PC or Server.



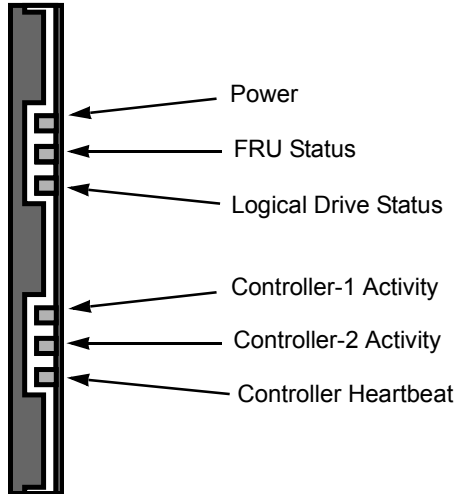
Note

The DB9 connector on the VTrak controller is for a UPS support, which is planned for a future release.

Connecting the Power

Plug the power cords and switch on both power supplies on. When the power is switched on, the LEDs on the front of the VTrak will light up.

Figure 23. VTrak front panel LED display. The E310f/s is shown. The E610f/s is similar

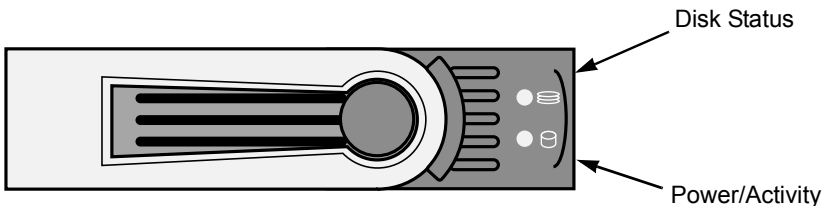


When boot-up is finished and the VTrak is functioning normally:

- Controller LED blinks green once per second for five seconds, goes dark for ten seconds, then blinks green once per second for five seconds again.
- Power, FRU and Logical Drive LEDs display green continuously.
- Controller LEDs flash green if there is activity on that controller.

There are two LEDs on each disk drive carrier. They report the presence of power and a disk drive, and the current condition of the drive.

Figure 24. VTrak disk drive carrier LEDs



After a few moments the Power/Activity LED should display Green. If there is no disk drive in the carrier, the Power/Activity LED will remain dark.

The Power/Activity LED flashes during drive activity.

The Disk Status LED displays Green when a drive is present and configured.

Go to “Chapter 3: VTrak Setup” on page 35.

Chapter 3: VTrak Setup

This chapter covers the following topics:

- Setting up the Serial Connection (below)
 - Choosing DHCP or a Static IP Address (page 36)
 - Setting up VTrak with the CLI (page 37)
 - Setting up VTrak with the CLU (page 39)
 - Creating Disk Arrays with WebPAM PROe (page 42)
-

Setting up the Serial Connection

VTrak has a Command Line Interface (CLI) to manage all of its functions, including customization. A subset of the CLI is the Command Line Utility (CLU), a user-level interface that manages your VTrak via your PC's terminal emulation program, such as Microsoft HyperTerminal. This procedure uses the serial cable connection you made. See "Setting Up Serial Cable Connections" on page 32.

1. Change your terminal emulation program settings to match the following specifications:
 - Bits per second: 115200
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: none
2. Start your PC's terminal VT100 or ANSI emulation program.
3. Press Enter once to launch the CLI.
4. At the Login prompt, type **administrator** and press Enter.
5. At the Password prompt, type **password** and press Enter.

At this point, you are in the CLI. You can continue using the CLI to make network settings or you can switch to the CLU. Go to:

- Setting up VTrak with the CLI (page 37)
- Setting up VTrak with the CLU (page 39)

Choosing DHCP or a Static IP Address

When you setup your VTrak, you have the option of:

- Enabling DHCP and letting your DHCP server assign the IP address to the VTrak's virtual management port.
- Specifying a static IP address for the VTrak's virtual management port.

If you choose to enable DHCP, have your Network Administrator dedicate an IP address for the VTrak, linked to the VTrak's MAC address. This action will prevent the DHCP server from assigning a new IP address when the VTrak restarts, with the result that users can no longer log in.

To access the MAC address for VTrak's virtual management port:

- In the CLI, type **net -v** and press Enter.
- In the CLU Main Menu, highlight *Network Management* and press Enter. Then highlight *Virtual* and press Enter.

VTrak Default IP Addresses

VTrak uses virtual and physical IP addresses. This arrangement enables you to access a VTrak with two RAID controllers over your network using a single IP address.

Virtual Management Port

The default virtual management port IP address is set to 10.0.0.1.

The virtual management port IP address belongs to the VTrak subsystem, not to the RAID controller. Use the virtual management port IP address to log into the VTrak over your network.

See "Logging into WebPAM PROe" on page 42.

Physical Management Ports

The default physical management port IP addresses are set to:

- Controller 1 – 10.0.0.2
- Controller 2 – 10.0.0.3

The physical management port IP address belongs to the RAID controller, not to the VTrak subsystem. Use the physical management port IP address only when a controller is in *maintenance mode*.

See "Controller Enters Maintenance Mode" on page 310.

Setting up VTrak with the CLI

1. Type the following string to set the system date and time, then press Enter.

```
administrator@cli> date -a mod -d 2006/08/25 -t 14:50:05
```

In the above example, the date and time are included as examples only. Your values will be different. Use yyyy/mm/dd for the date and a 24-hour clock for the time.

2. Type the following string to set the Virtual Management Port IP address and other settings, then press Enter.

```
administrator@cli> net -a mod -t mgmt -s "primaryip=192.168.10.85,  
primaryipmask=255.255.255.0, gateway=192.168.10.1"
```

In the above example, the IP addresses and subnet mask are included as examples only. Your values will be different.

If you prefer to let your DHCP server assign the Virtual Management Port IP address, type the following string, then press Enter.

```
administrator@cli> net -a mod -t mgmt -s "dhcp=enable"
```

Note that the IP address described above belongs to the VTrak subsystem, not to the RAID controller. Use this IP address to log into the VTrak over your network.

3. To verify the settings, type **net** and press Enter.

```
administrator@cli> net
```

```
=====
CId  Port Type  IP           Mask           Gateway       Link
=====
Virtual  Mgmt 192.168.10.85 255.255.255.0 192.168.10.1 Up
```

Each RAID controller has an IP addresses for access when the controller goes into *maintenance mode*. Maintenance mode is only for remedial action in the event of a problem with the controller. See “Controller Enters Maintenance Mode” on page 310 for more information.

4. Type the following string to set the Maintenance Mode IP address and other settings, then press Enter. You must set each controller separately.

```
administrator@cli> net -a mod -t mgmt -m -c 1 -s  
"primaryip=192.168.10.101, primaryipmask=255.255.255.0,  
gateway=192.168.10.1"
```

```
administrator@cli> net -a mod -t mgmt -m -c 2 -s  
"primaryip=192.168.10.102, primaryipmask=255.255.255.0,  
gateway=192.168.10.1"
```

In the above example, the Maintenance Mode IP addresses and subnet mask are included as examples only. Your values will be different.

If you prefer to let your DHCP server assign the IP addresses, type the following strings, then press Enter.

```
administrator@cli> net -a mod -t mgmt -m -c 1 -s "dhcp=enable"
```

```
administrator@cli> net -a mod -t mgmt -m -c 2 -s "dhcp=enable"
```

Note that the IP address described above belongs to the RAID controller, not to the VTrak subsystem. Use this IP address to log into the controller over your network.

5. To verify the maintenance mode settings, type **net -m** and press Enter.

```
administrator@cli> net -m
```

```
-----  
CtrlId: 1                               Port: 1  
Type: Management Ethernet               IPType: IPv4  
IP: 192.168.10.101                      IPMask: 255.255.255.0  
MAC: 00:01:55:AE:02:AE                  DNS: 0.0.0.0  
Gateway: 192.168.10.1                   DHCP: Disabled
```

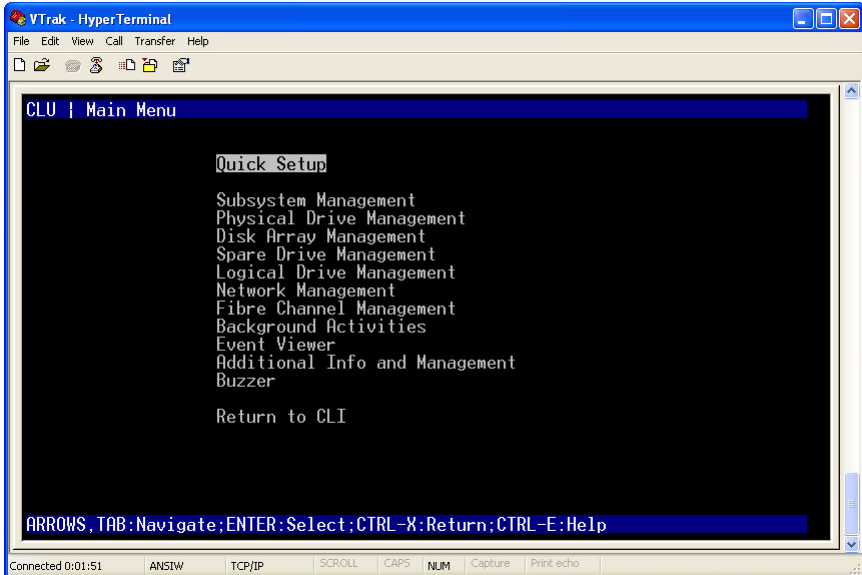
This completes the Management port setup. Go to "Creating Disk Arrays with WebPAM PROe" on page 42.

To see the full set of CLI commands, at the `admin@cli>` prompt, type **help** and press Enter.

Setting up VTrak with the CLU

1. At the administrator@cli> prompt, type **menu** and press Enter.
The CLU main menu appears.

Figure 1. CLU main menu



2. With *Quick Setup* highlighted, press Enter.
The first Quick Setup screen enables you to make Date and Time settings.

Setting system date and time

1. Press the arrow keys to highlight *System Date*.
2. Press the backspace key to erase the current date.
3. Type the new date.
4. Follow the same procedure to set the System Time.
5. Press Ctrl-A to save these settings and move to the Management Port configuration screen.

Making Management Port settings

Manual IP settings

To make Management Port settings manually:

1. Press the arrow keys to highlight *IP Address*.
2. Press the backspace key to erase the current IP Address.
3. Type the new IP Address.
4. Follow the same procedure to specify the Subnet Mask, Gateway IP Address and DNS Server IP Address.

If you do not have a DNS server, skip the DNS Server IP address.

5. Press Ctrl-A to save your settings.

Automatic IP settings

To make Management Port settings automatically:

1. Press the arrow keys to highlight *DHCP*.
2. Press the spacebar to toggle to *Enable*.
3. Press Ctrl-A to save these settings.

Viewing IP address and settings

To view the current IP address and network settings when using DHCP:

1. Press the arrow keys to highlight *DHCP*.
2. Press the spacebar to toggle to *Disable*.
The current Management Port settings are displayed.
3. Press the spacebar to toggle DHCP back to *Enable*.
4. Press Ctrl-A to save these settings and move to the RAID configuration screen.

Making Controller Maintenance Mode Settings

Each RAID controller has an IP addresses for access when the controller goes into *maintenance mode*. Maintenance mode is only for remedial action in the event of a problem with the controller. See “Controller Enters Maintenance Mode” on page 310 for more information.

Making Automatic Settings

1. From the CLU Main Menu, highlight *Network Management* and press Enter.
2. Highlight *Maintenance Mode Network Configuration* and press Enter.
3. Highlight the controller you want and press Enter.
4. Highlight *DHCP* and press the spacebar to toggle to *Enabled*.

5. Press Ctrl-A to save your settings.

Making Manual Settings

1. From the CLU Main Menu, highlight *Network Management* and press Enter.
2. Highlight *Maintenance Mode Network Configuration* and press Enter.
3. Highlight the controller you want and press Enter.
4. Highlight *DHCP* and press the spacebar to toggle to *Disabled*.
5. Highlight each of the following and press the backspace key to erase the current value, then type the new value.
 - IP Address
 - Subnet Mask
 - Default Gateway IP Address
 - DNS Server IP Address
6. Press Ctrl-A to save your settings.

Exiting the CLU

1. Highlight *Skip the Step and Finish* and press Enter.
2. Highlight *Return to CLI* and press Enter.

This completes the Management Port setup. Go to “Creating Disk Arrays with WebPAM PROe” on page 42.

Creating Disk Arrays with WebPAM PROe



Note

You can also use the CLU to create disk arrays and logical drives. See “Chapter 5: Management with the CLU” on page 149.

Setting up disk arrays with WebPAM PROe consists of the following actions:

- Logging into WebPAM PROe (below)
- Selecting a Language (page 44)
- Creating a Disk Array (page 44)
- Logging out of WebPAM PROe (page 48)
- Using WebPAM PROe over the Internet (page 49)
- Obtaining a Security Certificate (page 49)

Logging into WebPAM PROe

1. Launch your Browser.
2. In the Browser address field, type in the virtual IP address of the VTrak subsystem.

Use the virtual IP address you set in the CLI (page 37) or CLU (page 39). Note that the IP address shown below is only an example. The IP address you type into your browser will be different.

Regular Connection

- WebPAM PROe uses an HTTP connection.http://
- Enter the VTrak’s IP address. 192.168.10.85

Together, your entry looks like this:

http://192.168.10.85

Secure Connection

- WebPAM PROe uses a secure HTTP connection.https://
- Enter the VTrak’s IP address. 192.168.10.85

Together, your entry looks like this:

https://192.168.10.85



Note

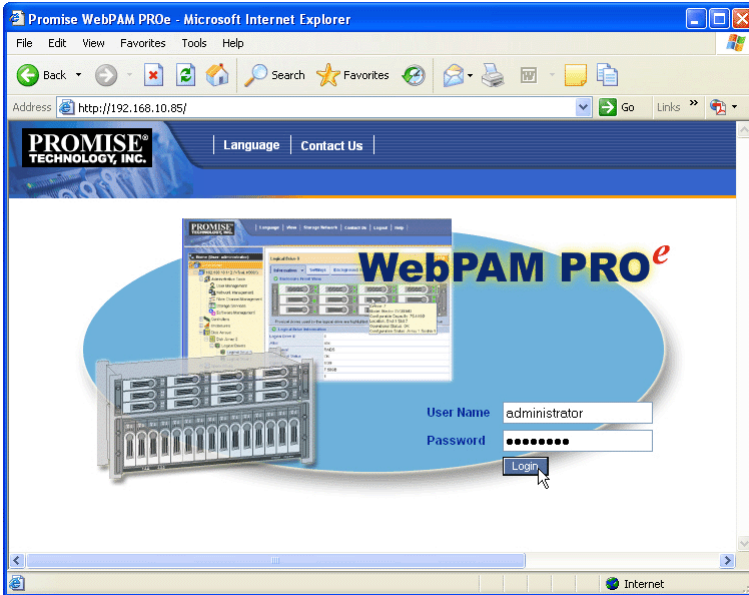
Whether you choose a regular or a secure connection, your login to WebPAM PROe and your user password are always secure.

3. When the log-in screen (Figure 2) appears:
 - Type **administrator** in the User Name field.
 - Type **password** in the Password field.
 - Click the **Login** button.

The User Name and Password are case sensitive.

4. Click the **Login** button.

Figure 2. WebPAM PROe log-in screen



After sign-in, the WebPAM PROe opening screen appears. If there are any unconfigured physical drives in the enclosure, an Array Configuration menu will also appear (see page 44).



Note

Make a Bookmark (Netscape Navigator) or set a Favorite (Internet Explorer) of the Login Screen so you can access it easily next time.

Selecting a Language

WebPAM PROe displays in English, German, French, Italian, Spanish, Russian, Japanese, Chinese Traditional, Chinese Simple, and Korean.

1. Click **Language** on the WebPAM PROe Header.
The language list appears in the Header.
2. Click the language you prefer.
The WebPAM PROe user interface displays in the selected language.

Figure 3. Clicking “Language” on the WebPAM PROe Header



Creating a Disk Array

On a newly activated VTrak subsystem, there are no disk arrays or logical drives. To create a disk array:


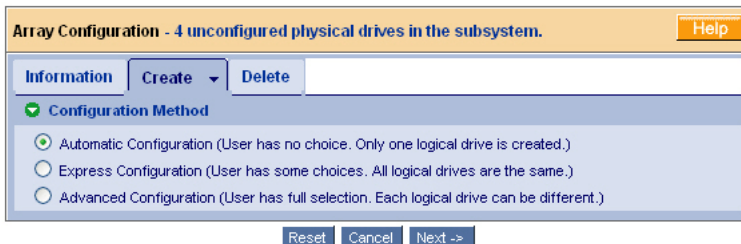
1. Click the Disk Arrays  icon, then click the **Create** tab.
The Array Configuration menu appears. See Figure 4.
2. Choose one of the options:
 - **Automatic** – Creates a new disk array based on a default set of parameters, including one logical drive. The number of unconfigured physical drives available determines the RAID level of the disk array and whether a spare drive is created. See page 45.
 - **Express** – Creates a new disk array based on the characteristics you specify. You can create multiple logical drives. However, all of the logical drives will be the same size and RAID level. See page 46.
 - **Advanced** – Enables you to directly specify all parameters for a new disk array and its logical drives. See page 47.
3. Click the **Next** button.

Figure 4. The Array Configuration menu



Automatic

When you choose the Automatic option, the following parameters appear on the screen:

- **Disk Arrays** – The number of physical drives in the disk array, their ID numbers, configurable capacity, and the number of logical drives to be created
- **Logical Drives** – The ID number of the logical drive(s), their RAID level, capacity, and stripe size
- **Spare Drives** – The physical drive slot number of the dedicated hot spare assigned to this disk array. A hot spare drive is created for all RAID levels except RAID 0, when five or more unconfigured physical drives are available

If you accept these parameters, click the **Submit** button.

The new disk array appears in the Disk Array List on the Information tab.

If you do NOT accept these parameters, use the Express (page 46) or Advanced (page 47) option to create your disk array.

Express

When you choose the Express option, a set of characteristics and options appears on the screen.

1. Check the boxes to choose any one or a combination of:
 - **Redundancy** – The array will remain available if a physical drive fails
 - **Capacity** – The greatest possible amount of data capacity
 - **Performance** – The highest possible read/write speed
 - **Spare Drive** – A hot spare drive is created when you choose Redundancy, Spare Drive, and five or more unconfigured physical drives are available
2. In the Number of Logical Drives field, enter the number of logical drives you want to make from this disk array.
The maximum possible number of logical drives appears to the right of this field.
3. From the Application Type menu, choose an application that best describes your intended use for this disk array:
 - File Server
 - Video Stream
 - Transaction Data
 - Transaction Log
 - Other

4. Click the **Update** button.

Or check the Automatic Update box and updates will occur automatically.

The following parameters display:

- **Disk Arrays** – The number of physical drives in the disk array, their ID numbers, configurable capacity, and the number of logical drives to be created
- **Logical Drives** – The ID number of the logical drive(s), their RAID level, capacity, and stripe size
- **Spare Drives** – The physical drive ID number of the dedicated hot spare assigned to this disk array (all RAID levels except RAID 0)

If you accept these parameters, proceed to the next step.

If you do NOT accept these parameters, review and modify your selections in the previous steps.

5. When you are done, click the **Submit** button.

The new disk array appears in the Disk Array List on the Information tab.

Advanced



Note

For an explanation of the parameters under the Advanced option, see “Chapter 7: Technology Background” on page 237.

When you choose the Advanced option, the *Step 1 – Disk Array Creation* screen displays.

Step 1 – Disk Array Creation

1. Enter a name for the disk array in the field provided.
2. Check the box if you want to enable Media Patrol.
For more information, see “Media Patrol” on page 267.
3. Check the box if you want to enable PDM.
For more information, see “Predictive Data Migration (PDM)” on page 268.
4. Highlight physical drives you want in the disk array from the Available list and press the >> button to move them to the Selected list.
You can also double-click them to move them.
5. When you are done, click the **Next** button.

Step 2 – Logical Drive Creation

Logical Drive Creation enables you to specify logical drives under the new disk array. Enter the information for a logical drive, then click the **Update** button. If there is free capacity remaining, you can specify another logical drive now or wait until later.

6. Enter an alias for the logical drive in the field provided.
7. Choose a RAID level for the logical drive from the dropdown menu.
The choice of RAID levels depends the number of physical drives you selected.
8. RAID 50 and 60 only – Specify the number of axles for your array.
For more information on axles, see “RAID 50 Axles” on page 245 or “RAID 60 Axles” on page 248.
9. Specify a Capacity and the unit of measure (MB, GB, TB).
This value will be the data capacity of the first logical drive in your new disk array. If you specify less than disk array's maximum capacity, the remainder will be available for additional logical drives which you can create later.
10. Specify a Stripe size from the dropdown menu.
64 KB, 128 KB, 256 KB, and 1 MB are available. 64 KB is the default.

11. Specify a Sector size from the dropdown menu.
512 B, 1 KB, 2 KB, and 4 KB are available. 512 B is the default.
12. Specify a Read (cache) Policy from the dropdown menu.
Read Cache, Read Ahead Cache, and No Cache are available. Read Ahead is the default.
13. Specify a Write (cache) Policy from the dropdown menu.
Write Back and Write Through (Thru) are available. Write Back is the default.
14. From the Preferred Controller ID dropdown menu, choose a controller.
The choices are Controller 1 or 2, or Automatic. This feature is only available on subsystems with two controllers and LUN Affinity enabled.
15. Click the **Update** button.
A new logical drive is displayed under New Logical Drives.
Repeat the above steps to specify additional logical drives as desired.
16. When you are done specifying logical drives, click the **Next** button.

Step 3 – Summary

The Summary lists the disk array and logical drive information you specified.

17. To proceed with disk array and logical drive creation, click the **Submit** button.

Logging out of WebPAM PROe

There are two ways to log out of WebPAM PROe:

- Close your browser window
- Click **Logout** on the WebPAM PROe banner

Figure 5. Clicking “Logout” on the WebPAM PROe banner



Clicking **Logout** brings you back to the Login Screen. See page 43.

After logging out, you must enter your user name and password in order to log in again.

Using WebPAM PROe over the Internet

The above instructions cover connections between VTrak and your company network. It is also possible to connect to a VTrak from the Internet.

Your MIS Administrator can tell you how to access your network from outside the firewall. Once you are logged onto the network, you can access the VTrak using its IP address.

While only a Fibre Channel or SAS-capable PC can read and write data to the logical drives on the VTrak, other PCs can monitor the VTrak from virtually any location.

Obtaining a Security Certificate

Promise Technology provides a default security certificate for the web server as well as for internal data communication. However, in most cases it is better to install and verify your own certificate. And, if possible, verify your certificate through a certificate authority, such as Verisign or Thwate. See your MIS Administrator for guidance.

To download your security certificate to WebPAM PROe, see “Making Web Server Settings” on page 92.

Chapter 4: Management with WebPAM PROe

This chapter covers the following topics:

- Logging into WebPAM PROe (page 52)
- Selecting a Language (page 54)
- Perusing the Interface (page 55)
- Logging out of WebPAM PROe (page 59)
- Working with the Storage Network (page 60)
- Working with Subsystems (page 61)
- Managing Users (page 72)
- Managing the Network Connection (page 77)
- Managing Fibre Channel Connections (page 79)
- Managing SAS Connections (page 85)
- Managing Storage Services (page 88)
- Managing Software Services (page 91)
- Exporting the User Database (page 99)
- Importing a User Database (page 100)
- Importing a Configuration Script (page 101)
- Updating the Firmware (page 102)
- Viewing Flash Image Information (page 103)
- Restoring Factory Defaults (page 104)
- Clearing Statistics (page 105)
- Shutting Down the Subsystem (page 106)
- Restarting the Subsystem (page 107)
- Managing Controllers (page 108)
- Managing Enclosures (page 113)
- Managing Physical Drives (page 119)
- Managing Disk Arrays (page 124)
- Managing Logical Drives (page 137)
- Managing Spare Drives (page 144)
- Working with the Logical Drive Summary (page 148)

For information about VTrak's audible alarm and LEDs, see "Chapter 8: Troubleshooting" on page 273.

Logging into WebPAM PROe

In order to log into WebPAM PROe, you must first setup a network connection between your Host PC and the VTrak subsystem, as described in “Chapter 3: VTrak Setup” on page 35.

To log into WebPAM PROe:

1. Launch your Browser.
2. In the Browser address field, type in the IP address of the VTrak Management port.

Note that the IIP address shown below is only an example. The IP address you type into your browser will be different.

Regular Connection

- WebPAM PROe uses an HTTP connection.http://
- Enter the VTrak’s Management Port IP address 192.168.10.85

Together, your entry looks like this:

http://192.168.10.85

Secure Connection

- WebPAM PROe uses a secure HTTP connection.https://
- Enter the VTrak’s Management Port IP address 192.168.10.85

Together, your entry looks like this:

https://192.168.10.85



Note

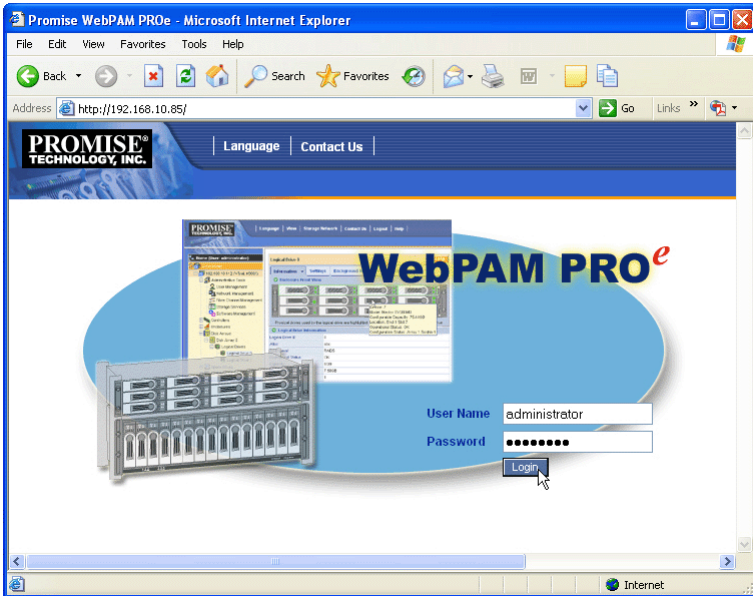
Whether you choose a regular or a secure connection, your login to WebPAM PROe and your user password are always secure.

3. When the log-in screen (Figure 1) appears:
 - Type **administrator** in the User Name field.
 - Type **password** in the Password field.
 - Click the **Login** button.

The User Name and Password are case sensitive.

4. Click the **Login** button.

Figure 1. The WebPAM PROe log-in screen



Selecting a Language

WebPAM PROe displays in English, German, French, Italian, Spanish, Russian, Japanese, Chinese Traditional, Chinese Simple, and Korean.

1. Click **Language** the WebPAM PROe Header.
The language list appears in the Header.
2. Click the language you prefer.
The WebPAM PROe user interface displays in the selected language.

Figure 2. Clicking “Language” in the Header



Perusing the Interface

WebPAM PROe is browser-based RAID management software with a graphic user interface.

Figure 3. WebPAM PROe interface

The screenshot shows the WebPAM PROe interface in a Microsoft Internet Explorer browser window. The browser title is "Promise WebPAM PROe - Microsoft Internet Explorer". The address bar shows "http://192.168.20.52/screen.php". The interface has a blue header with the "WebPAM Header" and navigation links: Language, View, Storage Network, Contact Us, Logout, Help, About. Below the header is a "Subsystem" section for "Disk Array 0" with tabs: Information, Settings, Create LD, Delete LD, Background Activities, Transport. The "Information" tab is active, showing "Enclosure Front View" with a server rack diagram and "Disk Array Information" with a "Management View" table. The table lists details for Disk Array ID 0, Alias Deniel, Operational Status OK, Total Physical Capacity 145.94GB, and Configurable Capacity 137.84GB. At the bottom is an "Event Frame" showing a log of events from Dec 7, 2006 to Dec 11, 2006. The interface also includes a left sidebar with a "Tree View" showing the system hierarchy and a top navigation bar with "WebPAM Header" and "Subsystem" labels.

There are four major parts to the graphic user interface:

- Header (see page 56)
- Tree (see page 57)
- Management View (see page 58)
- Event Frame (see page 58)

Using the Header

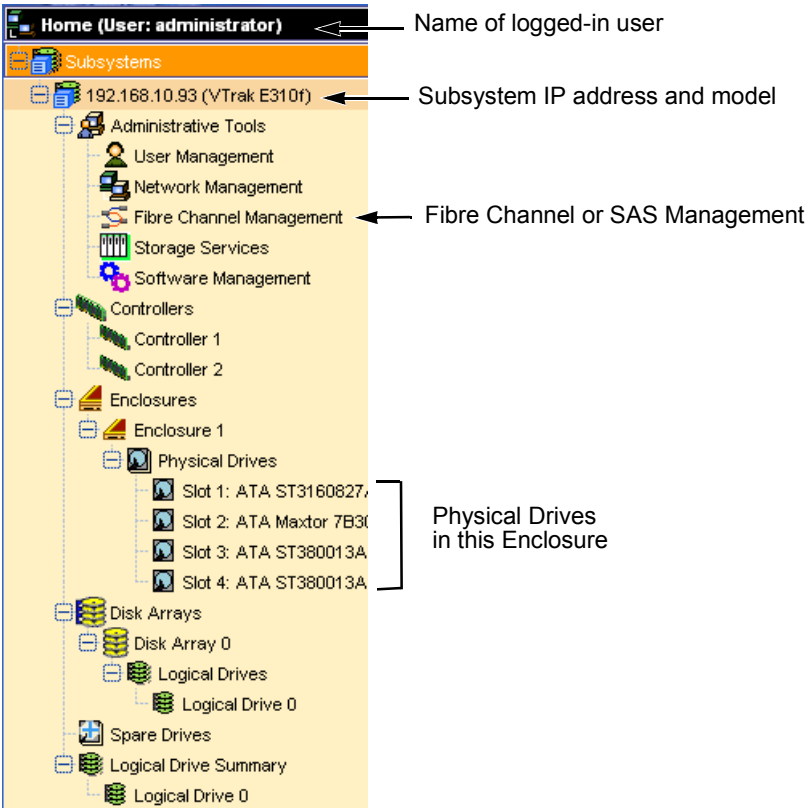
The Header contains the following items:

- **Language** – To change languages, see “Selecting a Language” on page 54.
- **View** – To view the Event Frame, see “Viewing the Event Frame” on page 58.
- **Storage Network** – To view all of the VTrak subsystem enclosures currently accessible the network, see “Working with the Storage Network” on page 60.
- **Contact Us** – Click **Contact Us** for a list of contact information, including Technical Support. Also see “Contacting Technical Support” on page 319.
- **Logout** – To logout of WebPAM PROe, see “Logging out of WebPAM PROe” on page 59
- **Help** – Click **Help** in the Header to access the main online help menu.
- **About** – Click **About** in the Header to display the WebPAM PROe software version and build date.

Using Tree View

Tree View enables you to navigate around all components of the Subsystem, including Fibre Channel or SAS management, network and service management, RAID controller, enclosure, physical drives, disk arrays, logical drives, and spare drives. The figure below shows the components of Tree View.

Figure 4. WebPAM PROe Tree View



The Administrative Tools section is different for the Super User than for other users. The remainder of the Tree is the same for all users.

Management View displays information according to the item you choose in Tree View.

Using Management View

Management View provides the actual user interface with the VTrak, including creation, maintenance, deletion, and monitoring of disk arrays and logical drives.

Function Tabs control specific actions and processes. This window changes depending on which item you choose in Tree View and which tab you choose in Management View itself.

Click the **Help** button in Management View to access online help for the function that is currently displayed.

Viewing the Event Frame

To view the Event Frame:

1. Click **View** in the Header.
2. Click the *Show Event Frame* popup option.
The VTrak user interface will display the Event Frame below Management View.
3. Click **View** again to hide the Event Frame.

In the event frame, events are listed and sorted by:

- **Item Number** – A consecutive decimal number assigned to a specific event
- **Device** – Battery, controller, logical drive, physical drive, port, etc.
- **Event ID** – The hexadecimal number that identifies the specific type of event
- **Severity** – Information, Warning, Minor, Major, Critical, and Fatal. The severity level is user-specified. See “Setting-up User Event Subscriptions” on page 73.
- **Time** – Time and date of the occurrence
- **Description** – A brief description of the event

Sorting Events

You can sort the events by Item Number, Device, Event ID, Severity, Time and Date, or Description.

Click the link at the top of the column by which you want to sort the events. After you click the item, a triangle icon appears.

- If the triangle points upward, the column is sorted low-to-high or old-to-new.
- If the triangle points downward, the column is sorted high-to-low or new-to-old.

Click the link a second time to change to flip the triangle and reverse the sort sequence.

Logging out of WebPAM PROe

There are two ways to log out of WebPAM PROe:

- Close your browser window
- Click Logout the WebPAM PROe banner (below)

Figure 8. Clicking “Logout” in the Header



Clicking **Logout** brings you back to the Login Screen. After logging out, you must enter your user name and password in order to log in again.

Working with the Storage Network

When you log into WebPAM PROe, you access a specific VTrak subsystem. See “Logging into WebPAM PROe” on page 52.

The Storage Network feature enables you to access all of the VTrak subsystems with a Management Port connection to your network.

Each VTrak subsystem is identified by its Management Port IP address.

Storage Network functions include:

- Viewing other subsystems
- Updating the list of subsystems
- Logging into a subsystem
- Hiding the other subsystems

Viewing Other Subsystems

To view the other VTrak subsystems the Storage Network:

1. Click **Storage Network** in the Header.
2. Click the *Show Network Subsystems* popup option.

The list will show all subsystems the network at the time the GUI was launched.


Updating the List of Subsystems

To update the list of the VTrak subsystems the Storage Network:

Click the **Discover** button at the bottom of the subsystem list.

Logging into a Subsystem

To log into any of the displayed VTrak subsystems:

1. In Tree View, click the Subsystem  icon of the subsystem you want to see.
If your user name and password do not match the subsystem you are logging into, the log in screen will appear.
2. Log into the new subsystem, as needed.

Hiding the Other Subsystems

To hide the other VTrak subsystems the Storage Network:


1. Click **Storage Network** in the Header.
2. Click the *Hide Network Subsystems* popup option.

Working with Subsystems

A VTrak subsystem is identified by its Management Port IP address. Subsystem functions include:


- Viewing Subsystem Information (page 61)
- Saving System Service Report (page 62)
- Setting an Alias for the Subsystem (page 62)
- Setting Redundancy for the Subsystem (page 62)
- Setting Cache Mirroring for the Subsystem (page 62)
- Setting Subsystem Date and Time (page 63)
- Viewing the Runtime Event Log (page 63)
- Saving the Runtime Event Log (page 64)
- Clearing the Runtime Event Log (page 64)
- Viewing NVRAM Events (page 65)
- Saving NVRAM Events (page 65)
- Clearing NVRAM Events (page 66)
- Viewing Current Background Activities (page 66)
- Making Background Activity Settings (page 66)
- Running Background Activities (page 67)
- Running Media Patrol (page 68)
- Running PDM (page 68)
- Viewing Scheduled Activities (page 68)
- Scheduling an Activity (page 69)
- Deleting a Scheduled Activity (page 70)
- Viewing Lock Status (page 70)
- Setting the Lock (page 70)
- Renewing the Lock (page 71)
- Releasing the Lock (page 71)

Viewing Subsystem Information

To view information about a subsystem, click the Subsystem  icon in Tree View. Management View displays the subsystem information.


Saving System Service Report

To save a System Service Report as a text file on your Host PC:

1. In Tree View, click the Subsystem  icon.
2. On the Information tab, click the **Save** button.
3. Direct your browser where to save the configuration and status file.


Setting an Alias for the Subsystem

An alias is optional. To set an alias for this subsystem:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Settings** tab.
3. Enter a name into the Alias field.
Maximum of 48 characters. Use letters, numbers, space between words, and underscore.
4. Click the **Submit** button.

Setting Redundancy for the Subsystem

To set redundancy for this subsystem:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Settings** tab.
3. In the Redundancy Type dropdown menu, choose:
 - **Active-Active** – Both RAID controllers are active and can share the load
 - **Active-Standby** – One RAID controller is in standby mode and goes active if the other fails
4. Click the **Submit** button.


If you change Redundancy Type, be sure both controllers are properly installed in the subsystem before you restart.

If your subsystem has dual controllers and they are set to Active-Active, you can use the LUN Affinity feature. See “Making Controller Settings” on page 110.

Setting Cache Mirroring for the Subsystem

This option applies only to subsystems with two controllers. To use Cache Mirroring, the Redundancy Type must be set to Active-Active.

To change Cache Mirroring for this subsystem:

1. In Tree View, click the Subsystem  icon.

2. In Management View, click the **Settings** tab.
3. Do one of the following actions:
 - To enable Cache Mirroring, check the Cache Mirroring box.
 - To disable Cache Mirroring, uncheck the Cache Mirroring box.
4. Click the **Submit** button.
5. Restart the subsystem.

See “Restarting the Subsystem” on page 107.




Notes

- If you disable Cache Mirroring, LUN Affinity will be enabled automatically.
- If you change Cache Mirroring, be sure both controllers are properly installed in the subsystem before you restart.


Setting Subsystem Date and Time

To set a Date and Time for this subsystem:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Settings** tab dropdown menu and choose *Date and Time Settings*.
3. Under Subsystem Date, choose the Month and Day from the dropdown menus.
4. Type the current year into the Year field.
5. Under Subsystem Time, choose the Hour, Minutes and Seconds from the dropdown menus.
6. Click the **Submit** button.

Viewing the Runtime Event Log

Runtime Events lists information about the 1023 most recent runtime events recorded since the system was started. To view runtime events:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Events** tab dropdown menu and choose *Runtime Events*.

Events are displayed by:


- **Item Number** – A consecutive decimal number assigned to a specific event
- **Device** – Battery, controller, logical drive, physical drive, port, etc.

- **Event ID** – The hexadecimal number that identifies the specific type of event
 - **Severity** – Information, Warning, Minor, Major, Critical, and Fatal. The severity level is user-specified. See “Setting-up User Event Subscriptions” on page 73.
 - **Time** – Time and date of the occurrence
 - **Description** – A brief description of the event
3. Click the link at the top of the column by which you want to sort the events. After you click the item, a triangle icon appears.
 - If the triangle points upward, the column is sorted low-to-high or old-to-new.
 - If the triangle points downward, the column is sorted high-to-low or new-to-old.

Click the link a second time to change to flip the triangle and reverse the sort sequence.


Saving the Runtime Event Log

To save the runtime event log as a text file:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Events** tab dropdown menu and choose *Runtime Events*.
3. Click the **Save Event Log** button.
4. In the File Download dialog box, click the **Save** button.
5. In the Save dialog box, name the file, navigate to the folder where you want to save the log file, and click the **Save** button.


Clearing the Runtime Event Log

To clear the runtime event log:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Events** tab dropdown menu and choose *Runtime Events*.
3. Click the **Clear Event Log** button.
4. In the Confirmation dialog box, type **confirm** and click the **OK** button.

Viewing NVRAM Events

NVRAM Events lists information about the 63 most recent important events. NVRAM events are stored in non-volatile memory. To view runtime events:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Events** tab dropdown menu and choose *System Events in NVRAM*.


Events are displayed by:

- **Item Number** – A consecutive decimal number assigned to a specific event
 - **Device** – Battery, controller, logical drive, physical drive, port, etc.
 - **Event ID** – The hexadecimal number that identifies the specific type of event
 - **Severity** – Information, Warning, Minor, Major, Critical, and Fatal. The severity level is user-specified. See “Setting-up User Event Subscriptions” on page 73.
 - **Time** – Time and date of the occurrence
 - **Description** – A brief description of the event
3. Click the link at the top of the column by which you want to sort the events. After you click the item, a triangle icon appears.
 - If the triangle points upward, the column is sorted low-to-high or old-to-new.
 - If the triangle points downward, the column is sorted high-to-low or new-to-old.

Click the link a second time to change to flip the triangle and reverse the sort sequence.


Saving NVRAM Events

To save the NVRAM event log as a text file:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Events** tab dropdown menu and choose *System Events in NVRAM*.
3. Click the **Save Event Log** button.
4. In the File Download dialog box, click the **Save** button.
5. In the Save dialog box, name the file, navigate to the folder where you want to save the log file, and click the **Save** button.


Clearing NVRAM Events

To clear the NVRAM event log:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Events** tab dropdown menu and choose *System Events in NVRAM*.
3. Click the **Clear Event Log** button.
4. In the Confirmation dialog box, type **confirm** and click the **OK** button.

Viewing Current Background Activities

To view the current background activities:


1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Background Activities** tab.

A list of current background activities appears, including:

- Rebuild
- PDM (Predictive Data Migration)
- Synchronization
- Redundancy Check
- Migration
- Transition
- Initialization
- Media Patrol

Making Background Activity Settings

To make settings for background activities:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Background Activities** tab and choose *Settings* from the dropdown menu.
3. Click the dropdown menu to choose a priority of *Low*, *Medium*, and *High* for the following functions:
 - **Rebuild** – Rebuilds the data from a failed drive in a disk array
 - **Synchronization** – Checks the data integrity on disk arrays
 - **Initialization** – Sets all data bits in the logical drive to zero
 - **Redundancy Check** – Checks, reports and can correct data inconsistencies in logical drives
 - **Migration** – Change RAID level or add physical drives to disk arrays


- **PDM** – Looks for bad blocks the physical drives of disk arrays
- **Transition** – Returns a revertible spare drive to spare status

The rates are defined as follows:

- **Low** – Fewer resources to activity, more to data read/write.
 - **Medium** – Balance of resources to activity and data read/write.
 - **High** – More resources to activity, fewer to data read/write.
4. Highlight the following PDM trigger settings and type a value into the corresponding field:
 - **Reassigned Block Threshold** – 1 to 512 blocks
 - **Error Block Threshold** – 1 to 1024 blocks
 5. Check to enable or uncheck to disable the following functions:
 - **Media Patrol** – Checks the magnetic media on physical drives
 - **Auto Rebuild** – If there is a spare drive of adequate capacity, a critical disk array will begin to rebuild automatically. If not spare drive is available, the disk array will begin to rebuild as soon as you replace the failed physical drive with an unconfigured physical drive of equal or greater size.
 6. Click the **Submit** button to save your settings.

Running Background Activities

To run a background activity from the Background Activities tab:


1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Background Activities** tab and choose one of the following from the dropdown menu.
 - **Media Patrol** – See “Running Media Patrol” on page 68
 - **Rebuild** – See “Rebuilding a Disk Array” on page 133
 - **PDM** – See “Running PDM” on page 68
 - **Transition** – See “Transitioning a Disk Array” on page 135
 - **Initialization** – See “Initializing a Logical Drive” on page 140
 - **Redundancy Check** – See “Running Redundancy Check” on page 140
3. In the next screen, make the choices as requested.
4. Click the **Start** button.

Running Media Patrol

Media Patrol checks the magnetic media on physical drives. When it finds the specified number of bad blocks, it will trigger PDM. See “Making Background Activity Settings” on page 66 and “Running PDM” on page 68.

You can schedule Media Patrol to run automatically, see “Scheduling an Activity” on page 69.

To run Media Patrol:

1. In Tree View, click the Subsystem  icon.
2. From the dropdown menu on the Background Activities tab, choose *Start Media Patrol*.
3. In the next screen, click the **Start** button.


Running PDM

Predictive Data Migration (PDM) migrates data from the suspect physical drive to a spare disk drive, similar to Rebuilding. But unlike Rebuilding, PDM acts *before* the disk drive fails and your Logical Drive goes Critical.

You can also run PDM on a specific disk array, see “Running PDM on a Disk Array” on page 135.


Also see “Predictive Data Migration (PDM)” on page 268.

To run PDM:

1. In Tree View, click the Subsystem  icon.
2. In Management View, click the **Background Activities** tab and choose *Start Media Patrol* from the dropdown menu.
3. In the next screen, choose the Source and Target physical drives.
The suspect physical drive is the source. The replacement physical drive is the target.
4. Click the **Start** button.


Viewing Scheduled Activities

To view scheduled activities for this subsystem:

1. Click the Subsystem  icon in Tree View.
2. Click the **Scheduler** tab in Management View.

Scheduling an Activity

To set a scheduled activity for this subsystem:

1. Click the Subsystem  icon Tree View.
2. From the dropdown menu on the Scheduler tab, choose an item:
 - Media Patrol. See “Running Media Patrol” on page 68
 - Redundancy Check. See “Running Redundancy Check” on page 140
 - Battery Reconditioning. See “Reconditioning a Battery” on page 117
 - Spare Drive Check. See “Running Spare Check” on page 147
3. In the Scheduler dialog box, check the Enable This Schedule box.
4. Select a start time (24-hour clock).
5. Select a Recurrence Pattern.
 - **Daily** – Enter the number of days between events.
 - **Weekly** – Enter the number of weeks between events and choose which days of the week.
 - **Monthly** – Choose a calendar day of the month (1 – 31).

If you choose a higher number than there are days in the current month, the actual start date will occur at the beginning of the following month.

Or, choose a day of the week and choose the first, second, third, fourth, or last occurrence of that day in the month.

Then, choose the months in which you want the activity to occur.

6. Select a Range of Occurrence.
 - Start-from date. The default is today's date.
 - End-on date.

Select No End Date (perpetual).

Or, choose a number of occurrences for this activity.

Or, choose a specific end date. The default is today's date.

7. For Redundancy Check only:
 - Choose the Auto Fix option. This feature attempts to repair the problem when it finds an error.
 - Choose the Pause on Error option. This feature stops the process when it finds an error
 - Check the boxes beside the logical drives (all except RAID 0) to which this activity will apply.
Each logical drive can have only one scheduled Redundancy Check.


**Note**

You can schedule only ONE Redundancy Check for each logical drive.

8. Click the **Submit** button.

Deleting a Scheduled Activity


To delete a scheduled activity for this subsystem:

1. Click the Subsystem  icon Tree View.
2. From the dropdown menu on the Scheduler tab, choose *Delete Schedules*.
3. Check the box to the left of the schedule you want to delete.
4. Click the **Submit** button.

Viewing Lock Status

The lock prevents other sessions (including by the same user) from making a configuration change to the controller until the lock expires or a forced unlock is done.

To view the lock status for this subsystem:

1. Click the Subsystem  icon Tree View.
2. Click the **Lock** tab in Management View.

The following information is displayed:

- **Lock Status** – The User who set (owns) the current lock.
- **Expiration Time** – Amount of time left until the lock automatically releases.
- **Expire At Time** – The date and time when the lock will automatically release.

Setting the Lock

The lock prevents other sessions (including by the same user) from making a configuration change to the controller until the lock expires or a forced unlock is done.

You can set the lock to last from one minute to one day. To set the lock for this subsystem:


1. Click the Subsystem  icon Tree View.

2. Click the **Lock** tab in Management View.
3. Click the **Lock** option.
4. Enter a time interval between 1 and 1440 minutes (one day) that you want the lock to stay active.
5. Click the **Submit** button.

Renewing the Lock

The lock prevents other sessions (including by the same user) from making a configuration change to the controller until the lock expires or a forced unlock is done.

Renewing the lock extends the period of time the controller remains locked. To renew an existing lock for this subsystem:

1. Click the Subsystem  icon Tree View.
2. Click the **Lock** tab in Management View.
3. Click the **Renew** option.
4. Enter a time interval between 1 and 1440 minutes (one day) that you want the lock to stay active.

The renew time replaces the previous Expiration Time.


5. Click the **Submit** button.

Releasing the Lock

The lock prevents other sessions (including by the same user) from making a configuration change to the controller until the lock expires or a forced unlock is done.

When the user who locked the controller logs out, the lock is automatically released. You can also release the lock before the scheduled time.

To release the lock for this subsystem:

1. Click the Subsystem  icon Tree View.
2. Click the **Lock** tab in Management View.

If you are the User who set the lock, click the **Unlock** option.

If another User set the lock and you are a Super User, click the **Unlock** option and check the **Force Unlock** box.

3. Click the **Submit** button.




Managing Users

User Management includes all functions dealing with user accounts. Functions include:

- Viewing User Information (page 72)
- Making User Settings (page 72)
- Making Your Own User Settings (page 73)
- Setting-up User Event Subscriptions (page 73)
- Changing Another User's Password (page 74)
- Changing Your Own Password (page 74)
- Creating a User (page 75)
- Deleting a User (page 76)
- Viewing User Sessions (page 76)
- Logging out Other Users (page 76)

Viewing User Information




The view a list of users, their status, access privileges, display name, and email address:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the User Management  icon.

The Information tab appears in Management View.

Making User Settings

To change settings of other users:

1. Log into WebPAM PROe as the Administrator or a Super User.
2. Click the Subsystem  icon in Tree View.
3. Click the Administrative Tools  icon.
4. Click the User Management  icon.
5. On the Information tab, click the link of the user whose settings you want to change.

The Settings screen for the selected user displays.

6. Make the following settings as needed.
 - Check the Enable box to enable this user.
 - Uncheck the box to disable this user.
 - Enter or change the display name.

- Enter or change the email address.
- From the Privilege dropdown menu, choose a new level.




See “List of User Privileges” on page 75

7. Click the **Submit** button.

The Administrator or Super User can change another user’s password. See “Changing Another User’s Password” on page 74 for more information.




Making Your Own User Settings

To change your own user settings:

1. Log into WebPAM PROe under your own user name.
2. Click the Subsystem  icon in Tree View.
3. Click the Administrative Tools  icon.
4. Click the User Management  icon.
5. Click the **Settings** tab in Management View.
6. Enter or change the display name or mail address.
7. Click the **Submit** button.

Setting-up User Event Subscriptions

An event subscription enables a user to receive email messages about events taking place in the VTrak subsystem. To make or change user event subscriptions:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the User Management  icon.
4. Click the **Event Subscription** tab in Management View.
5. Check the box to enable event notification.
6. Under the subheadings, choose the lowest level of Severity to be reported for each event. The selected level plus all higher levels of Severity will be reported.
 - **Information** – Information only, no action is required
 - **Warning** – User can decide whether or not action is required
 - **Minor** – Action is needed but the condition is not a serious at this time
 - **Major** – Action is needed now
 - **Critical** – Action is needed now and the implications of the condition are serious

- **Fatal** – Non-Recoverable error or failure has occurred
 - **None** – Deactivates this event for notification purposes
7. Click the **Submit** button.




The user's account must have an email address. See "Making User Settings" on page 72.

For information about the email service, see "Making Email Settings" on page 91.

To send a test message to the email address in the listed under General Info, click the **Test Email** button.




Changing Another User's Password

To change a user's password:

1. Log into WebPAM PROe as the Administrator or a Super User.
2. Click the Subsystem  icon in Tree View.
3. Click the Administrative Tools  icon.
4. Click the User Management  icon.
5. In the list of users, click the link of the user whose settings you want to change.
The Settings screen for the selected user displays.
6. Click the **Password** tab in Management View.
7. Enter the new password in the New Password field.
8. Enter the new password in the Retype Password field.
9. Click the **Submit** button.

Changing Your Own Password




To set or change your own password:

1. Log into WebPAM PROe under your own user name.
2. Click the Subsystem  icon in Tree View.
3. Click the Administrative Tools  icon.
4. Click the User Management  icon.
5. Click the **Password** tab in Management View.
6. Enter the current password in the Old Password field.
If you do not have a password, leave this field blank.
7. Enter the new password in the New Password field.
8. Enter the new password in the Retype Password field.

9. Click the **Submit** button.

Creating a User

To create a user:

1. Log into WebPAM PROe as the Administrator or a Super User.
2. Click the Subsystem  icon in Tree View.
3. Click the Administrative Tools  icon.
4. Click the User Management  icon.
5. Click the **Create** tab in Management View.
6. Enter a user name in the User Name field.
7. Enter a password for this user in the New Password and Retype Password fields.

A password is optional. If you do not specify a password, log into WebPAM PROe with the User Name and leave the password field blank.

8. Enter a display name in the Display Name field.
A display name is optional.
9. Enter the user's email address in the Email Address field.
An email address is required in order to receive email event notification.
10. Select a privilege level from the Privilege dropdown menu.
For definitions of each privilege level, see the List of User Privileges below.
11. Check the Enabled box to enable this user on this subsystem.
12. Click the **Submit** button.




List of User Privileges

- **View** – Allows the user to see all status and settings but not to make any changes
- **Maintenance** – Allows the user to perform maintenance tasks including Rebuilding, PDM, Media Patrol, and Redundancy Check
- **Power** – Allows the user to create (but not delete) disk arrays and logical drives, change RAID levels, change stripe size; change settings of components such as disk arrays, logical drives, physical drives, and the controller.
- **Super** – Allows the user full access to all functions including create and delete users and changing the settings of other users, and delete disk arrays and logical drives. The default “administrator” account is a Super User.

Deleting a User




There will always be at least one Super User account. You cannot delete the user account you used to log in.

To delete a user:

1. Log into WebPAM PROe as the Administrator or a Super User.
2. Click the Subsystem  icon in Tree View.
3. Click the Administrative Tools  icon.
4. Click the User Management  icon.
5. Click the **Delete** tab in Management View.
6. Check the box to the left of the user you want to delete.
7. Click the **Submit** button.
8. Click **OK** in the confirmation box.




Viewing User Sessions

To view the current sessions:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the User Management  icon.
4. Click the **Sessions** tab in Management View.

Logging out Other Users

To logout other users:

1. Log into WebPAM PROe as the Administrator or a Super User.
2. Click the Subsystem  icon in Tree View.
3. Click the Administrative Tools  icon.
4. Click the User Management  icon.
5. Click the **Sessions** tab in Management View.
6. Check the box to the left of the user you want to log out.
7. Click the **Logout** button.
8. Click **OK** in the confirmation box.

Managing the Network Connection

The network connection deals with network connections to the VTrak's Management Ports. Functions include:




- Making Subsystem Management Port Settings (page 77)
- Making Controller Management Port Settings (page 77)

Making Subsystem Management Port Settings

The VTrak subsystem has a virtual management port. When you log into the VTrak over your network, you use the virtual management port. This arrangement enables you to log into a VTrak with two controllers using one IP address.

Before you change settings, please see “Choosing DHCP or a Static IP Address” on page 36.

To make changes to the Subsystem Management Port settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Network Management  icon.
4. Click the **Port Configuration** link in Management View.
5. To enable DHCP, check the DHCP box.




When DHCP is NOT enabled, enter:

- Primary IP address
 - Primary subnet mask
 - Default gateway IP address
 - Enter a primary DNS server IP address.
6. Click the **Submit** button.

Making Controller Management Port Settings

The controller has an IP addresses for access when the controller goes into *maintenance mode*. Maintenance mode is only for remedial action in the event of a problem with the controller. See “Controller Enters Maintenance Mode” on page 310 for more information.

To make changes to the Controller Management Port settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Network Management  icon.

4. Click the **Maintenance Mode** tab in Management View.
5. Click the **Port Configuration** link for Controller 1 or 2.
6. To enable DHCP, check the DHCP box.
When DHCP is NOT enabled, enter:
 - Primary IP address
 - Primary subnet mask
 - Default gateway IP address
 - Enter a primary DNS server IP address.
7. Click the **Submit** button.
8. Click the **Maintenance Mode** tab again.
9. Click the **Port Configuration** link for the other controller.
10. To enable DHCP, check the DHCP box.
When DHCP is NOT enabled, enter:
 - Primary IP address
 - Primary subnet mask
 - Default gateway IP address
 - Enter a primary DNS server IP address.
11. Click the **Submit** button.




Managing Fibre Channel Connections

This feature pertains to VTrak Fibre Channel models. Functions include:

- Viewing Fibre Channel Node Information (page 79)
- Viewing Fibre Channel Port Settings (page 79)
- Making Fibre Channel Port Settings (page 80)
- Viewing Fibre Channel Port Statistics (page 81)
- Viewing SFP Information (page 82)
- Viewing Fibre Channel Logged-in Devices (page 83)
- Viewing Fibre Channel Initiators (page 84)

Viewing Fibre Channel Node Information

To view Fibre Channel node information:




1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Fibre Channel Management  icon.
4. Click the **Node** tab in Management View.

The current node (data port) settings the Controller are shown, including:

- **WWNN** – World Wide Node Name
- **Supported Features** – Class of service
- **Maximum Frame Size** – 2048 bits
- **Supported Speeds** – 4 Gb/s, 2Gb/s, or 1 Gb/s

Viewing Fibre Channel Port Settings

To view the current Fibre Channel port settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Fibre Channel Management  icon.
4. Click the **Port** tab in Management View

The current data port settings the Controller are shown, including:




- **State** – Online, Offline, Unknown
- **Port Identifier** – A hexadecimal name for this port
- **Topology Attached** – See the table on page 81
- **Fabric WWNN** – World Wide Node Name (appears when connected to a switch)

- **Fabric WWPN** – World Wide Port Name (appears when connected to a switch)
- **Current Speed** – 4 Gb/s, 2 Gb/s, or 1 Gb/s
- **Link Type** – Long-wave laser, short-wave laser or electrical
- **Symbolic Name** – A text name for this port
- **Link Speed*** – 4 Gb/s, 2 Gb/s, 1 Gb/s, or Auto
- **Topology*** – NL-Port, N-Port, or Auto
- **Hard ALPA*** – Address can be 0 to 254. 255 means this feature is disabled
- **Alias WWPN**

* Denotes items that you can change under Port Settings, below.

Making Fibre Channel Port Settings

To make Fibre Channel port settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Fibre Channel Management  icon.
4. Click the **Port** tab in Management View
5. Click the **Port1** or **Port2** link in Management View.
6. Make the settings appropriate to your system. See “Port Setting Information” on page 81.
 - **Configured Link Speed** – 4 Gb/s, 2 Gb/s, 1 Gb/s or Auto (self-setting)
 - **Configured Topology** – N-Port (Point-to-Point), NL Port (Arbitrated Loop) or Auto (self-setting)
 - **Hard ALPA** – Address can be 0 to 254. 255 means this feature is disabled. An ALPA identifies a port in an arbitrated loop.
7. Click the **Submit** button to save your settings.

Port Setting Information

The table below shows the type of attached topology you will achieve based on your connection type and the configured topology you select.

Fibre Channel Attached Topology		
	Configured Topology	
Connection Type	N-Port	NL-Port
Switch	Fabric Direct	Public Loop
Direct	Point to Point	Private Loop

Example 1: If you connect the VTrak to a Fibre Channel switch and choose NL-Port topology, you will create a Public Loop attached topology.

Example 2: If you have a Point to Point attached topology, you made a direct connection (no switch) and selected N-port topology.






Note

In some cases, HBA settings to N-Port only work if connected to the switch. Refer to your HBA manual for more information.

Viewing Fibre Channel Port Statistics

To view statistics for the Fibre Channel ports:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Fibre Channel Management  icon.
4. Click the **Statistic** tab in Management View.

The statistics for all Fibre Channel ports are shown.

Property Definitions

Definitions of the properties for which statistical information is reported appears in the list below.

- **Time Since Last Reset** – Time in minutes since the system has been running.
- **Number of Frames Sent** – Number of frames sent since last reset.
- **Number of Frames Received** – Number of frames received since last reset.

- **Number of Words Sent** – Number of words sent since last reset.
- **Number of Words Received** – Number of words received since last reset.
- **LIP Count** – Loop Initialization Primitive Sequence. This primitive sequence applies only to the arbitrated loop topology. It is transmitted by an L_Port to initialize or re-initialize the loop.
- **NOS Count** – Not Operational Primitive Sequence. This primitive sequence is used during link initialization between two N_Ports in the point-to-point topology or an N_Port and an F_Port in the fabric topology.
 NOS is sent to indicate that the transmitting port has detected a link failure or is offline. The expected response to a port sending NOS is the OLS primitive sequence.
- **Number of Error Frames** – FC devices propagate handshake signals back-and-forth requesting and acknowledging each byte transferred. FC transfers occur in one frame of data at a time. In this case, the value reflects the number of frames with errors.
- **Number of Dumped Frames** – This field specifies the number of frames dumped due to a lack of host buffers.
- **Link Failure Count** – Number of times the link has failed. Can be caused by a disconnected link or a bad fiber element.
- **Loss Sync Count** – Number of times a loss of sync has occurred since last reset.
- **Primitive Sequence Error Count** – An ordered set transmitted repeatedly and used to establish and maintain a link.
 LR, LRR, NOS, and OLS are primitive sequences used to establish an active link in a connection between two N_Ports or an N_Port and an F_Port.
 LIP, LPB, and LPE are primitive sequences used in the Arbitrated Loop topology for initializing the loop and enabling or disabling an L_Port.
- **Invalid Word Sent Count** – Number of invalid words sent since last reset.
- **Invalid CRC Count** – Invalid Cyclical Redundancy Count. Number of frames received with an invalid CRC since last reset.
- **Initiator IO Count** – I/O Count on the initiator on the host side.




Clearing Statistics

To clear statistics, see “Clearing Statistics” on page 105.

Viewing SFP Information

SFPs (small form-factor pluggable) transceivers connect the ports the VTrak controllers to the Fibre Channel fabric.

To view SFP information:




1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Fibre Channel Management  icon.
4. Click the **SFP** tab in Management View.
The SFP information for all Fibre Channel ports is shown.

SFP Information

- **Connector** – Type of connector
- **Transceiver** – SFP
- **Transceiver Code** – Defines the method to interpret the transceiver type and compatibility options
- **Serial Encoding** – Serial encoding algorithm
- **Bit Rate** – In gigabits per second
- **Link Length** – The maximum link length depending the type of fiber
- **Vendor Name** – Vendor name of the SFP transceiver
- **Vendor OUI** – Organizational Unique Identifier, SFP vendor's IEEE company ID
- **Vendor Part Number**
- **Vendor Revision**
- **Vendor Serial Number**
- **Manufacturing Date** – Code with 2 digits each for year, month, day, and optional vendor-specific lot number

Viewing Fibre Channel Logged-in Devices

To view a list of the devices currently logged into the VTrak:




1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Fibre Channel Management  icon.
4. Click the **Logged In Device** tab in Management View.

One of the devices in the list will be the port itself. If there is no other device, this notification will appear: "There is no logged in device." If a Fibre Channel switch is attached, it will also appear in this list.

Viewing Fibre Channel Initiators

You must add an initiator to the VTrak's initiator list in order to use the initiator to create a LUN for your logical drive.

To view a list of recognized initiators:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Fibre Channel Management  icon.
4. Click the **Initiator** tab in Management View.

A Fibre Channel switch will also display as an initiator in the list. If your Host PC's Fibre Channel HBA is connected to the VTrak directly (not through a Fibre Channel switch), the initiator will NOT display in the initiator list.

Adding an Initiator

To add an initiator to the VTrak's initiator list:

1. Check the box to the left of the initiator.
2. Click the **Add to Initiator List** button.

The initiator appears under Storage Services. See page 88. You can then use the initiator to create a LUN. See "Adding a LUN Map" on page 89.

Managing SAS Connections

This feature pertains to VTrak Serial Attached SCSI models. Functions include:

- Viewing SAS Port Information (page 85)
- Making SAS Port Settings (page 85)
- Viewing SAS Port Statistics (page 86)
- Viewing SAS Initiators (page 86)




Viewing SAS Port Information

A SAS Controller can have one or two SAS channels. Each SAS channel has two ports:

- Host In or Data Port (with a diamond icon)
- Host In/Out or Data Cascade Port (with a circle icon)

See “Serial Attached SCSI” on page 26 for information about how these ports are physically connected to the Host PC or other subsystems.

To view information about the SAS ports:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the SAS Management  icon.

The port information appears the screen.

- Channel ID
- Port Type
- Link Status
- Link Speed
- SAS Address
- Cable Signal Strength (adjustable under Port Settings)




See “Serial Attached SCSI” on page 26 for information about how these ports are physically connected to the Host PC or other subsystems.

Making SAS Port Settings

A SAS Controller can have one or two SAS channels. Each SAS channel has two ports:

- Host In or Data Port (with a diamond icon)
- Host In/Out or Data Cascade Port (with a circle icon)

To make settings to the SAS ports:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the SAS Management  icon.
4. In Management View, click the **Port 1** or **Port 2** link.
5. From the Cable Signal Strength dropdown menu, choose a value.




The range is 1 to 8. 1 is the default. Signal strength correlates to cable length in meters. Example: If you have a 2 m SAS cable, set signal strength to 2. If performance is unsatisfactory (see “Viewing SAS Port Statistics” on page 86), try settings of 1 and 3, then use the best setting for your system.

6. Click the **Submit** button.

Viewing SAS Port Statistics

The SAS Management Statistics tab displays statistical information about all of the SAS ports on the VTrak subsystem.

To view information about the SAS ports:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the SAS Management  icon.
4. In Management View, click the **Statistic** tab.

The statistics for the selected port appear the screen.




Clearing Statistics

To clear statistics, see “Clearing Statistics” on page 105.

Viewing SAS Initiators

You must add an initiator to the VTrak’s initiator list in order to use the initiator to create a LUN for your logical drive.

To view a list of recognized initiators:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the SAS Management  icon.
4. In Management View, click the **Initiators** tab.

A list of all currently logged-in initiators appears the screen.

Adding an Initiator

To add an initiator to the VTrak's initiator list:

1. Check the box to the left of the initiator.
2. Click the **Add to Initiator List** button.

The initiator appears under Storage Services. See page 88. You can then use the initiator to create a LUN. See "Adding a LUN Map" on page 89.

Managing Storage Services

Storage services deal with initiators and LUN mapping for Fibre Channel models and for Serial Attached SCSI models. LUN masking is the process of applying a LUN Map so that each initiator can only access the LUNs specified for it.




Features include:

- Adding an Initiator (page 88)
- Deleting an Initiator (page 89)
- Viewing the LUN Map (page 89)
- Enabling LUN Masking (page 89)
- Adding a LUN Map (page 89)
- Editing a LUN Map (page 90)

Adding an Initiator

You must add an initiator to the VTrak's initiator list in order to use the initiator to create a LUN

To add an initiator:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Storage Services  icon.
4. Click the **Initiators** tab in Management View.
5. From the Initiators tab dropdown menu, choose *Add Initiator*.
6. Enter the initiator's name in the Initiator Name field.
 - **Fibre Channel** – A Fibre Channel initiator name is the World Wide Port Name of the device and is composed of a series of eight, two-digit hexadecimal numbers.
 - **SAS** – A SAS initiator name is the SAS address of the HBA card in the Host PC. Obtain the initiator name from the initiator utility on your host system.

Obtain the initiator name from the initiator utility on your host system.




Note that the initiator name you input must match exactly in order for the connection to work.

7. Click the **Submit** button.

You can also add initiators from the Fibre Channel or SAS Initiators tab. See “Viewing Fibre Channel Initiators” on page 84 and “Viewing SAS Initiators” on page 86.




Deleting an Initiator

To delete an initiator:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Storage Services  icon.
4. Click the **Initiators** tab in Management View.
5. From the Initiators tab dropdown menu, choose *Delete Initiators*.
6. Check the box to the left of the initiator you want to delete.
7. Click the **Submit** button.




Viewing the LUN Map

To view the current LUN Map:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Storage Services  icon.
4. Click the **LUN Map** tab in Management View.




Enabling LUN Masking

To enable the LUN Masking:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Storage Services  icon.
4. Click the **LUN Map** tab in Management View.
5. Click the **LUN Masking Enabled** box.
6. Click the **Submit** button.

Adding a LUN Map




To edit the LUN Map:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Storage Services  icon.
4. Click the **LUN Map** tab in Management View and from the dropdown menu, choose *Add a LUN Map*.

5. Choose an initiator from the Initiator dropdown list.
Or enter the initiator's name in the Initiator Name field.
Note that the initiator name you input must match exactly in order for the connection to work.
6. In the LUN Mapping & Masking list, enter the LUNs for each logical drive.
You must enter different LUN numbers for each logical drive.
7. Click the **Submit** button.

Editing a LUN Map

To edit the LUN Map:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Storage Services  icon.
4. Click the **LUN Map** tab in Management View.
5. From the LUN Mapping & Masking Information list, choose an initiator and click its link.
Or enter the initiator's name in the Initiator Name field.
Note that the initiator name you input must match exactly in order for the connection to work.
6. In the LUN field, enter the LUNs for each logical drive.
You must enter different LUN numbers for each logical drive.
7. Click the **Submit** button.

Managing Software Services



Software Services include the following functions:

- Making Email Settings (page 91)
- Making SLP Settings (page 92)
- Making Web Server Settings (page 92)
- Making Telnet Settings (page 94)
- Making SNMP Settings (page 94)
- Making CIM Settings (page 96)
- Making Netsend Settings (page 97)

Making Email Settings

The Email sends notification messages to users. See Setting-up User Event Subscriptions (page 73).

To make Email service settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the **Email Setting** link in Management View.
4. Enter the IP address for your SMTP server.
5. Enter server port number for your SMTP server.
25 is the default.
6. Choose Yes to enable SMTP authentication or No to disable.
7. If you chose Yes for SMTP authentication, enter a Username and Password in the fields provided.
8. Enter an Email sender address (example: RAIDmaster@mycompany.com).
9. Enter an Email subject (example: VTrak Status).
10. Click the **Submit** button.

Sending a Test Message

To send one test message to the User currently logged into WebPAM PROe:

1. Under Test Email, check the “Send A Test Email” box.
2. Click the **Submit** button.

If you do not receive the Test Email message, see your Network Administrator for assistance with the mail server setup, email accounts, and other issues.

Changing the Startup Setting

1. Under Startup Type:

- Click the **Automatic** option to start the service automatically during system startup. Recommended.
 - Click the **Manual** option to start the service manually (the service does not start during system startup).
2. Click the **Submit** button.

Stopping Email service

To stop the Email service:




1. Click the **Stop** button.
2. Click **OK** in the confirmation box.

Starting or Restarting Email service

To start or restart the Email service, click the **Start** or **Restart** button.

Making SLP Settings

VTrak's SLP service discovers services available over the Internet. To make SLP service settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Software Management  icon.
4. Click the **SLP** link.
5. Choose the Startup Type.
 - Click the **Automatic** option to start the service automatically during system startup. Recommended.
 - Click the **Manual** option to start the service manually (the service does not start during system startup).
6. Click the **Submit** button.

Stopping SLP service

To stop the SLP service:

1. Click the **Stop** button.
2. Click **OK** in the confirmation box.



Starting or Restarting SLP service

To start or restart the SLP service, click the **Start** or **Restart** button.

Making Web Server Settings

VTrak's Web Server service connects the VTrak GUI to the VTrak subsystem through your browser.

To make Web Server settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the **Web Server Setting** link in Management View.
4. Enter the HTTP Port number.
80 is the default.
5. Enter Session Time Out interval.
This setting causes WebPAM PROe to time-out after a period of inactivity. 24 minutes is the default. The range is 1 to 1440 minutes (one day).
6. If you want to use a secure connection, check the Enable SSL box.
7. If you checked the Enable SSL box, enter a HTTPS Port number.
443 is the default.
8. If you want to download a SSL Certificate, check the Download Certificate box.
9. If you checked the Download Certificate box, enter the Certificate filename or click the Browse... button to locate it.
10. Click the **Submit** button.
11. Click **OK** in the confirmation box to restart the Web Server service with your changes.

Changing the Startup Setting

1. Under Startup Type:
 - Click the **Automatic** option to start the service automatically during system startup. Recommended.
 - Click the **Manual** option to start the service manually (the service does not start during system startup).
2. Click the **Submit** button.

Stopping Web Server service

To stop the Web Server service:



1. Click the **Stop** button.
2. Click **OK** in the confirmation box.

Starting or Restarting Web Server service

To start or restart the Web Server service, click the **Start** or **Restart** button.

Making Telnet Settings

VTrak's Telnet service enables you to access VTrak's Command Line Interface (CLI) through a network connection. To make Telnet settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the **Telnet Setting** link in Management View.
4. Enter the Telnet Port number.
2300 is the default.
5. Enter the Maximum Number of Connections.
4 is the default.
6. Enter the Session Time Out interval.
24 minutes is the default.
7. Click the **Submit** button.
8. Click **OK** in the confirmation box to restart the Telnet service with your changes.

Changing the Startup Setting

1. Under Startup Type:
 - Click the **Automatic** option to start the service automatically during system startup. Recommended.
 - Click the **Manual** option to start the service manually (the service does not start during system startup).
2. Click the **Submit** button.

Stopping Telnet service

To stop the Telnet service:

1. Click the **Stop** button.
2. Click **OK** in the confirmation box.

Starting or Restarting Telnet service


To start or restart the Telnet service, click the **Start** or **Restart** button.

Making SNMP Settings

VTrak's SNMP service enables the SNMP browser to obtain information from the VTrak. The Trap Sink is where SNMP events are sent and can be viewed.

To change the SNMP settings:

1. Click the Subsystem  icon in Tree View.

2. Click the Administrative Tools  icon.
3. Click the **SNMP Management** link in Management View.
4. Enter the SNMP Port number.
161 is the default.
5. Enter a System Name.
There is no default name.
6. Enter a System Location.
USA is the default.
7. Enter a System Contact (the email address of the administrator or other individual).
8. Enter the Read Community.
Public is the default.
9. Enter the Write Community.
Private is the default.
To add a Trap Sink, see “Adding Trap Sinks” below.
10. Click **OK** in the confirmation box to restart the SNMP service with your changes.

Adding Trap Sinks

To add a trap sink:

1. Enter a Trap Sink IP address.
2. Select a Trap Filter, choose the lowest level of Severity to be reported for each event.
See “Setting-up User Event Subscriptions” on page 73 for an explanation of the Severity levels.
3. Click the **Update** button.
The new trap sink appears in the Trap Sinks list.
4. Click the **Submit** button.
5. Click **OK** in the confirmation box.

Deleting Trap Sinks

To delete a trap sink:

1. Highlight the trap sink you want to delete from the list.
2. Click the **Delete** button to remove the trap sink from the list.
3. Click the **Submit** button.
4. Click **OK** in the confirmation box.

Changing the Startup Setting

1. Under Startup Type:
 - Click the **Automatic** option to start the service automatically during system startup. Recommended.
 - Click the **Manual** option to start the service manually (the service does not start during system startup).
2. Click the **Submit** button.

Stopping SNMP service

To stop the SNMP service:

1. Click the **Stop** button.
2. Click **OK** in the confirmation box.



Starting or Restarting SNMP service

To start or restart the SNMP service, click the **Start** or **Restart** button.

Making CIM Settings

VTrak's CIM (Common Information Model [a protocol]) service provides a database for information about computer systems and network devices.

To change the CIM settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the **CIM Setting** link in Management View.
4. Click the **Start** button to start the CIM service.
5. To enable CIM using a HTTP connection:
 - Choose the Yes option
 - Enter a port number in the field provided (5988 is the default)
6. To enable CIM using a HTTPS connection:
 - Choose the Yes option
 - Enter a port number in the field provided (5989 is the default)
7. To enable authentication for your CIM connection(s):
 - Choose the Yes option
 - Enter the old password in the field provided (password is the default)
 - Enter a new password in the field provided

To change your password, the CIM service must be running. See "Starting or Restarting CIM service" on page 97.

There is only one user. The default name is "cim." No changes are possible.

8. Click the **Submit** button.

Changing the Startup Setting

1. Under Startup Type:
 - Click the **Automatic** option to start the service automatically during system startup. Recommended.
 - Click the **Manual** option to start the service manually (the service does not start during system startup).
2. Click the **Submit** button.

Stopping CIM service

To stop the CIM service:

1. Click the **Stop** button.
2. Click **OK** in the confirmation box.



Starting or Restarting CIM service

To start or restart the CIM service, click the **Start** or **Restart** button.

Making Netsend Settings

VTrak's Netsend service sends VTrak subsystem events in the form of text messages to your Host PC and other networked PCs. This service is normally Stopped and set to Manual start. See "Netsend Requirements" on page 98.

To change the Netsend settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the **Netsend** link.
4. Click the **Start** button to start the Netsend service.
5. Click the **Submit** button.

Adding Netsend recipients

See "Netsend Requirements" on page 98. To add a Netsend recipient:

1. In the Recipient Address field, type the IP address of the recipient PC.
2. Under Recipient filter, choose the lowest level of Severity to be reported for each event.

See "Setting-up User Event Subscriptions" on page 73 for an explanation of the Severity levels.
3. Click the **Update** button to add the new recipient to the list
4. Click the **Submit** button.
5. Click **OK** in the confirmation box.

Deleting Netsend Recipients

To delete a Netsend recipient:

1. Highlight the recipient you want to delete in the recipient list.
2. Click the **Delete** button to remove the recipient from the list.
3. Click the **Submit** button.
4. Click **OK** in the confirmation box.

Changing the Startup Setting

1. Under Startup Type:
 - Click the **Automatic** option to start the service automatically during system startup. Recommended if you plan to use this feature.
 - Click the **Manual** option to start the service manually (the service does not start during system startup). The default setting.
2. Click the **Submit** button.

Stopping Netsend service

To stop the Netsend service:

1. Click the **Stop** button.
2. Click **OK** in the confirmation box.

Starting or Restarting Netsend service

To start or restart the Netsend service, click the **Start** or **Restart** button.

Netsend Requirements

In order to use Netsend:

- Netsend must be running the VTrak
- You must provide the IP address for each recipient PC
- The Messenger service must be running on each recipient PC



If your Netsend and Messenger service settings are correct but the recipient PC does not receive event messages, check the recipient PC's Firewall settings. Refer to your OS documentation for more information.

Exporting the User Database

You can export the User Database file to share user information and settings among multiple VTrak subsystems.

The Export action saves a text file a designated folder the Host PC. From there, you can import the User Database file to other VTrak subsystems.

To export the User Database file:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the **Export** link in Management View.
4. Click the **Export** button.
5. In the Opening export dialog box, click the **Save to Disk** option.
6. Click the **OK** button.

The user database file is saved to the Host PC from which you access WebPAM PROe.



Note

The Encryption box is grayed out. Encryption is always enabled.

Importing a User Database






Caution

Do NOT use this function to update the VTrak firmware.

The Software Management–Import tab enables you to import the User Database file from the Host PC's file system to the VTrak subsystem. When you make user settings to one VTrak, you can export the User Database file to the Host PC. From there, you can import the User Database file to other VTraks so that all have the same User information and settings.

To import the User Database file to this subsystem:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Software Management  icon.
4. Click the **Import** tab.
5. Under the Type dropdown list, choose *User Database*.
6. Enter the name of the file to be imported.
Or, click the **Browse...** button to search for the file.
Look for a file called *export*.
7. Click the **Submit** button.
8. Click the **Next** button.
If the imported file is a valid user database, a warning will appear to inform you that it will overwrite the previous settings.
9. In the Warning box, click the **OK** button.
This user settings are applied to this VTrak subsystem.






Note

The Decryption box is grayed out. Decryption is enabled for user databases.

Importing a Configuration Script

The Software Management–Import tab enables you to import a Configuration Script to the VTrak subsystem. You can write a CLI configuration script to automatically configure your VTrak subsystem. The script must be a plain, non-encrypted text file. The Import function runs the script and performs the configuration automatically.

To import a Configuration Script to this subsystem:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Software Management  icon.
4. Click the **Import** tab.
5. Under the Type dropdown list, choose *Configuration Script*.
6. Enter the name of the file to be imported.
Or, click the **Browse...** button to search for the file.
7. Click the **Submit** button.
8. Click the **Next** button.

If the imported file is a valid configuration script, a warning will appear to inform you that it will overwrite the previous settings.

9. In the Warning box, click the **OK** button.

The new configuration is applied to this VTrak subsystem.



Note

The Decryption box is grayed out. Decryption is disabled for configuration scripts.

Updating the Firmware




This procedure is covered in Chapter 6: Maintenance. See “Updating the Firmware in WebPAM PROe” on page 217 for instructions.

Viewing Flash Image Information

Flash image information refers to the package of firmware components running on your VTrak controller or controllers, including:

- Component name
- Version number
- Build date
- Flash (installation) date
- Controller number (1 or 2)

To view flash image information:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Software Management  icon.
4. Click the **Image Version** tab.

The flash image information displays on the screen.

Running Image Info – The firmware package currently running on the controllers

Flashed Image Info – The firmware package flashed to memory

If the Running and Flashed Images do not match, the VTrak has not restarted since the firmware was last updated. Restart the VTrak to run the Flashed firmware package. See “Restarting the Subsystem” on page 107.

Note that all of these components are upgraded together in a package. See “Updating the Firmware in WebPAM PROe” on page 217.

Restoring Factory Defaults



VTrak includes a function to restore the default settings to its Firmware and Software settings.



Caution

The action of restoring default settings can disrupt your VTrak functions. Use this feature only when necessary and only the settings that must reset to default in order to set them correctly.



To access the Restore Defaults feature:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
The Administrative Tools list appears.
3. Click the **Restore Factory Defaults** link at the bottom of the list in Management View.
The Restore Factory Defaults screen appears.
4. Check the Firmware and Software functions you want to restore to default settings.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.

The functions you selected will be automatically restored to their default settings.

Clearing Statistics

The Clear Statistics function clears statistical data on controllers, Fibre Channel ports, SAS ports, physical drives, and logical drives. To clear statistical data:



1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the **Clear Statistics** link.

The Clear Statistics tab appears in Management View.

4. Click the **Submit** button.
5. In the confirmation box, type the word **confirm** in the field provided.
6. Click the **OK** button.

Shutting Down the Subsystem

You can only do part of this function in WebPAM PROe. Additional action is required, as described below. To shutdown the subsystem:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Shutdown link in Management View.
A Shutdown or Restart tab will appear.
4. On the Shutdown or Restart tab, choose *Shutdown* from the dropdown menu.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.

When the controller shuts down, your WebPAM PROe connection will be lost.

8. Wait for no less than two minutes.
9. Manually turn off the power supply switches the back of the subsystem.

Monitoring the Shutdown



To monitor a shutdown, you must use the Command Line Interface (CLI) though a serial connection to the VTrak.

At the “administrator@CLI>” prompt, type **shutdown -a shutdown**.

When the “Shutdown complete. It is now safe to power off the subsystem.” message appears, turn off the power supply switches.

Restarting the Subsystem

You can only do part of this function in WebPAM PROe. Additional action is required, as described below. To restart the subsystem

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Shutdown link in Management View.
A Shutdown or Restart tab will appear.
4. On the Shutdown or Restart tab, choose *Restart* from the dropdown menu.
5. Click the **Submit** button.
6. In the warning box, click the **OK** button.
7. In the confirmation box, type the word **confirm** in the field provided.
8. Click the **OK** button.

When the controller shuts down, your WebPAM PROe connection will be lost.

9. Wait for two to three minutes.
10. In your browser, log into WebPAM PROe once again.
If you cannot log in, wait for 30 seconds, and try again. Repeat until login is successful.

Monitoring the Restart

To monitor a restart, you must use the Command Line Interface (CLI) through a serial connection to the VTrak.

At the “administrator@CLI>” prompt, type **shutdown -a restart**.

When the “Login:” prompt appears, the restart is finished.



Managing Controllers

The RAID controllers are the heart of the VTrak subsystem. VTrak E-Class models have one or two controllers. Management of Controllers includes the following functions:

- Viewing the Controllers (page 108)
- Locating a Controller (page 108)
- Viewing Controller Information (page 109)
- Viewing Controller Statistics (page 110)
- Making Controller Settings (page 110)
- Clearing an Orphan Watermark (page 111)

Viewing the Controllers

To view information about the controllers:

1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.

The controller information appears under the Information tab in Management View. Controller information includes:

- **Controller ID** – 1 or 2
- **Alias** – if assigned
- **Model** – if applicable
- **Status** – OK means normal
- **Readiness Status** – Active or Standby
- **Locate** – Click the button to locate the controller. See below

VTrak subsystems with only one controller will always show that the second controller is “Missing.”

If your VTrak subsystem has two controllers and one is “Missing,” see “Controller Enters Maintenance Mode” on page 310 for more information.

Locating a Controller

To identify a specific controller in the VTrak subsystem:





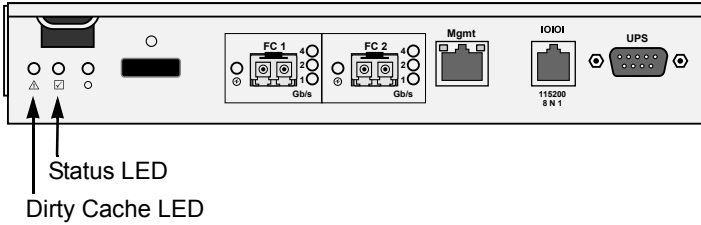
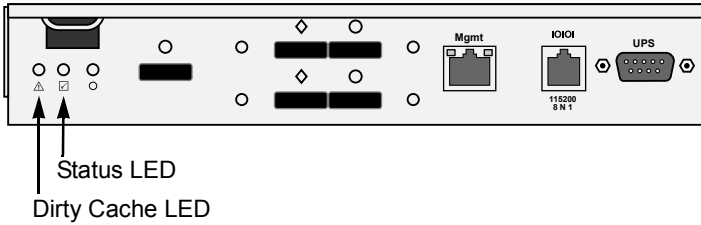



1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.
3. In Management View, click the **Locate Controller** button.
4. The Controller Dirty Cache  LED and Status  LED, on the back of the Controller, will flash for one minute. See the illustrations below.

Figure 9. The VTrak E610f and E310f controller LEDs**Figure 10. The VTrak E610s and E310s controller LEDs**

Viewing Controller Information

To view Controller information:

1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.
3. Click the Controller  icon.

The controller information appears the Information tab in Management View.

Adjustable items

You can set or adjust the following items:

- Alias, if assigned
- Coercion, enable or disable
- Coercion Method
- SMART (Self-Monitoring, Analysis, and Reporting System for physical drives)
- SMART Polling Interval
- Write Back Cache Flush Interval
- Enclosure Polling Interval
- LUN Affinity

See “Making Controller Settings” on page 110.

Upgradable items




You can upgrade the following items:

- Boot loader Version
- Firmware Version number
- Software Version number
- Memory Size

See “Chapter 6: Maintenance” on page 217.

Viewing Controller Statistics

To view controller statistics:

1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.
3. Click the Controller  icon.
4. Click the **Information** tab in Management View and choose *Statistics* from dropdown menu.




Clearing Statistics

To clear statistics, see “Clearing Statistics” on page 105.

Making Controller Settings

If your subsystem has two controllers, any settings you make to one controller will automatically apply to the other controller.

To make Controller settings:




1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.
3. Click the Controller  icon.
4. Click the **Settings** tab in Management View.
5. Make the following settings as needed:
 - Enter a name into the Alias field.
Maximum of 48 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
 - Check the Enable LUN affinity box to enable the LUN affinity feature.
If your subsystem has two controllers and Cache Mirroring is disabled, LUN Affinity is enabled automatically.
 - Check the SMART Log box to enable the Self-Monitoring, Analysis, and Reporting System (SMART).

- Enter a polling interval (1 to 1440 minutes) in SMART Polling Interval field.
 - Check the Coercion Enabled box to enable disk drive capacity coercion. When disk drives of different capacities are used in the same array, coercion reduces the usable capacity of the larger disk drive(s) in order to match the smallest capacity drive.
For more information, see “Capacity Coercion” on page 258.
 - Select a coercion method from the Coercion Method dropdown menu. The choices are:
 - GB Truncate** – (Default) Reduces the useful capacity to the nearest 1,000,000,000 byte boundary.
 - 10GB Truncate** – Reduces the useful capacity to the nearest 10,000,000,000 byte boundary.
 - Group Rounding** – Uses an algorithm to determine how much to truncate. Results in the maximum amount of usable drive capacity.
 - Table Rounding** – Applies a predefined table to determine how much to truncate.
 - Enter a time interval (1 to 12 seconds) in the Write Back Cache Flush Interval field.
For more information, see “Cache Policy” on page 254.
 - Enter a time interval (15 to 255 seconds) in the Enclosure Polling Interval field.
 - Check the Adaptive Writeback Cache box to enable the Adaptive Writeback Cache feature.
For more information, see “Adaptive Writeback Cache” on page 255.
6. Click the **Submit** button.
The changes take effect immediately.

Clearing an Orphan Watermark

An Orphan Watermark condition is the result of a disk drive failure during an NVRAM RAID level migration on a disk array.

To clear an Orphan Watermark:

1. Click the Subsystem  icon in Tree View.
2. Click the Controllers  icon.
3. Click the Controller  icon.
4. Click the **Clear** tab in Management View.
5. Click the **Submit** button.

The changes take effect immediately. If your subsystem has two controllers, clearing a condition on one controller will automatically apply to the other controller.



Managing Enclosures

On VTrak E-Class, enclosures include the main VTrak subsystem or *Head Unit* as well as additional enclosures that are connected to it through cascading or expansion. Enclosure Management includes the following functions:

- Viewing the Enclosures (page 113)
- Locating an Enclosure (page 113)
- Viewing Enclosure Topology (page 114)
- Viewing Enclosure Information (page 115)
- Making Enclosure Settings (page 115)
- Viewing FRU VPD Information (page 116)
- Checking the Batteries (page 116)
- Reconditioning a Battery (page 117)
- Silencing the Buzzer (page 117)
- Making Buzzer Settings (page 118)
- Testing the Buzzer (page 118)

Viewing the Enclosures

To view information about the enclosures:



1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.

The following information is shown:

- Enclosure ID number
- Enclosure Type
- Operational Status
- Status Description (specific components in need of attention, if any)

Locating an Enclosure

To locate an enclosure (subsystem):

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the **Locate Enclosure** button.

The Disk Status LEDs on the front of the enclosure will flash for one minute. See the illustrations below.

Figure 11. VTrak E610f and E610s front view

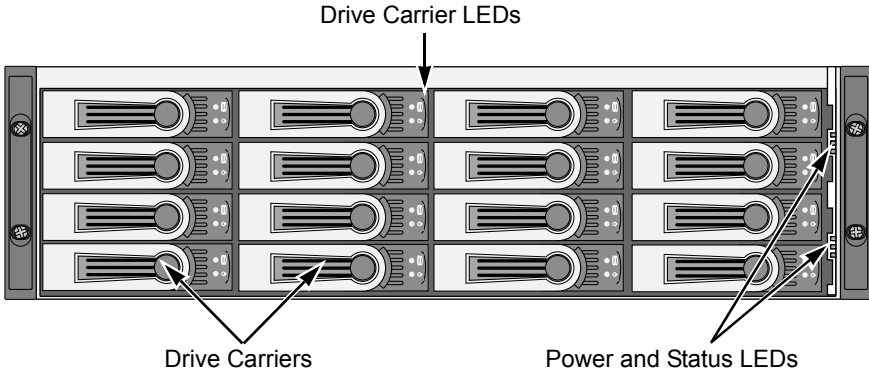


Figure 12. VTrak E310f and E310s front view

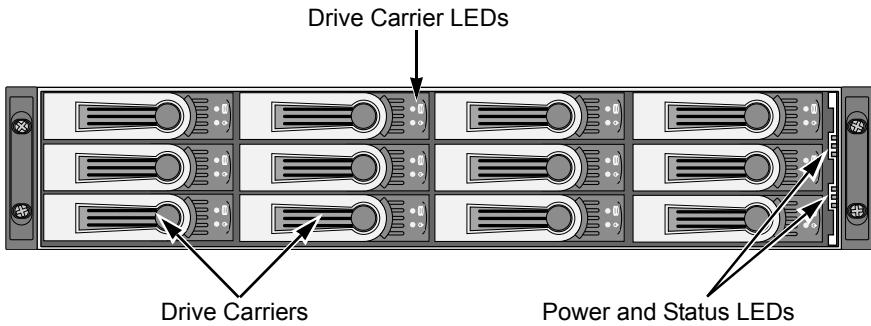
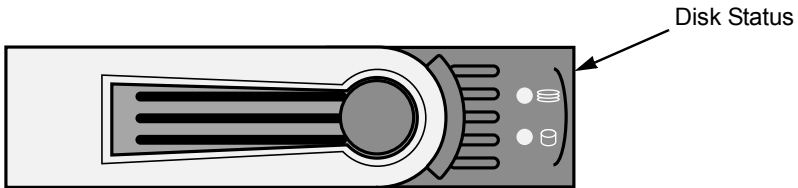




Figure 13. VTrak drive carrier LEDs



Viewing Enclosure Topology

To view Enclosure Topology:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.

3. Click the **Topology** tab in Management View.




Enclosure topology refers to the manner in which the data paths among the enclosures are connected:

- **Individual Subsystem** – One VTrak E-Class subsystem
- **JBOD Expansion** – One VTrak E-Class subsystem plus one or more JBOD expansion subsystems, managed through one subsystem or head unit
- **RAID Subsystem Cascading** – Multiple VTrak E-Class subsystems, managed through one subsystem or head unit

The logical connections for these arrangements are shown the Enclosure Topology tab. The physical connections for these arrangements are discussed in “Chapter 2: VTrak Installation” on page 11.

Viewing Enclosure Information

To view enclosure information:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.

Enclosure information appears the Information tab in Management View.

You can monitor power supplies, cooling units, enclosure temperatures and voltages, and the battery.

Adjustable items

You can set or adjust the following items:




- Enclosure Warning and Critical temperature thresholds
- Controller Warning and Critical temperature thresholds

See “Making Enclosure Settings” on page 115.

For information on Enclosure problems, see “Chapter 8: Troubleshooting” on page 273.

Making Enclosure Settings

To make Enclosure settings:




1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the **Settings** tab in Management View.
5. Enter a value in the following fields as necessary:

- Enclosure Warning Temperature Threshold
 - Enclosure Critical Temperature Threshold
 - Controller Warning Temperature Threshold
 - Controller Critical Temperature Threshold
6. Click the **Submit** button.
The changes take effect immediately.

Viewing FRU VPD Information

FRU VPD refers to Vital Product Data (VPD) information about Field Replaceable Units (FRU) in the enclosure. The number and type of FRU depends on the subsystem model.




To view FRU VPD information:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the **FRU VPD** tab in Management View.

Use this information when communicating with Technical Support and when ordering replacement units. For contact information, see “Contacting Technical Support” on page 319.

Checking the Batteries

The Enclosure–Battery tab displays information about the cache backup battery (or batteries) in the VTrak subsystem enclosure. To check the batteries:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the **Battery** tab in Management View.

Battery Notes

Each battery works with a controller. If the battery is present in the subsystem but the corresponding controller is not present, the battery will not appear in the interface.

If a battery does not reflect normal conditions and it is not currently under reconditioning, run the Recondition function before you replace the battery. See “Reconditioning a Battery” on page 117.

Reconditioning fully discharges, then fully recharges the battery. During reconditioning, if the Adaptive Writeback Cache function is enabled, the controller

cache is set to *Write Thru*. After reconditioning, the cache is reset to *Write Back*. See “Making Controller Settings” on page 110.

If a battery reaches the threshold temperature while charging or discharging, the charge or discharge pauses and the blower runs at high speed until the battery temperature falls below the threshold.




If the battery does not maintain normal values after a Recondition, replace the battery. See “Replacing a Cache Battery” on page 229.

VTrak automatically reconditions the battery every two months. To set the schedule, see “Scheduling an Activity” on page 69.

When you install a new battery, the cycle count shows 0. VTrak automatically runs a recondition on the battery to verify it. If you restart the subsystem or controller before reconditioning is finished, the battery is charged to 100%, then reconditioning starts again.

Reconditioning a Battery

To recondition the battery:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the **Battery** tab in Management View.
5. From the Battery tab dropdown menu, choose *Recondition*.
6. Click the **Submit** button.




Reconditioning fully discharges, then fully recharges the battery. During reconditioning, if the Adaptive Writeback Cache function is enabled, the controller cache is set to *Write Thru*. After reconditioning, the cache is reset to *Write Back*. See “Making Controller Settings” on page 110.

VTrak automatically reconditions the battery every two months. To set the recondition schedule, see “Scheduling an Activity” on page 69.

Silencing the Buzzer

The buzzer sounds to inform you that the VTrak needs attention. See “VTrak is Beeping” on page 274 for more information.

To silence the buzzer for the current trigger event:




1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.

4. Click the **Buzzer** tab in Management View.
5. Click the **Mute** button.
The buzzer goes silent. If another trigger event occurs, the buzzer will sound again.

To silence the buzzer for all trigger events, disable it under “Making Buzzer Settings.”

Making Buzzer Settings




To make buzzer settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. In Management View, from the Buzzer tab dropdown menu, choose *Settings*.
5. Check the **Buzzer Enable** box to enable the buzzer.
Uncheck the Buzzer Enable box if you do not want the buzzer to sound.
6. Click the **Submit** button.

Testing the Buzzer

You must enable the buzzer before you can test it.

To test buzzer function:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the **Buzzer** tab in Management View.
5. Click the **Sound** button.
The buzzer will sound for one minute.





Managing Physical Drives

Managing Physical Drives deals with the physical disk drives installed in the VTrak subsystem enclosure, including the following functions:

- Viewing a List of Physical Drives (page 119)
- Identifying a Physical Drive (page 119)
- Making Global Physical Drive Settings (page 119)
- Viewing Physical Drive Information (page 120)
- Viewing Physical Drive Statistics (page 121)
- Making Physical Drive Settings (page 121)
- Clearing Stale and PFA Conditions (page 122)
- Forcing a Physical Drive Offline or Online (page 122)

Viewing a List of Physical Drives





To view a list of physical drives in this enclosure:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the Physical Drives  icon.

The list of physical drives appears in Management View.

Identifying a Physical Drive

To identify physical drive in the VTrak subsystem enclosure:




1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the Physical Drives  icon.
5. In Management View, click the physical drives in the graphic.

The location of the physical drive is highlighted in the Enclosure Front View diagram.

Making Global Physical Drive Settings

Global settings apply to all of the physical disk drives installed in the VTrak subsystem enclosure. To make global physical drive settings:

1. Click the Subsystem  icon in Tree View.

2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the Physical Drives  icon.
5. Click the **Global Settings** tab in Management View.
6. Make the settings as needed.

For SATA drives, check the boxes to enable:

- Write Cache
- Read Look Ahead Cache
- Command Queuing (for disk drives that support Command Queuing)
- From the DMA Mode dropdown menu, choose a DMA mode.

For SAS drives, check the boxes to enable:






- Write Cache
- Read Look Ahead Cache
- Command Queuing (for disk drives that support Command Queuing)
- Read Cache

7. Click the **Submit** button.

The functions you enable here depend on whether the physical drives support those functions. See “Viewing Physical Drive Information” on page 120 to determine which functions a particular drive supports.

Viewing Physical Drive Information

To view physical drive information:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the Physical Drives  icon.
5. Click a Physical Drive  icon.

Useful information provided here includes:

- The location of the physical drive is highlighted in the Enclosure Front View diagram.
- **Operational Status** – OK is normal. Can also show Rebuilding, Forced Online, Forced Offline, Transition Running, PDM Running, Media Patrol Running, Stale, PFA, Offline, or Dead.
- **Configuration Status** – The array to which the drive is assigned or its spare designation, including Unconfigured, Stale, PFA, Global Spare, Dedicated Spare, Revertible Global Spare, Revertible Dedicated Spare.






Adjustable Items

- Write Cache
- Read Look Ahead Cache
- Read Cache (SAS drive only)
- Command Queuing
- DMA Mode (SATA drives only)

See “Making Global Physical Drive Settings” on page 119.

Viewing Physical Drive Statistics

To view physical drive statistics:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the Physical Drives  icon.
5. Click a Physical Drive  icon.
6. From the dropdown menu on the Information tab, choose *Statistics*.






Clearing Statistics

To clear statistics, see “Clearing Statistics” on page 105.

Making Physical Drive Settings

An alias is the only setting you can make to an individual physical drive. All other settings are global. See “Making Global Physical Drive Settings” on page 119.

To make physical drive settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the Physical Drives  icon.
5. Click a Physical Drive  icon.
6. Click the **Settings** tab in Management View.
7. Type an alias into the Physical Drive Alias field.
Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
8. Click the **Submit** button.






Clearing Stale and PFA Conditions

The Clear tab only appears when those conditions are present.

- **Stale** – The physical drive contains obsolete disk array information.
- **PFA** – The physical drive has errors resulting in a prediction of failure.

Be sure you have corrected the condition by a physical drive replacement, rebuild operation, etc., first. Then clear the condition. See “Physical Drive Problems” on page 305 for more information.

To clear a Stale or PFA status from a physical drive:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the Physical Drives  icon.
5. Click a Physical Drive  icon.
6. In Management View, click the **Clear** tab.
7. In the Confirmation box, click **OK** to confirm.



Note

If a physical drive has both a Stale and a PFA condition, click the **Clear** tab once to clear the Stale condition, then click again to clear the PFA condition.

Forcing a Physical Drive Offline or Online

The Physical Drive–Force Offline/Online tab enables you to force an:

- Online physical drive to go Offline
- Offline physical drive to go Online

The Force Offline/Online tab appears only for physical drives that are assigned to disk arrays.



Caution






Forcing a physical drive offline or online is likely to cause data loss. Back up your data before you proceed. Use these functions only when required.



Important

Forcing a physical drive offline will cause your logical drives to become degraded. If Auto Rebuild is enabled and a spare drive is available, the disk array will begin rebuilding itself automatically.

To force a physical drive offline or online:

1. Click the Subsystem  icon in Tree View.
2. Click the Enclosures  icon.
3. Click the Enclosure  icon.
4. Click the Physical Drives  icon.
5. Click a Physical Drive  icon.
6. Click the **Force Offline/Online** tab in Management View.
7. Click the **Submit** button.
8. In the confirmation box, type the word **confirm** in the field provided.
9. Click the **OK** button.



Managing Disk Arrays

Disk Array Management includes the following functions:

- Viewing Disk Arrays (page 124)
- Creating a Disk Array (page 124)
- Deleting a Disk Array (page 129)
- Viewing Disk Array Information (page 129)
- Making Disk Array Settings (page 130)
- Creating a Logical Drive (page 130)
- Deleting a Logical Drive (page 132)
- Migrating a Disk Array (page 132)
- Rebuilding a Disk Array (page 133)
- Running PDM on a Disk Array (page 135)
- Transitioning a Disk Array (page 135)
- Preparing a Disk Array for Transport (page 136)

Viewing Disk Arrays

To view the disk arrays in this enclosure plus any expanded or cascaded enclosures:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.

A list of disk arrays appears in Management View.

Click the **DA** link to view a specific disk array. See “Viewing Disk Array Information” on page 129.



Creating a Disk Array

The CLU provides three methods of creating a disk array:

- **Automatic** – Creates a default disk array and logical drive based on unconfigured physical drives in the system. No user choices. See “Creating a Disk Array – Automatic” on page 125.
- **Express** – You choose the RAID characteristics and type of application. Creates a disk array and logical drive(s) based on your input. See “Creating a Disk Array – Express” on page 125.
- **Advanced** – You specify all parameters for a new disk array. One logical drive will be made automatically when you create the disk array. If you choose less than the total available capacity, you can use the remaining space to create additional logical drives at a later time. See “Creating a Disk Array – Advanced” on page 127.

Creating a Disk Array – Automatic

The Disk Array Automatic Creation option enables you to create a new disk array following a default set of parameters. One logical drive will be made automatically when you create the disk array. To create a Disk Array using the Automatic function:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the **Create** tab in Management View.
4. From the Create tab dropdown menu, choose *Automatic*.

The following parameters display:

- **Disk Arrays** – The number of physical drives in the disk array, their slot numbers, configurable capacity, and the number of logical drives to be created
- **Logical Drives** – The ID number of the logical drive(s), their RAID level, capacity, and stripe size
- **Spare Drives** – The physical drive slot number of the dedicated hot spare assigned to this disk array. A hot spare drive is created for all RAID levels except RAID 0, when five or more unconfigured physical drives are available

5. If you accept these parameters, click the **Submit** button.

The new disk array appears in the Disk Array List the Information tab.

If you do NOT accept these parameters, use the Advanced option to create your disk array.



Creating a Disk Array – Express

The Disk Array Express Creation option enables you to choose the parameters for a new disk array by specifying the characteristics you want. With this method, you can create multiple logical drives at the same time you create your disk array. However, all of the logical drives will be the same.

If you prefer to specific the parameters directly, use the Advanced option to create your disk array.

If you are uncertain about choosing parameters for your disk array, use the Automatic option.

To create a new disk array:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.

3. Click the **Create** tab in Management View.
4. From the Create tab dropdown menu, choose *Express*.
5. Check the boxes to choose any one or combination of:
 - **Redundancy** – The array will remain available if a physical drive fails
 - **Capacity** – The greatest possible amount of data capacity
 - **Performance** – The highest possible read/write speed
 - **Mixing SATA/SAS Drive** – Check this box if you want to use both SATA and SAS drives in the same disk array
If the box is unchecked, and you have both SATA and SAS drives, different arrays will be created for each type of drive.
6. In the Number of Logical Drives field, enter the number of logical drives you want to make from this disk array.
7. From the Application Type menu, choose an application that best describes your intended use for this disk array:
 - File Server
 - Video Stream
 - Transaction Data
 - Transaction Log
 - Other

8. Click the **Update** button.

Or check the Automatic Update box and updates will occur automatically.

The following parameters display:

- **Disk Arrays** – The number of physical drives in the disk array, their slot numbers, configurable capacity, and the number of logical drives to be created
- **Logical Drives** – The slot number of the logical drive(s), their RAID level, capacity, and stripe size
- **Spare Drives** – The physical drive slot number of the dedicated hot spare assigned to this disk array (all RAID levels except RAID 0)

If you accept these parameters, proceed to the next step.

If you do NOT accept these parameters, review and modify your selections in the previous steps.

9. When you are done, click the **Submit** button.



The new disk array appears in the Disk Array List the Information tab.

Creating a Disk Array – Advanced

The Disk Array Advanced Creation option enables you to directly specify all parameters for a new disk array. One logical drive will be made automatically when you create the disk array. If you choose less than the total available capacity, you can use the remaining space to create additional logical drives at a later time.

If you are uncertain about choosing parameters for your disk array, use the Express or Automatic option to create your disk array.

To create a new disk array:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. From the Create tab dropdown menu, choose *Advanced*.

Step 1 – Disk Array Creation

4. Enter an alias for the disk array in the field provided.
5. Check the box if you want to enable Media Patrol.
For more information, see “Media Patrol” on page 267.
6. Check the box if you want to enable PDM.
For more information, see “Predictive Data Migration (PDM)” on page 268.
7. Highlight physical drives you want in the disk array from the Available list and press the >> button to move them to the Selected list.
You can also double-click them to move them.
8. When you are done, click the **Next** button.

Step 2 – Logical Drive Creation

Logical Drive Creation enables you to specify logical drives under the new disk array. Enter the information for a logical drive, then click the **Update** button. If there is free capacity remaining, you can specify another logical drive now or wait until later.

9. Enter an alias for the logical drive in the field provided.
10. Choose a RAID level for the logical drive from the dropdown menu.
The choice of RAID levels depends the number of physical drives you selected.
11. RAID 50 and 60 only – Specify the number of axles for your array.
For more information on axles, see “RAID 50 Axles” on page 245 or “RAID 60 Axles” on page 248.
12. Specify a Capacity and the unit of measure (MB, GB, TB).

This value will be the data capacity of the first logical drive in your new disk array. If you specify less than disk array's maximum capacity, the remainder will be available for additional logical drives which you can create later.

13. Specify a Stripe size from the dropdown menu.
64 KB, 128 KB, 256 KB, and 1 MB are available. 64 KB is the default.
14. Specify a Sector size from the dropdown menu.
512 B, 1 KB, 2 KB, and 4 KB are available. 512 B is the default.
15. Specify a Read (cache) Policy from the dropdown menu.
Read Cache, Read Ahead Cache, and No Cache are available. Read Ahead is the default.
16. Specify a Write (cache) Policy from the dropdown menu.
Write Back and Write Through (Thru) are available. Write Back is the default.
17. From the Preferred Controller ID dropdown menu, choose a controller.
The choices are Controller 1 or 2, or Automatic. This feature is only available on subsystems with two controllers and LUN Affinity enabled.
18. Click the **Update** button.
A new logical drive is displayed under New Logical Drives.
Repeat the above steps to specify additional logical drives as desired.
19. When you are done specifying logical drives, click the **Next** button.

Step 3 – Summary

The Summary lists the disk array and logical drive information you specified.

20. To proceed with disk array and logical drive creation, click the **Submit** button.

The new disk array appears in the Disk Array List the Information tab.



Note

This function does not automatically create a hot spare drive. After the disk array is created, you can create a hot spare drive for it. For more information, see “Creating a Spare Drive” on page 145.

Deleting a Disk Array



The Disk Arrays–Delete tab enables you to delete existing disk arrays.



Caution

If you delete a disk array, you also delete any logical drives that belong to it, along with the data in those logical drives. Back up any important data before deleting a disk array.




To delete a disk array:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the **Delete** tab in Management View.
4. Check the box to the left of the disk array you want to delete.
5. Click the **Submit** button.
6. In the confirmation box, type the word confirm in the field provided.
7. Click the **OK** button.

The selected disk array disappears from the Disk Array List the Information tab.

Viewing Disk Array Information

To view Disk Array information:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.

The disk array information is shown in Management View.

Disk Array Operational Status

- **OK** – This is the normal state of a logical drive. When a logical drive is Functional, it is ready for immediate use. For RAID Levels other than RAID 0 (Striping), the logical drive has full redundancy.
- **Synchronizing** – This condition is temporary. Synchronizing is a maintenance function that verifies the integrity of data and redundancy in the logical drive. When a logical drive is Synchronizing, it will function and your data is available. However, access will be slower due to the synchronizing operation.
- **Critical/Degraded** – This condition arises as the result of a physical drive failure. A degraded logical drive will still function and your data is still

available. However, the logical drive has lost redundancy (fault tolerance). You must determine the cause of the problem and correct it.

- **Rebuilding** – This condition is temporary. When a physical drive has been replaced, the logical drive automatically begins rebuilding in order to restore redundancy (fault tolerance). When a logical drive is rebuilding, it will function and your data is available. However, access will be slower due to the rebuilding operation.
- **Transport Ready** – After you perform a successful Prepare for Transport operation, this condition means you can remove the physical drives of this disk array and move them to another enclosure or different drive slots. After you relocate the physical drives, the disk array status will show OK.




Adjustable Items

- **Alias** – Optional.
- **Media Patrol** – Enabled or disabled.
- **PDM** – Enabled or disabled.

See “Making Disk Array Settings” on page 130.

Making Disk Array Settings

To make Disk Array settings:



1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the **Settings** tab in Management View.
5. Optional. Enter an alias in the Disk Array Alias field.
Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
6. To enable Media Patrol support, check the **Media Patrol** box.
7. To enable PDM support, check the **PDM** box.
8. Click the **Submit** button.

Creating a Logical Drive

When you create a disk array, you automatically create one logical drive also. If the initial logical drive used less than the full capacity of the disk array, you can create additional logical drives from the same disk array.

To create a logical drive:

1. Click the Subsystem  icon in Tree View.

2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the **Create LD** tab in Management View.
5. Enter an alias (name) in the Alias field.

Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
6. From the RAID Level dropdown list, choose a RAID level for this logical drive.

All RAID levels supported by the disk array appear in the list. See “Choosing a RAID Level” on page 250.
7. RAID 50 and 60 only – Specify the number of axles for your array.

For more information on axles, see “RAID 50 Axles” on page 245 or “RAID 60 Axles” on page 248.
8. Enter a capacity and choose unit of measure (MB, GB, TB).

The default value is the available capacity of the disk array. You can use this value or any lesser amount.
9. From the Stripe dropdown menu, choose a Stripe size for this logical drive.

The choices are 64 KB, 128 KB, 256 KB, 512 KB, and 1 MB. 64 KB is the default. See “Choosing Stripe Size” on page 253.
10. From the Sector dropdown menu, choose a Sector size for this logical drive.

The choices are 512 B, 1 KB, 2 KB, and 4 KB. 512 B is the default. See “Choosing Sector Size” on page 253.
11. From the Read Policy dropdown menu, choose a Read Cache policy for this logical drive.

The choices are Read Cache, Read Ahead, and No (read) Cache. Read Ahead is the default. See “Cache Policy” on page 254.
12. From the Write Policy dropdown menu, choose a Write Cache policy for this logical drive.

The choices are Write Through (thru) and Write Back. Write Back is the default. If you selected No Cache under Read Cache, this setting will be Write Through. See “Cache Policy” on page 254.
13. From the Preferred Controller ID dropdown menu, choose a controller.

The choices are Controller 1 or 2, or Automatic. This feature is only available on subsystems with two controllers and LUN Affinity enabled.
14. Click the **Update** button to enter the logical drive parameters.

15. Review the results. If there is remaining space the disk array, you can create another logical drive, following the steps above. Each logical drive can have a different set of parameters.
16. Click the **Next** button when you are done.
A new window displays with the disk array information and the proposed logical drives with their parameters.
17. Click the **Submit** button create the logical drives.

The new logical drive appears in the Logical Drive List the Information tab.

If you created a fault-tolerant logical drive (any RAID level except RAID 0), the Operational Status of new logical drive will display *Synchronizing* for several minutes after creation. You can use the logical drive during this period but read/write performance could be slower than normal.




Deleting a Logical Drive



Caution

All data the logical drive will be lost. Back up any valuable data before deleting the logical drive.

To delete a logical drive:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the **Delete LD** tab in Management View.
5. Check the box to the left of the logical drive you want to delete.
6. Click the **Submit** button.

In the confirmation box, type the word **confirm** in the field provided.

7. Click the **OK** button.

The selected logical disappears from the Logical Drive List the Information tab.

Migrating a Disk Array

The action of migrating a disk array means either or both:

- Change the RAID Level
- Expand the storage capacity




For a list of Migration options and other important information, see “RAID Level Migration” on page 260.



Notes

- You can add physical drives to a RAID 50 or RAID 60 array but you cannot change the number of axes.
- If you add an odd number of physical drives to a RAID 10 array, it will become a RAID 1E array by default.

To Migrate an existing disk array:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. From the dropdown menu the Background Activities tab, choose *Start Migration*.
5. Highlight physical drives you want in the disk array from the Available list and press the >> button to move them to the Selected list.
You can also double-click them to move them.
6. When you are done, click the **Next** button.
7. Select a new RAID Level, if desired.
8. To expand the disk array's capacity, check the Expand Capacity box.
9. If you checked the Expand Capacity box, enter a number into the Capacity field and choose the appropriate unit of measure (MB, GB, TB).
10. Under Capacity Usage, highlight the logical drive whose RAID level you want to change or whose capacity you want to expand.
11. Click the **Update** button.
The logical drive changes to reflect your choices.
12. Update other logical drives using the same method.
13. When you are done making the changes, click the **Next** button.
14. Click the **Submit** button to begin Migration.

To set Migration priority, see “Making Background Activity Settings” on page 66.

Rebuilding a Disk Array

When you rebuild a disk array, you are actually rebuilding the data on a replacement physical drive.

Rebuilding Automatically

Normally, a disk array would rebuild itself using a hot disk drive, after going Critical. However, if the Auto Rebuild function is disabled or no spare drives are available, you must initiate the procedure.




To enable Auto Rebuild, see “Making Background Activity Settings” on page 66.

To create a spare drive, see “Creating a Spare Drive” on page 145.

For more information, see “Hot Spare Drive(s)” on page 259.

Rebuilding Manually

If a physical drive has failed, identify and replace the drive, then rebuild the disk array as described below:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.

If there are multiple disk arrays, choose the icon with the yellow !.

4. From the dropdown menu the Background Activity tab, choose *Start Rebuild*.
5. Select the Source physical drive.
This is a remaining functional physical drive in the disk array.
6. Select the Target physical drive.
This is the replacement physical drive.
7. Click the **Submit** button.

The Disk Array Background Activity tab shows the rebuild progress on the replacement (target) physical drive. Depending the size of the physical disk involved, this process will take some time.

To view more information, click the **Rebuild on PDx** link.




To set Rebuild priority, see “Making Background Activity Settings” on page 66.

Running Media Patrol on a Disk Array

Media Patrol checks the magnetic media on physical drives. When it finds the specified number of bad blocks, it will trigger PDM. See “Making Background Activity Settings” on page 66 and “Running PDM” on page 68.

You can schedule Media Patrol to run automatically, see “Scheduling an Activity” on page 69.

To start Media Patrol:




1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. From the dropdown menu the Background Activities tab, choose *Start Media Patrol*.
5. Click the **Start** button.

Running PDM on a Disk Array

Predictive Data Migration (PDM) migrates data from the suspect physical drive to a spare physical drive, similar to Rebuilding. But unlike Rebuilding, PDM acts *before* the disk drive fails and your Logical Drive goes Critical.

See “Predictive Data Migration (PDM)” on page 268.

To start PDM:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the **Background Activities** tab in Management View.
5. From the dropdown menu the Background Activities tab, choose *Start PDM*.
6. In the next screen, choose the Source and Target physical drives.
The suspect physical drive is the source. The replacement physical drive is the target.
7. Click the **Start** button.

Transitioning a Disk Array

Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare. The revertible spare drive returns to its original status. For more information, see “Transition” on page 269.

In order to run the Transition function:

- The spare drive must be Revertible.
- You must specify an unconfigured physical drive of the same or larger capacity to replace the revertible spare drive.

To run Transition:

1. Click the Subsystem  icon in Tree View.

2. From the dropdown menu on the Background Activities tab, choose *Start Transition*.
3. Choose an unconfigured physical drive from the list of available drives.
4. From the Target Physical Drive dropdown menu, choose an unconfigured physical drive.
5. Click the **Submit** button.

After Transition is completed, refresh the screen. The revertible spare drive will be listed under the Spare Drives icon and the disk array's operational status will show OK.

To set Transition priority, see "Making Background Activity Settings" on page 66.

Preparing a Disk Array for Transport

Transport is the action of moving the physical drives of a disk array:




- To different slots in the same VTrak enclosure
- From one VTrak enclosure to another



Important

Before you can use this feature, the disk array's Operational Status must be OK.

To prepare a disk array for transport:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the **Transport** tab in Management View.
5. Click the **Submit** button.
6. In the confirmation box, type the word **confirm** in the field provided.
7. Click the **OK** button.
8. After the Transition is complete, move the physical drives comprising the disk array to their new locations.
9. Click the **Refresh** button in your Browser.
The drives appear in their new locations and disk array status displays OK.

Managing Logical Drives





Logical drives are made from disk arrays. In the Tree, you can see a graphic representation of the logical drives that belong to each array. You can see a summary of all logical drives in the subsystem under Logical Drive Summary.

Logical drive management includes the following functions:

- Viewing Information for All Logical Drives (page 137)
- Viewing Logical Drive Information (page 138)
- Viewing Logical Drive Statistics (page 139)
- Making Logical Drive Settings (page 139)
- Initializing a Logical Drive (page 140)
- Running Redundancy Check (page 140)
- Viewing the Logical Drive Check Table (page 141)
- Making Logical Drive LUN Settings (page 142)

Viewing Information for All Logical Drives

To view information about all logical drives in a disk array:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the Logical Drives  icon

Logical Drive Status

- **OK** – This is the normal state of a logical drive. When a logical drive is Functional, it is ready for immediate use. For RAID Levels other than RAID 0 (Striping), the logical drive has full redundancy.
- **Synchronizing** – This condition is temporary. Synchronizing is a maintenance function that verifies the integrity of data and redundancy in the logical drive. When a logical drive is Synchronizing, it will function and your data is available. However, access will be slower due to the synchronizing operation.
- **Rebuilding** – This condition is temporary. When a physical drive has been replaced, the logical drive automatically begins rebuilding in order to restore redundancy (fault tolerance). When a logical drive is rebuilding, it will function and your data is available. However, access will be slower due to the rebuilding operation.
- **Critical** – This condition arises as the result of a physical drive failure. A degraded logical drive will still function and your data is still available.

However, the logical drive has lost redundancy (fault tolerance). You must determine the cause of the problem and correct it.

- **Offline** – This condition arises as the result of a second physical drive failure. An Offline logical drive is not accessible but some or all of your data may remain intact. You must determine the cause of the problem and correct it.
- **Transport Ready** – After you perform a successful Prepare for Transport operation, this condition means you can remove the physical drives of this disk array and move them to another enclosure or different drive slots. After you relocate the physical drives, the disk array status will show OK.






To create a logical drive, see “Creating a Logical Drive” on page 130.

To delete a logical drive, see “Deleting a Logical Drive” on page 132.

For a Degraded or Offline logical drive, see “Critical & Offline Disk Arrays” on page 301.

Viewing Logical Drive Information

To view information for a single logical drive:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the Logical Drives  icon
5. Click the Logical Drive  icon.

To specify an Alias or set the Read and Write Policies, click the **Settings** tab.

Logical Drive Status

See “Logical Drive Status” on page 137.

Logical Drive Synchronization

Synchronization is an automatic procedure applied to logical drives when they are created. Yes means the logical drive was synchronized.






Adjustable Items

- Alias (optional)
- Read Policy
- Write Policy
- Preferred Controller ID

See “Making Logical Drive Settings” on page 139.

Viewing Logical Drive Statistics

To view information for a single logical drive:






1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the Logical Drives  icon
5. Click the Logical Drive  icon.
6. In Management View, from the dropdown menu on the Information tab, choose *Statistics*.

Clearing Statistics

To clear statistics, see “Clearing Statistics” on page 105.

Making Logical Drive Settings

To make Logical Drive settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the Logical Drives  icon
5. Click the Logical Drive  icon.
6. Click the **Settings** tab in Management View.
7. Optional. Enter an alias in the Logical Drive Alias field.
Maximum of 32 characters. Use letters, numbers, space between words, and underscore. An alias is optional.
8. From the Read Policy dropdown menu, choose a Read Cache policy.
The choices are Read Cache, Read Ahead, and No Cache.
9. From the Write Policy dropdown menu, choose a Write Cache policy.
The choices are Write Back and Write Through (Thru). If you choose No Read Cache, Write policy is automatically Write Through.
10. From the Preferred Controller ID dropdown menu, choose the preferred controller to access this logical drive.
The choices are 1 and 2. This feature is only available on subsystems with two controllers and LUN Affinity enabled. If N/A is shown, there is only one controller in the enclosure.

11. Click the **Submit** button.

Initializing a Logical Drive




Initialization is done to logical drives after they are created from a disk array. Initialization sets all data bits in the logical drive to zero. The action is useful because there may be residual data the logical drives left behind from earlier configurations. For this reason, Initialization is recommended for all new logical drives.




Caution

When you initialize a logical drive, all the data the logical drive will be lost. Backup any important data before you initialize a logical drive.

Initialize a Logical Drive:

1. Click the Subsystem  icon in Tree View.
2. Click the Logical Drive Summary  icon.
3. Click the  icon of the logical drive you want to Initialize.

You can also start Initialization from the Subsystem  icon Background Activities tab

4. Click the **Background Activities** tab in Management View.
5. From the Background Activities dropdown menu, choose *Initialization*.
6. To choose Quick Initialization, check the box.
If you checked the box, enter a value in the Quick Initialization Size field. This value is the size of the initialization blocks in MB.
7. If you did not choose Quick Initialization, enter a hexadecimal value in the Initialization Pattern in Hex field or use the default 00000000 value.
8. Click the **Submit** button.
9. In the confirmation box, type the word **confirm** in the field provided.
10. Click the **OK** button.

To view the progress of the Initialization, click the **Background Activity** tab.




To set Initialization priority, see “Making Background Activity Settings” on page 66.


Running Redundancy Check

Redundancy Check is a routine maintenance procedure for fault-tolerant logical drives (those with redundancy) that ensures all the data matches exactly.

Redundancy Check can also correct inconsistencies. You can also schedule a Redundancy Check. See “Scheduling an Activity” on page 69.

Redundancy Check a Logical Drive:

1. Click the Subsystem  icon in Tree View.
2. Click the Logical Drive Summary  icon.
3. Click the  icon of the logical drive you want to Initialize.

You can also start Redundancy check from the Subsystem  icon Background Activities tab






4. From the dropdown menu on the Background Activities tab, choose *Redundancy Check*.
5. To choose *Auto Fix*, check the box.
This feature attempts to repair the problem when it finds an error.
6. To choose *Pause On Error*, check the box.
This feature stops the process when it finds an error.
If Auto Fix is also checked, the process stops only when it finds a non-repairable error.
7. Click the **Submit** button.

To view the progress of the Redundancy Check, click the **Background Activity** tab.

To set Redundancy Check priority, see “Making Background Activity Settings” on page 66.

Viewing the Logical Drive Check Table

The Logical Drive Check Table displays errors related to a logical drive. Use this information to evaluate the integrity of the logical drive and to determine whether corrective action is needed. To View the tables:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the Logical Drives  icon
5. Click the Logical Drive  icon.
6. Click the **Check Table** tab in Management View.
7. Click the option for the table you want to see.

The default is All tables.

If there are entries, they are listed as follows:

- **Entry Number** – A number assigned to each block of entry.
- **Table Type** – Read Check, Write Check or Inconsistent Block (see below).
- **Start Logical Block Address** – LBA of the first block for this entry.
- **Count** – Number of continuous blocks starting from this LBA.

Table Definitions

- **Read Check Table** – Contains a list of read errors for this logical drive.
- **Write Check Table** – Contains a list of write errors for this logical drive.
- **Inconsistent Block Table** – Contains a list of inconsistent blocks for this logical drive. Mirror data for RAID Levels 1, 1E, and 10 or Parity data for RAID Levels 5, 6, 50, and 60 identified by the Redundancy Check (a background function).






Making Logical Drive LUN Settings

For Fibre Channel and SAS, LUN Masking is the process of applying a LUN Map so that each initiator can only access the LUNs specified for it.

Before you can specify an initiator for your LUN map, you must add the initiator to the VTrak 's initiator list. See “Adding an Initiator” on page 84 or page 87.

You must enable LUN Masking in order apply a LUN map. See “Enabling LUN Masking” on page 89.

To specify a LUN Map:

1. Click the Subsystem  icon in Tree View.
2. Click the Disk Arrays  icon.
3. Click the Disk Array  icon.
4. Click the Logical Drives  icon.
5. Click the Logical Drive  icon.
6. Click the **LUN Map** tab in Management View.
7. From the Unassigned Initiator List, click an initiator to choose it.
Or type the initiator name into the Initiator Name field.
8. Type a LUN into the Map to LUN field.
9. Click the **Assign** button.

The initiator appears in the Assigned Initiator List.

10. Click the **Submit** button.



Notes

- Obtain the initiator name from the initiator utility on your host system.
 - The initiator name you input must match exactly in order for the connection to work.
-

LUN Mapping Parameters

- **Initiator Name**
 - **Fibre Channel** – A Fibre Channel initiator name is the World Wide Port Name of the device and is composed of a series of eight, two-digit hexadecimal numbers.
 - **SAS** – A SAS initiator name is the SAS address of the HBA card in the Host PC.
- **Alias** – Optional. A common name for an iSCSI initiator
- **Symbolic Name** – Optional. A common name for a Fibre Channel initiator
- **Port ID** – Port ID of the Fibre Channel port for this initiator
- **LUN** – Logical Unit Number on this logical drive for the selected initiator. You must enter different LUN numbers for each logical drive.

Managing Spare Drives



When a physical drive in a disk array fails and a spare drive of adequate capacity is available, the disk array will begin to rebuild automatically using the spare drive. See “Critical & Offline Disk Arrays” on page 301.

Spare drive management includes the following functions:

- Viewing a List of Spare Drives (page 144)
- Locating a Spare Drive (page 144)
- Creating a Spare Drive (page 145)
- Deleting Spare Drive (page 146)
- Making Spare Drive Settings (page 146)
- Running Spare Check (page 147)

Viewing a List of Spare Drives

To view a list of spare drives:



1. Click the Subsystem  icon in Tree View.
2. Click the Spare Drives  icon.

The information includes:

- **ID** – The unique ID number assigned to the spare drive.
- **Operational Status** – OK is normal. Can also show Rebuilding, Transition Running, PDM Running, or Offline.
- **Physical Drive ID** – The ID number of the physical drive in the subsystem enclosure.
- **Capacity** – The data storage capacity of this spare drive.
- **Revertible** – Yes or No. A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced.
- **Type** – Global, can be used by any disk array. Dedicated, can only be used by the assigned disk array.
- **Dedicated to Array** – For dedicated spares, the disk array to which it is assigned. Global spares show N/A.

Locating a Spare Drive

To locate a physical drive assigned as a spare drive in the VTrak subsystem enclosure:

1. Click the Subsystem  icon in Tree View.
2. Click the Spare Drives  icon.

3. Click the Spare Drive  icon.

In Management View, the Enclosure Front View diagram appears with the location of the spare drive highlighted.



Creating a Spare Drive



Important

- There must be an unconfigured physical drive available for selection as a spare drive. See “Viewing a List of Physical Drives” on page 119.
- Be sure the unconfigured physical drive has adequate capacity to replace the largest drive in the disk array.

To create a spare drive:

1. Click the Subsystem  icon in Tree View.
2. Click the Spare Drives  icon.
3. Click the **Create** tab in Management View.
4. Select a spare type, Global or Dedicated.

Global can be used by any disk array. Dedicated can only be used by the assigned disk arrays
5. To make a revertible spare drive, check the Revertible box.

A revertible spare drive can be returned to spare drive status after it replaces a failed drive in a disk array. See “Transition” on page 269 for more information.
6. In the Physical drives field, highlight the physical drive you want to assign as a spare drive in the Available list and press the >> button to move the drive to the Selected list.

You can also double-click drives to move them.
7. If you selected a Dedicated spare drive, in the Dedicated to Disk Arrays field, highlight disk arrays to which you want assign the spare drive from the Available list and press the >> button to move the array to the Selected list.

You can also double-click arrays to move them.
8. Click the **Update** button.

Your choices are displayed under New Hot Spare Drives.
9. If you agree with the proposed choices, click the **Submit** button.



Deleting Spare Drive



Note




If an existing spare drive has the wrong parameters for your needs, click the **Settings** tab to change the parameters rather than delete the spare drive and create a new one.

To delete a spare drive:

1. Click the Subsystem  icon in Tree View.
2. Click the Spare Drives  icon.
3. Click the **Delete** tab in Management View.
4. Check the box to the left of the spare drive you want to delete.
5. Click the **Submit** button.
In the confirmation box, type the word **confirm** in the field provided.
6. Click the **OK** button.

Making Spare Drive Settings



The Spare Drive–Settings tab enables you to change the settings of an existing spare drive. To change spare drive settings:

1. Click the Subsystem  icon in Tree View.
2. Click the Spare Drives  icon.
3. Click the Spare Drive  icon.
4. Click the **Settings** tab in Management View.
5. Select a spare type, Global or Dedicated.
Global can be used by any disk array. Dedicated can only be used by the assigned disk arrays
6. To make a revertible spare drive, check the Revertible box.
A revertible spare drive automatically returns to its spare drive assignment after the failed physical drive in the disk array is replaced.
7. If you selected a Dedicated spare drive, in the Dedicated to Disk Arrays field, highlight the disk arrays to which you want assign the spare drive from the Available list and press the >> button to move them to the Selected list.
You can also double-click array to move it.
8. Click the **Submit** button.

Running Spare Check

Spare Check verifies the operational status of your spare drives. You can also schedule a Spare Check. See “Scheduling an Activity” on page 69.

To check a spare drive:

1. Click the Subsystem  icon in Tree View.
2. Click the Spare Drives  icon.
3. Click the **Spare Check** tab in Management View.
4. From the Physical Drive dropdown menu, choose the spare drive you want to check.
Or choose *All* to check all the spare drives at the same time.
5. Click the **Submit** button.

The results of the Spare Check appear under Spare Check Status in the Information tab. “Healthy” means normal condition.

Working with the Logical Drive Summary



The Logical Drive Summary displays a list of all logical drives in the VTrak enclosure plus the expanded or cascaded enclosures. This list does not arrange the logical drives under the disk array to which they belong nor under the enclosure in which they are located.

Logical Drive Summary includes the following functions:




- Viewing a List of All Logical Drives (page 148)
- Viewing Individual Logical Drive Information (page 148)

Viewing a List of All Logical Drives

To view a list of all logical drives in all enclosures:

1. Click the Subsystem  icon in Tree View.
2. Click the Drive Summary  icon.

Viewing Individual Logical Drive Information

1. Click the Subsystem  icon in Tree View.
2. Click the Drive Summary  icon.
3. Click the Logical Drive  icon.

The information and location for the logical drive appear in Management View. See Viewing Logical Drive Information (page 138).

Chapter 5: Management with the CLU

This chapter covers the following topics:

- Logging into the CLU (page 150)
- Running Quick Setup (page 153)
- Managing the Subsystem (page 154)
- Managing the Controllers (page 157)
- Managing the Enclosure (page 160)
- Managing Physical Drives (page 164)
- Managing Disk Arrays (page 167)
- Managing Spare Drives (page 178)
- Managing Logical Drives (page 181)
- Managing the Network Connection (page 184)
- Managing Fibre Channel Connections (page 186)
- Managing SAS Connections (page 190)
- Managing Background Activity (page 192)
- Working with the Event Viewer (page 194)
- Working with LUN Mapping (page 196)
- Managing Users (page 199)
- Working with Software Management (page 202)
- Flashing through TFTP (page 209)
- Viewing Flash Image Information (page 210)
- Clearing Statistics (page 211)
- Restoring Factory Defaults (page 212)
- Shutting Down the Subsystem (page 213)
- Restarting the Subsystem (page 215)
- Making Buzzer Settings (page 216)

For information about VTrak's audible alarm and LEDs, see "Chapter 8: Troubleshooting" on page 273.

Logging into the CLU

There are two connections methods for the CLU:

- **Serial** – Requires the RJ11-to-DB9 serial data cable to connect the Host PC to the VTrak's serial port
- **Telnet** – Requires a network connection between the Host PC and VTrak's Management port

Making a Serial Connection

Before you begin, be sure the null modem cable is connected between the Host PC and VTrak, and that both machines are booted and running. Then do the following actions:

1. Start your PC's terminal emulation program.
2. Press **Enter** once to launch the CLU.

Making a Telnet Connection

If your Telnet connection has not been setup, refer to "Setting Up Serial Cable Connections" on page 32.

To start the telnet program:

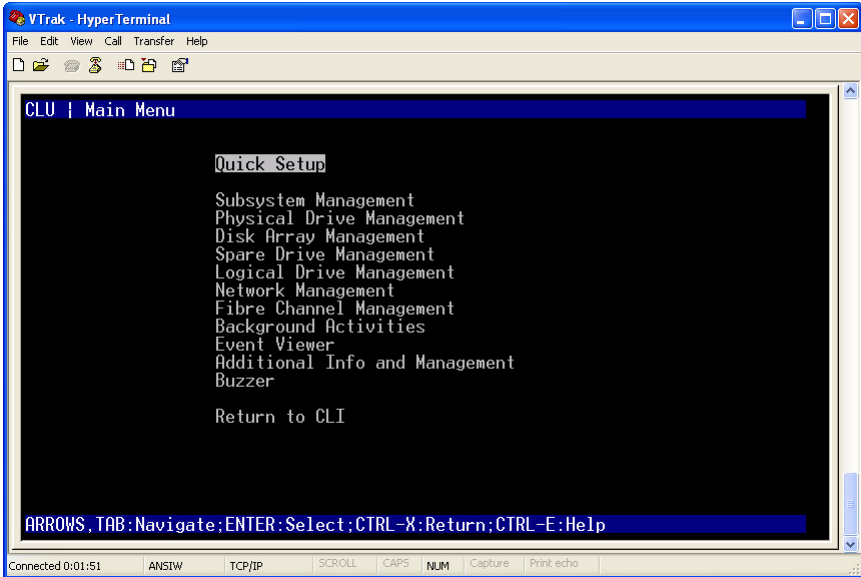
1. Go to the command line prompt (Windows) or click the terminal icon (Linux), then run:

```
telnet 192.168.1.56 2300
```

The IP address above is only an example. Use your VTrak's Management port IP address. *2300* is the Telnet port for the VTrak.

The telnet login screen appears:

2. At the Login prompt, type the user name and press Enter.
The default user name is *administrator*.
3. At the Password prompt, type the password and press Enter.
The default password is *password*.
The CLI screen appears.
4. At the CLI prompt, type **menu** and press Enter
The CLU Main Menu appears.

Figure 4. The CLU main menu

Quick Setup – A sequence of four steps to setup System Date & Time, Management Port, and RAID Configuration.

Subsystem Management – View controller information, lock/unlock the controller, set date and time, and monitor the enclosure.

Physical Drive Management – View disk drive assignments and parameters, change disk drive cache settings and command queuing, and locate a physical drive.

Disk Array Management – View disk array information, create and delete disk arrays, transport, rebuild, PDM, and transition functions, and locate a disk array, create and delete logical drives.

Spare Drive Management – View a list of spare drives, create, modify, and delete spare drives, and run spare check.

Logical Drive Management – View logical drive information, name logical drives, initialization and redundancy check, and locate a logical drive.

Network Management – Set IP addresses for Management Port, gateway, and DNS server; subnet mask.

Fibre Channel Management – Node information, Port information, settings and statistics, list of logged-in devices, list of initiators.

SAS Management – Node information, Port information, settings, status, and statistics; SFP information, list initiators.

Background Activity – Settings for Media Patrol, Auto Rebuild, Rebuild, Migration, PDM, Transition, Synchronization, Initialization, Redundancy Check rate, and thresholds.

Event Viewer – View the event logs.

Additional Info and Management – Spare Drives, LUN Mapping, User management, EMail, SLP, Webserver, Telnet, SNMP, CIM, and Netsend settings, firmware flash, clear statistics and restore factory default settings.

Buzzer – Enable, disable or silence the buzzer (audible alarm).

Accessing Online Help

To access online help on any CLU screen, press Ctrl-E.

To return to the CLU, press Enter.

Logging out of the CLU

1. Highlight *Return to Previous Menu* and press Enter.
Repeat this action until you arrive at the Main Menu.
2. From the Main Menu, highlight *Return to CLI* and press **Enter** to exit
3. Close the terminal emulation, Telnet or terminal window.

Running Quick Setup

Quick Setup is discussed under “Setting up the Serial Connection” on page 35.

Managing the Subsystem

Subsystem Management includes the following functions:

- Setting an Alias for the Subsystem (page 154)
- Setting Redundancy for the Subsystem (page 154)
- Setting Cache Mirroring for the Subsystem (page 154)
- Running Media Patrol (page 155)
- Locking or Unlocking the Subsystem (page 155)
- Setting Subsystem Date and Time (page 156)

Setting an Alias for the Subsystem

An alias is optional. To set an Alias for this subsystem:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Type and alias into the Alias field.
Maximum of 48 characters. Use letters, numbers, space between words and underscore.
3. Press Ctrl-A to save your settings.

Setting Redundancy for the Subsystem

This feature applies to models with dual controllers.

To set redundancy:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Redundancy Type* and press the spacebar to toggle between Active-Active and Active-Standby.
 - **Active-Active** – Both RAID controllers are active and can share the load
 - **Active-Standby** – One RAID controller is in standby mode and goes active if the other fails
3. Press Ctrl-A to save your settings.

Setting Cache Mirroring for the Subsystem

This option applies only to subsystems with two controllers. To use Cache Mirroring, the Redundancy Type must be set to Active-Active.

To change Cache Mirroring for this subsystem:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Redundancy Type* and press the spacebar to toggle between Active-Active and Active-Standby.

3. Highlight Cache Mirroring and press the spacebar to toggle between Enabled and Disabled.
4. Press Ctrl-A to save your settings.
5. Restart the subsystem.
See “Restarting the Subsystem” on page 215.



Notes

- If you disable Cache Mirroring, LUN Affinity will be enabled automatically.
- If you change Cache Mirroring, be sure both controllers are properly installed in the subsystem before you restart.

Running Media Patrol

Media Patrol is a routine maintenance procedure that checks the magnetic media on each disk drive. Media Patrol checks all physical drives assigned to disk arrays and spare drives. It does not check unconfigured drives.

To start, stop, pause or resume Media Patrol:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Media Patrol* and press enter.
3. Highlight *Start, Stop, Pause, or Resume* and press Enter.
4. If you chose Stop, press Y to confirm.

Locking or Unlocking the Subsystem

The lock prevents other sessions (including by the same user) from making a configuration change to the controller until the lock expires or a forced unlock is done. When the user who locked the controller logs out, the lock is automatically released.

Setting the Lock

To set the lock:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Lock Management* and press Enter.
3. In the Lock Time field, type a lock time in minutes.
1440 minutes = 24 hours
4. Highlight *Lock* and press Enter.

Resetting the Lock

To reset the lock with a new time:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Lock Management* and press Enter.
3. In the Lock Time field, type a lock time in minutes.
1 to 1440 minutes (24 hours)
4. Highlight *Renew* and press Enter.

Releasing the Lock

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Lock Management* and press Enter.
3. Highlight *Unlock* and press Enter.

Releasing a Lock set by another user

To release somebody else's lock:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Lock Management* and press Enter.
3. Highlight *Force Unlock* and press the Spacebar to change to *Yes*.
4. Highlight *Unlock* and press Enter.

Setting Subsystem Date and Time

Use this screen to make Date and Time settings:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Modify System Date and Time* and press Enter.
3. Highlight the System Date or System Time setting.
4. Press the backspace key to erase the current value.
5. Type in a new value.
6. Press Ctrl-A to save your settings.

Managing the Controllers

Controller Management includes the following functions:

- Viewing Controller Information (page 157)
- Clearing an Orphan Watermark (page 157)
- Making Controller Settings (page 158)
- Locating the Controller (page 159)

Viewing Controller Information

Controller Management includes information, settings and statistics.

To access Controller Management:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Controller Management* and press Enter.
3. Highlight the controller you want and press Enter.

Basic Controller information displays.

To access additional controller information, highlight *Advanced Information* and press Enter.

To access controller statistics, highlight *Controller Statistics* and press Enter.

Clearing an Orphan Watermark

This condition is the result of a disk drive failure during an NVRAM RAID level migration on a disk array.

To clear an orphan watermark:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Controller Management* and press Enter.
3. Highlight one of the controllers and press Enter.
4. Highlight *Clear Orphan Watermark* and press Enter.

The condition is cleared. See “Physical Drive Failed” on page 305 for more information.

Making Controller Settings

If your subsystem has two controllers, any settings you make to one controller will automatically apply to the other controller.

To make Controller settings:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Controller Management* and press Enter.
3. Highlight the controller you want and press Enter.
4. Highlight *Controller Settings* and press Enter.
5. Make the following settings as required:
 - Type and alias into the Alias field.
Maximum of 48 characters. Use letters, numbers, space between words and underscore. An alias is optional.
 - Highlight *LUN Affinity* and press the spacebar to toggle between *Enabled* and *Disabled*.
If your subsystem has two controllers and Cache Mirroring is disabled, LUN Affinity is enabled automatically.
 - Highlight *Coercion* and press the spacebar to toggle between *Enabled* and *Disabled*.
 - Highlight *Coercion Method* and press the spacebar to toggle through:
 - GB Truncate** – Reduces the capacity to the nearest 1 GB boundary
 - 10 GB Truncate** – Reduces the capacity to the nearest 10 GB boundary
 - Grp (group) Rounding** – Uses an algorithm to determine truncation. Results in the maximum amount of usable drive capacity
 - Table Rounding** – Applies a predefined table to determine truncation
 - Highlight *Cache Flush Interval* and press the backspace key to erase the current value. Type a new interval value (1 to 12 seconds).
 - Highlight *SMART* and press the spacebar to toggle between *Enable* and *Disable*.
 - Highlight *SMART Poll Interval* and press the backspace key to erase the current value. Type a new interval value (1 to 1440 minutes).
 - Highlight *Poll Interval* and press the backspace key to erase the current value. Type a new interval value (15 to 255 seconds).
 - Highlight *Adaptive Writeback Cache* and press the spacebar to toggle between *Enabled* and *Disabled*.
6. Press Ctrl-A to save your settings.

Locating the Controller

To locate this controller:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Controller Management* and press Enter.
3. Highlight the controller you want and press Enter.
4. Highlight *Controller Settings* and press Enter.
5. Highlight *Locate Controller* and press Enter.

Controller Dirty Cache LED and Status LED, on the back of the Controller, will flash for one minute.

Managing the Enclosure

Enclosure Management includes the following functions:

- Viewing Enclosure Information (page 160)
- Viewing Power Supply Status (page 160)
- Locating a Power Supply (page 161)
- Viewing Blower Status (page 161)
- Viewing Voltage Sensor Status (page 161)
- Viewing Temperature Sensor Status (page 161)
- Setting Temperature Thresholds (page 162)
- Checking the Batteries (page 162)
- Reconditioning a Battery (page 163)
- Locating an Enclosure (page 163)
- Viewing Enclosure Topology (page 163)

Viewing Enclosure Information

Enclosure Management includes information, status, settings and location. To access Enclosure Management:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.

To access FPU VPD information (vital product data on field replaceable units), highlight *FPU VPD Information* and press Enter.

To access the current status of the power supplies, blowers, temperature or voltage sensors, highlight the item you want and press Enter.

Viewing Power Supply Status

To view the status of the power supplies:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Power Supplies* and press Enter.

The screen displays the operational and fan status of VTrak's two power supplies. If any status differs from normal or the fan speed is below the Healthy Threshold value, there is a fan/power supply malfunction. See "Replacing a Power Supply" on page 223.

Locating a Power Supply

To locate a power supply:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Power Supplies* and press Enter.
4. Highlight *Locate Power Supply* and press Enter.

The LED on the selected power supply blinks for one minute.

Viewing Blower Status

To view the status of the blowers:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Blowers* and press Enter.

The screen displays the status and speed of VTrak's blowers. There is one blower in each cooling unit. If blower speed is below the Healthy Threshold, there is a blower malfunction. See "Replacing a Cooling Unit Fan or Blower" on page 224.

Viewing Voltage Sensor Status

To view the status of the voltage sensors:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Voltage Sensors* and press Enter.

If any voltage is outside the Healthy Threshold values, there is a voltage malfunction in the enclosure. See "Chapter 8: Troubleshooting" on page 273.

Viewing Temperature Sensor Status

To view the status of the temperature sensors:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Temperature Sensors* and press Enter.

If any temperature exceeds the Healthy Threshold value, there is an overheat condition in the enclosure. See "Setting Temperature Thresholds" on page 162 and "Chapter 8: Troubleshooting" on page 273.

Setting Temperature Thresholds

To change temperature thresholds:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Enclosure Settings* and press Enter.
4. Highlight the Temperature Warning threshold you want to change.
5. Press the backspace key to erase the current value.
6. Type a new interval value in degrees C.
7. Press Ctrl-A to save your settings.

Checking the Batteries

This feature enables you monitor and recondition the subsystem battery or batteries.

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Batteries* and press Enter.
4. Highlight the battery you want to monitor and press Enter.

Battery Notes

Each battery works with a controller. If the battery is present in the subsystem but the corresponding controller is not present, the battery will not appear in the interface.

If a battery does not reflect normal conditions and it is not currently under reconditioning, run the Recondition function before you replace the battery. See “Reconditioning a Battery” on page 163.

Reconditioning fully discharges, then fully recharges the battery. During reconditioning, if the Adaptive Writeback Cache function is enabled, the controller cache is set to *Write Thru*. After reconditioning, the cache is reset to *Write Back*. See “Making Controller Settings” on page 158.

If a battery reaches the threshold temperature while charging or discharging, the charge or discharge pauses and the blower runs at high speed until the battery temperature falls below the threshold.

If the battery does not maintain normal values after a Recondition, replace the battery. See “Replacing a Cache Battery” on page 229.

VTrak automatically reconditions the battery every two months.

When you install a new battery, the cycle count shows 0. VTrak automatically runs a recondition on the battery to verify it. If you restart the subsystem or

controller before reconditioning is finished, the battery is charged to 100%, then reconditioning starts again.

Reconditioning a Battery

To recondition the subsystem battery:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Batteries* and press Enter.
4. Highlight the battery you want to recondition and press Enter.
5. Highlight *Start Reconditioning* and press Enter.
6. Press Y to confirm.

Reconditioning fully discharges, then fully recharges the battery. During reconditioning, if the Adaptive Writeback Cache function is enabled, the controller cache is set to *Write Thru*. After reconditioning, the cache is reset to *Write Back*. See “Making Controller Settings” on page 158.

Locating an Enclosure

This feature helps you identify the physical VTrak enclosure you are working with through the CLU.

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Management* and press Enter.
3. Highlight *Locate Enclosure* and press Enter.

The LEDs on the front of the VTrak will blink for one minute.

Viewing Enclosure Topology

This feature displays the connection topology of the VTrak subsystem. Topology refers to the manner in which the data paths among the enclosures are connected. There are three methods:

- **Individual Subsystem** – A single subsystem
- **JBOD Expansion** – Managed through one subsystem or head unit
- **RAID Subsystem Cascading** – Managed through one subsystem or head unit

For more information, see “Making Management and Data Connections” on page 21.

To view enclosure topology:

1. From the Main Menu, highlight *Subsystem Management* and press Enter.
2. Highlight *Enclosure Topology* and press Enter.

Managing Physical Drives

Physical Drive Management includes the following functions:

- Making Global Physical Drive Settings (page 164)
- Setting an Alias (page 165)
- Viewing Advanced Information (page 165)
- Viewing Physical Drive Statistics (page 165)
- Clearing Stale and PFA Conditions (page 165)
- Forcing a Physical Drive Offline or Online (page 166)
- Locating a Physical Drive (page 166)

Making Global Physical Drive Settings

All physical drive settings are made globally, except for setting an alias, which applies to individual drives.

To make global physical drive settings:

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight *Global Physical Drives Settings* and press Enter.
3. Change the following settings as required.

For SATA drives:

- Highlight *Write Cache* and press the spacebar to toggle between *Enabled* and *Disabled*.
- Highlight *Read Look Ahead Cache* and press the spacebar to toggle between *Enabled* and *Disabled*.
- Highlight *CmdQueuing* and press the spacebar to toggle between *Enabled* and *Disabled*.
- Highlight *DMA Mode* and press the spacebar to toggle through UDMA 0–5 and MDMA 0–2.

For SAS drives:

- Highlight *Write Cache* and press the spacebar to toggle between *Enabled* and *Disabled*.
 - Highlight *Read Look Ahead Cache* and press the spacebar to toggle between *Enabled* and *Disabled*.
 - Highlight *CmdQueuing* and press the spacebar to toggle between *Enabled* and *Disabled*.
 - Highlight *Read Cache* and press the spacebar to toggle between *Enabled* and *Disabled*.
4. Press Ctrl-A to save your settings.

Setting an Alias

An alias is optional. To set an Alias for a physical drive:

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight the physical drive of your choice and press Enter.
3. Type an alias into the Alias field.
Maximum of 32 characters. Use letters, numbers, space between words and underscore.
4. Press Ctrl-A to save your settings.

Viewing Advanced Information

To view advanced information about the selected physical drive:

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight the physical drive of your choice and press Enter.
3. Highlight *Advanced Information* and press Enter.

Viewing Physical Drive Statistics

To view the statistics for the selected physical drive:

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight the physical drive of your choice and press Enter.
3. Highlight *Physical Drive Statistics* and press Enter.

Clearing Stale and PFA Conditions

The Clear Stale and Clear PFA functions only appear when those conditions exist on the physical drive. To clear a Stale or PFA condition on a physical drive:

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight the physical drive of your choice and press Enter.
3. Highlight *Clear Stale* or *Clear PFA* and press Enter.

If a physical drive is still online and shows a PFA error but “Clear PFA” does not appear, use PDM to copy the data to a new physical drive. Go to Disk Array Info and Settings.

If a physical drive is offline and shows a PFA error, rebuild the disk array. Go to Disk Array Info and Settings. After rebuilding, the drive will show Stale. Run Clear Stale then run Clear PFA.

If the physical drive with a PFA error is a spare, you must delete the drive as a spare, then Clear PFA will be available.

After you clear a PFA error, watch for another PFA error to appear. If it does, replace the physical drive.

Forcing a Physical Drive Offline or Online

This function enables you to force an:

- Online physical drive to go Offline
- Offline physical drive to go Online

The Force Offline/Online function appears only for physical drives that are assigned to disk arrays.



Caution

Forcing a physical drive offline or online is likely to cause data loss. Back up your data before you proceed. Use these functions only when required.

To force a physical drive offline or online:

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight *Global Physical Drives Settings* and press Enter.
3. Highlight the physical drive of your choice and press Enter.
4. Highlight *Force Offline* or *Force Online* and press Enter.
5. Press Y to confirm.

Locating a Physical Drive

This feature helps you identify a physical drive within the VTrak enclosure you are working with through the CLU. To locate a physical drive:

1. From the Main Menu, highlight *Physical Drive Management* and press Enter.
2. Highlight *Global Physical Drives Settings* and press Enter.
3. Highlight the physical drive of your choice and press Enter.
4. Highlight *Locate Physical Drive* and press Enter.

The drive carrier LEDs on the front of the VTrak will blink for one minute.

Managing Disk Arrays

Disk Array Management includes the following functions:

- Creating a Disk Array (page 167)
- Deleting a Disk Array (page 171)
- Viewing Disk Array Information (page 172)
- Setting an Alias for a Disk Array (page 172)
- Enabling Media Patrol on a Disk Array (page 173)
- Enabling PDM on a Disk Array (page 173)
- Preparing the Disk Array for Transport (page 173)
- Rebuilding a Disk Array (page 174)
- Migrating a Disk Array (page 174)
- Running PDM (page 175)
- Running Transition on a Disk Array (page 175)
- Locating a Disk Array (page 176)
- Locating a Disk Array (page 176)
- Creating a Logical Drive (page 176)
- Deleting a Logical Drive (page 177)

Creating a Disk Array

The CLU provides three methods of creating a disk array:

- **Automatic** – Creates a default disk array and logical drive based on unconfigured physical drives in the system. No user choices. See “Creating a Disk Array – Automatic” on page 168.
- **Express** – You choose the RAID characteristics and type of application. Creates a disk array and logical drive(s) based on your input. See “Creating a Disk Array – Express” on page 169.
- **Advanced** – You specify all parameters for a new disk array. One logical drive will be made automatically when you create the disk array. If you choose less than the total available capacity, you can use the remaining space to create additional logical drives at a later time. See “Creating a Disk Array – Advanced” on page 170.

Creating a Disk Array – Automatic

To create a disk array using the Automatic feature:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight *Create New Array* and press Enter.
3. Highlight *Configuration Method* and press the spacebar to toggle to *Automatic*.
4. Review the proposed configuration of disk array and logical drive(s).
 - To accept the proposed configuration and create the disk array and logical drive(s), highlight *Save Configuration* and press Enter.
 - To reject the proposed configuration, highlight *Cancel Array Configuration* and press Enter. You will return to the Disk Arrays Summary screen.

To create a disk array with different characteristics, repeat the steps above specifying different parameters but choose the Express or Advanced option.

Creating a Disk Array – Express

To create a disk array using the Express feature:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight *Create New Array* and press Enter.
3. Highlight *Configuration Method* and press the spacebar to toggle to *Express*.
4. Highlight *Configuration Method* and press to spacebar to choose each of the following characteristics for your disk array:
 - Redundancy
 - Capacity
 - Performance
 - Spare Drive
5. Highlight *Number of Logical Drives* and press the backspace key to erase the current value.
6. Enter the number of logical drives you want.
7. Highlight *Application Type* and press the spacebar to toggle though the applications and choose the best one for your disk array.
 - File Server
 - Video Stream
 - Transaction Data
 - Transaction Log
 - Other
8. Press Ctrl-A to save your settings and move to the next screen.
9. Review the proposed configuration of disk array and logical drive(s).

To accept the proposed configuration and create the disk array and logical drive(s), highlight *Save Configuration* and press Enter.

To reject the proposed configuration, highlight *Cancel Array Configuration* and press Enter. You will return to the Disk Arrays Summary screen.

To create a disk array with different characteristics, highlight *Create New Array* and press Enter. Repeat the steps above specifying different parameters.

Creating a Disk Array – Advanced

For more information on the choices below, see “Chapter 7: Technology Background” on page 237. To create a disk array using the Advanced feature:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight *Create New Array* and press Enter.
3. Highlight *Configuration Method* and press the spacebar to toggle to *Advanced*.
4. Choose whether to enable Media Patrol and PDM.
5. If you want to specify an alias to the disk array, highlight *Alias* and type a name.
Maximum of 32 characters. Use letters, numbers, space between words and underscore.
6. Highlight *Save Settings* and Continue and press Enter.
7. Highlight a physical drive you want to add to your array and press the spacebar to choose it.
Repeat this action until you have selected all the physical drives for your array.
8. Highlight *Save Settings and Continue* and press Enter.
9. If you want to specify an alias to the logical drive, highlight *Alias* and type a name.
Maximum of 32 characters. Use letters, numbers, space between words and underscore.
10. Highlight *RAID Level* and press the spacebar to toggle through a list of available RAID levels.
11. If you want to create multiple logical drives, highlight *Capacity*, press the backspace key to remove the current value, then type a new smaller value.
12. Highlight *Number of Axles* and press the spacebar to choose the number of axles. Applies to RAID 50 and 60 only.
13. Highlight *Stripe* and press the spacebar to toggle through stripe sizes and choose 64 KB, 128 KB, 256 KB, 512 KB, or 1 MB.
14. Highlight *Sector* and press the spacebar to toggle through sector sizes and choose 512 B, 1 KB, 2 KB, or 4 KB.
15. Highlight *Write Policy* and press the spacebar to toggle write cache policy between *WriteBack* and *WriteThru* (write though).
16. Highlight *Read Policy* and press the spacebar to toggle read cache policy through *ReadCache*, *ReadAhead*, and *NoCache*.
17. Highlight *Preferred Controller ID* and press the spacebar to toggle among 1, 2, or *Automatic*. Applies to dual-controller capable Fibre Channel models only.

18. Highlight *Save Logical Drive* and press Enter.
19. Review logical drive(s) you are about to create for your new array. Then do one of the following actions:
 - If you agree with the logical drive(s) as specified, highlight *Complete Disk Array Creation* and press Enter. A note will appear to remind you to set up LUN mapping for your new logical drive(s). Press any key to continue.
 - If you specified less than the full capacity for the logical drive in the previous screen, and you want to add another logical drive now, highlight *Create New Logical Drive* and press Enter.
 - If you do not agree with the logical drive(s), highlight *Return to Previous Screen* and press Enter to begin the process again.

Deleting a Disk Array



Caution

When you delete a disk array, you delete all the logical drives and the data they contain. Back up all important data before deleting a disk array.

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want to delete and press the spacebar to mark it. The mark is an asterisk (*) to the left of the listing.
3. Highlight *Delete Marked Arrays* and press Enter.
4. Press Y to confirm the deletion.

Viewing Disk Array Information

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
The information and settings screen appears.
3. Highlight any of the following and press Enter to view a list of:
 - Spare drives in this array, dedicated and global
 - Physical drives in this array
 - Logical drives in this array

Disk Array Operational Status

- **OK** – This is the normal state of a logical drive. When a logical drive is Functional, it is ready for immediate use. For RAID Levels other than RAID 0 (Striping), the logical drive has full redundancy.
- **Synchronizing** – This condition is temporary. Synchronizing is a maintenance function that verifies the integrity of data and redundancy in the logical drive. When a logical drive is Synchronizing, it will function and your data is available. However, access will be slower due to the synchronizing operation.
- **Critical/Degraded** – This condition arises as the result of a physical drive failure. A degraded logical drive will still function and your data is still available. However, the logical drive has lost redundancy (fault tolerance). You must determine the cause of the problem and correct it.
- **Rebuilding** – This condition is temporary. When a physical drive has been replaced, the logical drive automatically begins rebuilding in order to restore redundancy (fault tolerance). When a logical drive is rebuilding, it will function and your data is available. However, access will be slower due to the rebuilding operation.
- **Transport Ready** – After you perform a successful Prepare for Transport operation, this condition means you can remove the physical drives of this disk array and move them to another enclosure or different drive slots. After you relocate the physical drives, the disk array status will show OK.

Setting an Alias for a Disk Array

This function sets an alias for the disk array. To set an alias:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. To set an alias for this disk array, highlight *Alias* and type an alias into the field.

Maximum of 32 characters. Use letters, numbers, space between words and underscore. An alias is optional.

4. Press Ctrl-A to save your settings.

Accepting an Incomplete Array

This condition is the result of a missing physical drive. See “Incomplete Array” on page 304 before you use this function.

To accept an incomplete array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Accept Incomplete Array* and press Enter.

Enabling Media Patrol on a Disk Array

Media Patrol checks the magnetic media on physical drives.

To run Media Patrol on a disk array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Media Patrol* and press the spacebar to toggle between *Enable* and *Disable*.
4. Press Ctrl-A to save your settings.

Enabling PDM on a Disk Array

This function enables and disables Predictive Data Migration (PDM).

To enable or disable PDM:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *PDM* and press the spacebar to toggle between *Enable* and *Disable*.
4. Press Ctrl-A to save your settings.

See “Running PDM” on page 175.

Preparing the Disk Array for Transport

To run the Transport function on a disk array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.

3. Highlight *Transport* and press Enter.
4. Press Y to confirm.

Rebuilding a Disk Array

Before you can rebuild, you must have a replacement physical drive of adequate capacity or your disk array. To rebuild a disk array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Background Activities* and press Enter.
4. Highlight *Rebuild* and press Enter.
5. Specify the source and target physical drives.
6. Highlight *Start* and press Enter.

Migrating a Disk Array

In order to migrate RAID level, you may have to add physical drives. For more information, see “RAID Level Migration” on page 260.

To migrate a disk array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Background Activities* and press Enter.
4. Highlight *Migration* and press Enter.
5. Highlight the physical drive you want to add and press the spacebar to choose it.

Repeat this action to add more physical drives.



Notes

- You can add physical drives to a RAID 50 or 60 array but you cannot change the number of axes.
 - If you add an odd number of physical drives to a RAID 10 array, it will become a RAID 1E array by default.
-

6. Highlight *Save Settings and Continue* and press Enter.
7. To change RAID level, Highlight the logical drive in the list and press Enter.
8. Highlight *RAID Level* and press the spacebar to toggle through the available RAID levels.
9. Optional. If you want to increase capacity, highlight *Expand Capacity* and press the spacebar to toggle to Yes.

10. Optional. If you want to increase capacity, highlight *Capacity*, press the backspace key to erase the current logical drive capacity and type in the new value.
The new value must be equal or larger than the current capacity.
11. Highlight *Save Logical Drive* and press Enter.
The screen returns to Disk Array Migration Logical Drives.
12. Highlight *Complete Disk Array Migration* and press Enter.
13. In the confirmation message, press Y to confirm.
The screen jumps to Disk Arrays Summary.

Running PDM

Be sure PDM must be enabled. See “Enabling PDM on a Disk Array” on page 173.

To run Predictive Data Migration on a disk array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Background Activities* and press Enter.
4. Highlight *Predictive Data Migration* and press Enter.
5. Specify the source and target physical drives.
6. Highlight *Start* and press Enter.

Running Transition on a Disk Array

Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare drive. For more information, see “Transition” on page 269.

In order to run Transition:

- The spare drive must be Revertible.
- You must have an unconfigured physical drive of the same or larger capacity to replace the spare drive.

To run Transition on a disk array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Background Activities* and press Enter.
4. Highlight *Transition* and press Enter.
5. Specify the source and target physical drives.
6. Highlight *Start* and press Enter.

Locating a Disk Array

This feature helps you identify the physical drives assigned to the disk array you are working with in the CLU.

To locate a disk array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Locate Disk Array* and press Enter.

The drive carrier LEDs pertaining to this disk array will blink for one minute.

Creating a Logical Drive

You can create logical drives on existing disk arrays if there is available space in the array. For more information on the choices below, see “Chapter 7: Technology Background” on page 237.

To create a logical drive from an existing disk array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array in which you want to create a logical drive and press Enter.
3. Highlight *Create New Logical Drive* and press Enter.

The Disk Array ID number and Maximum capacity available for the new logical drive are displayed.

4. Highlight the following parameters and press the backspace key to erase the current value:
 - **Alias** – Type an alias into the field, if desired. Maximum of 32 characters. Use letters, numbers, space between words and underscore.
 - **Capacity** – Maximum capacity shown. Enter a smaller capacity if desired.
5. Highlight the following parameters and press the spacebar to toggle through the available choices:
 - **Stripe size** – Press the spacebar to choose: 64 KB, 128 KB, 256 KB, 512 KB, or 1 MB
 - **Sector size** – Press the spacebar to choose: 512 B; 1 KB, 2 KB, or 4 KB
 - **Write Policy** – Press spacebar to choose: Write Back or Write Through
 - **Read Policy** – Press spacebar to choose: No Cache, Read Cache, or Read Ahead Cache
6. Highlight *Preferred Controller ID* and press the spacebar to toggle among 1, 2, or *Automatic*. Applies to dual-controller capable Fibre Channel models only.

7. Highlight *Number of Axles* and press the spacebar to choose the number of axles. Applies to RAID 50 and 60 only.
8. Press Ctrl-A to save your settings.



Note

If you did not use all of the available capacity of the disk array, you can create an additional logical drive at this point.

Deleting a Logical Drive



Caution

When you delete a logical drive, you delete all the data it contains. Back up all important data before deleting a logical drive.

To delete a logical drive from a disk array:

1. From the Main Menu, highlight *Disk Array Management* and press Enter.
2. Highlight the disk array that contains the logical drive you want to delete and press Enter.
3. Highlight the logical drive you want to delete and press the spacebar to mark it.
The mark is an asterisk (*) to the left of the listing.
4. Highlight *Delete Marked Logical Drives* and press Enter.
5. Press Y to confirm the deletion.

Managing Spare Drives

Spare Drive Management includes the following functions:

- Viewing a list of Spare Drives (page 178)
- Creating a Spare Drive (page 178)
- Making Spare Drive Settings (page 179)
- Running Spare Check (page 179)
- Deleting a Spare Drive (page 180)

Viewing a list of Spare Drives

To view a list of spare drives:

From the Main Menu, highlight *Spare Drive Management* and press Enter.

A list of the current spare drives appears, including the following parameters:

- **ID number**
- **Operational Status**
- **Physical Drive ID number**
- **Configured Capacity**
- **Revertible** – The spare drive returns to spare status after you replace the failed drive in the disk array. See “Transition” on page 269 for more information.
- **Type** – Global (all disk arrays) or Dedicated (to specified disk arrays)
- **Dedicated to Array** – The array to which a dedicated spare is assigned

Creating a Spare Drive

Only unconfigured physical drives can be used to make spares. Check your available drives under Physical Drive Management. See “Managing Physical Drives” on page 164.

1. From the Main Menu, highlight *Spare Drive Management* and press Enter.
2. Highlight *Create New Spare Drive* and press Enter.
3. Highlight *Physical Drive Number* and press the backspace key to erase the current value, then type the new value.

Specify the number of the physical drive you want for your spare. The available drive numbers are in parentheses.

4. Highlight *Revertible* and press the spacebar to toggle between *Yes* and *No*.
A revertible drive can be returned to spare status after you replace the failed drive in a disk array. See “Transition” on page 269 for more information.
5. Highlight *Spare Type* and press the spacebar to toggle between *Dedicated* and *Global*.

Dedicated means this spare drive can only be used with the specified disk arrays. Global means this spare drive can be used by any disk array.

6. If you chose Dedicated, highlight *Dedicated to Arrays* and press the backspace key to erase the current value, then type the new value.
Specify the number(s) of the disk array(s) you want to assign your spare. The current disk arrays are listed in parentheses.
7. Press Ctrl-A to save the spare drive.

Making Spare Drive Settings

To change spare drive settings:

1. From the Main Menu, highlight *Spare Drive Management* and press Enter.
A list of the current spare drives appears, including the following parameters:
2. Highlight the spare drive you want to change and press Enter.
3. Highlight the setting you want to change:
 - **Revertible** – A revertible drive can be returned to spare status after you replace the failed drive in a disk array. See “Transition” on page 269 for more information.
 - **Type** – Dedicated means this spare drive can only be used with the specified disk array(s). Global means this spare drive can be used by any disk array.
4. Press the spacebar to toggle between the choices.
5. For dedicated spares, type the array number the spare is assigned to.
6. Press Ctrl-A to save your settings.

Running Spare Check

To run Spare Check:

1. From the Main Menu, highlight *Spare Drive Management* and press Enter.
A list of the current spare drives appears.
2. Highlight the spare drive you want to check and press Enter.
3. Highlight *Start Spare Check* and press Enter.
The results appear next to Spare Check Status.

Deleting a Spare Drive



Caution

If the spare drive you delete is the only spare, the controller will not rebuild a critical array until you provide a new spare drive.

To delete a spare drive:

1. From the Main Menu, highlight *Spare Drive Management* and press Enter.
A list of the current spare drives appears.
2. Highlight the spare drive you want to delete and press the spacebar to mark it.
The mark is an asterisk (*) to the left of the listing.
3. Highlight *Delete Marked Spare Drives* and press Enter.
4. Press Y to confirm the deletion.

Managing Logical Drives

The Logical Drive Management function deals with settings and functions of existing logical drives. To create or delete a logical drive, see “Managing Disk Arrays” on page 167. Logical drive management includes:

- Viewing Logical Drive Information (page 181)
- Setting an Alias for a Logical Drive (page 181)
- Setting Write Cache Policy (page 181)
- Setting Read Cache Policy (page 182)
- Setting Preferred Controller ID (page 182)
- Initializing a Logical Drive (page 182)
- Running Redundancy Check (page 183)
- Locating a Logical Drive (page 183)

Viewing Logical Drive Information

To view logical drive information:

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the logical drive you want and press Enter.
The information and settings screen appears.
3. Highlight any of the following and press Enter to view more information:
 - **Check Table** – Read Check, Write Check, and Inconsistency Check Tables
 - **Logical Drive Statistics**

Setting an Alias for a Logical Drive

To set an alias for a logical drive:

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the logical drive you want and press Enter.
3. To set an alias for this disk array, highlight *Alias* and type an alias into the field.
Maximum of 32 characters. Use letters, numbers, space between words and underscore. An alias is optional.
4. Press Ctrl-A to save your settings.

Setting Write Cache Policy

To set write cache policy on a logical drive:

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.

2. Highlight the logical drive you want and press Enter.
3. To set write cache policy for this logical drive, highlight *WritePolicy* and press the spacebar to toggle between *WriteBack* and *WriteThru* (write though).
4. Press Ctrl-A to save your settings.

Setting Read Cache Policy

To set read cache policy on a logical drive:

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the logical drive you want and press Enter.
3. To set read cache policy for this logical drive, highlight *ReadPolicy* and press the spacebar to toggle though *ReadCache*, *ReadAhead* and *None*.
4. Press Ctrl-A to save your settings.

Setting Preferred Controller ID

This feature applies to dual-controller capable Fibre Channel models only.

To set the preferred controller for this logical drive:

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the logical drive you want and press Enter.
3. To set the preferred controller ID for this logical drive, highlight *Preferred Controller ID* and press the spacebar to toggle between 1 and 2.
4. Press Ctrl-A to save your settings.

Initializing a Logical Drive

This function sets all data bits in the logical drive to zero.



Caution

When you initialize a logical drive, you delete all the data it contains. Back up all important data before initializing a logical drive.

To initialize a logical drive:

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the logical drive you want and press Enter.
3. Highlight *Background Activity* and press Enter.
4. Highlight *Start Initialization* and press Enter.
The initialization parameters appear.

- **Initialization pattern** – The default 00000000 is best for most applications
- **Quick Initialization** – Yes means only the first and last sections of the logical drives are initialized. No means the entire logical drive is initialized.
- **Quick Initialization Size** – Enter a value for the first and last sections of the logical drive to be initialized or use the default 64 MB.

To change a parameter, highlight it and press the backspace key to erase the current value, then type the new value.

5. Highlight *Start* and press Enter.

If necessary, you can pause and resume or stop and restart the Initialization. You cannot access the logical drive until Initialization has finished.

Running Redundancy Check

Redundancy Check is a maintenance procedure for logical drives in fault-tolerant disk arrays that ensures all the data matches exactly. To run Redundancy Check:

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the logical drive you want and press Enter.
3. Highlight *Background Activity* and press Enter.
4. Highlight *Start Redundancy Check* and press Enter.

The redundancy check parameters appear.

- **Auto Fix** – Corrects inconsistencies automatically
- **Pause On Error** – Pauses the Redundancy Check when an error is found

To change a parameter, highlight it and press the backspace toggle between *Yes* and *No*.

5. Highlight *Start* and press Enter.

If necessary, you can pause and resume or stop and restart the Redundancy Check. You can use the logical drive while Redundancy Check is running.

Locating a Logical Drive

This feature helps you identify the physical drives assigned to the logical drive you are working with in the CLU. To locate a logical drive:

1. From the Main Menu, highlight *Logical Drive Management* and press Enter.
2. Highlight the disk array you want and press Enter.
3. Highlight *Locate Logical Drive* and press Enter.

The drive status LEDs for the physical drives in this logical drive will blink for one minute.

Managing the Network Connection

Network Management deals with network connections and settings for the Management Ports. Each Management Port can be configured:

- Making Subsystem Management Port Settings (page 184)
- Making Controller Maintenance Mode Settings (page 184)

Making Subsystem Management Port Settings

The VTrak subsystem has a virtual management port. When you log into the VTrak over your network, you use the virtual management port.

Before you change settings, please see “Choosing DHCP or a Static IP Address” on page 36.

Making Automatic Settings

1. From the Main Menu, highlight *Network Management* and press Enter.
2. Highlight the Virtual management port and press Enter.
3. Highlight *NetMgmt Ethernet Port Settings* and press Enter
4. Highlight *DHCP* and press the spacebar to toggle to *Enabled*.
5. Press Ctrl-A to save your settings.

Making Manual Settings

1. From the Main Menu, highlight *Network Management* and press Enter.
2. Highlight the Virtual management port and press Enter.
3. Highlight *NetMgmt Ethernet Port Settings* and press Enter
4. Highlight *DHCP* and press the spacebar to toggle to *Disabled*.
5. Highlight each of the following and press the backspace key to erase the current value, then type the new value.
 - IP Address
 - Subnet Mask
 - Default Gateway IP Address
 - DNS Server IP Address
6. Press Ctrl-A to save your settings.

Making Controller Maintenance Mode Settings

Each RAID controller has an IP addresses for access when the controller goes into *maintenance mode*. Maintenance mode is only for remedial action in the event of a problem with the controller. See “Controller Enters Maintenance Mode” on page 310 for more information.

Before you change settings, please see “Choosing DHCP or a Static IP Address” on page 36.

Making Automatic Settings

1. From the Main Menu, highlight *Network Management* and press Enter.
2. Highlight *Maintenance Mode Network Configuration* and press Enter.
3. Highlight the controller you want and press Enter.
4. Highlight *DHCP* and press the spacebar to toggle to *Enabled*.
5. Press Ctrl-A to save your settings.

Making Manual Settings

1. From the Main Menu, highlight *Network Management* and press Enter.
2. Highlight *Maintenance Mode Network Configuration* and press Enter.
3. Highlight the controller you want and press Enter.
4. Highlight *DHCP* and press the spacebar to toggle to *Disabled*.
5. Highlight each of the following and press the backspace key to erase the current value, then type the new value.
 - IP Address
 - Subnet Mask
 - Default Gateway IP Address
 - DNS Server IP Address
6. Press Ctrl-A to save your settings.

Managing Fibre Channel Connections

The Fibre Channel Management option appears only with VTrak Fibre Channel models. Fibre Channel Management includes the following functions:

- Viewing Node Information (page 186)
- Viewing Fibre Channel Logged-in Devices (page 186)
- Making Fibre Channel Port Settings (page 186)
- Viewing SFP Information (page 187)
- Viewing Fibre Channel Port Statistics (page 188)
- Viewing Fibre Channel Initiators (page 189)
- Adding a Fibre Channel Initiator (page 189)

Viewing Node Information

These functions affect both VTrak Fibre Channel ports.

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Node* and press Enter.

Node information appears. There are no user settings on this screen.

Viewing Fibre Channel Logged-in Devices

To view a list of logged-in devices:

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Ports* and press Enter.
3. Highlight *Fibre Channel Port 1* or *Port 2* and press Enter.
4. Highlight *Logged In Devices* and press Enter.

If a Fibre Channel switch is attached, it will also appear in this list.

Making Fibre Channel Port Settings

To make Fibre Channel port settings:

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Ports* and press Enter.
3. Highlight *Fibre Channel Port 1* or *Port 2* and press Enter.
4. Highlight *Fibre Channel Port Settings* and press Enter.
5. Highlight the following parameters and press the spacebar to toggle through the choices:

- **Configured Link Speed** – 1 Gb/s, 2 Gb/s, 4 Gb/s, or Automatic selection

- **Configured Topology** – NL-Port (Arbitrated Loop), N-Port (Point to Point) or Automatic selection
6. Highlight *Hard ALPA* and press the backspace key to erase the current value, then type the new value.
The range is 0 to 255. 255 disables this feature.
 7. Press Ctrl-A to save your settings.

The table below shows the type of attached topology you will achieve based on your connection type and the configured topology you choose:

Fibre Channel Attached Topology		
	Configured Topology	
Connection Type	N-Port	NL-Port
Switch	Fabric Direct	Public Loop
Direct	Point to Point	Private Loop

Example 1: If you connect the VTrak to a Fibre Channel switch and choose NL-Port topology, you will create a Public Loop attached topology.

Example 2: If you have a Point to Point attached topology, you made a direct connection (no switch) and chose N-port topology.



Note

In some cases, HBA settings to N-Port only work if connected to the switch. Refer to your HBA manual for more information.

Viewing SFP Information

To view information about the SFPs (small form-factor pluggable transceivers):

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Ports* and press Enter.
3. Highlight *Fibre Channel Port 1* or *Port 2* and press Enter.
4. Highlight *Fibre Channel Port SFP* and press Enter.

The screen displays information about the SFP transceiver. There are no user settings on this screen.

Viewing Fibre Channel Port Statistics

To view port statistics:

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Ports* and press Enter.
3. Highlight *Fibre Channel Port 1* or *Port 2* and press Enter.
4. Highlight *Fibre Channel Port Statistics* and press Enter.

This screen displays statistics for this port. There are no user settings on this screen.

Property Definitions

Definitions of the properties for which statistical information is reported appears in the list below.

- **TimeLastReset** – Time in minutes since the system has been running.
- **FramesSent** – Number of frames sent since last reset.
- **FramesReceived** – Number of frames received since last reset.
- **WordsSent** – Number of words sent since last reset.
- **WordsReceived** – Number of words received since last reset.
- **LIPCount** – Loop Initialization Primitive Sequence. This primitive sequence applies only to the arbitrated loop topology. It is transmitted by an L_Port to initialize or re-initialize the loop.
- **NOSCount** – Not Operational Primitive Sequence. This primitive sequence is used during link initialization between two N_Ports in the point-to-point topology or an N_Port and an F_Port in the fabric topology.
NOS is sent to indicate that the transmitting port has detected a link failure or is offline. The expected response to a port sending NOS is the OLS primitive sequence.
- **ErrorFrames** – FC devices propagate handshake signals back-and-forth requesting and acknowledging each byte transferred. FC transfers occur in one frame of data at a time. In this case, the value reflects the number of frames with errors.
- **DumpedFrames** – This field specifies the number of frames dumped due to a lack of host buffers.
- **LinkFailureCount** – Number of times the link has failed. Can be caused by a disconnected link or a bad fiber element.
- **LossSyncCount** – Number of times a loss of sync has occurred since last reset.
- **PrimitiveSeqErrorCount** – An ordered set transmitted repeatedly and used to establish and maintain a link.

LR, LRR, NOS, and OLS are primitive sequences used to establish an active link in a connection between two N_Ports or an N_Port and an F_Port.

LIP, LPB, and LPE are primitive sequences used in the Arbitrated Loop topology for initializing the loop and enabling or disabling an L_Port.

- **InvalidWordSentCount** – Number of invalid words sent since last reset.
- **InvalidCRCCount** – Invalid Cyclical Redundancy Count. Number of frames received with an invalid CRC since last reset.
- **InitiatorIOCount** – I/O Count on the initiator on the host side.

Clearing Statistics

To clear statistics, see “Clearing Statistics” on page 211.

Viewing Fibre Channel Initiators

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Initiators* and press Enter.

A list of initiators appears.

To create an initiator, see “Creating an Initiator” on page 196.

Adding a Fibre Channel Initiator

You must add an initiator to the VTrak’s initiator list in order to use the initiator to create a LUN for your logical drive.

To add an initiator:

1. From the Main Menu, highlight *Fibre Channel Management* and press Enter.
2. Highlight *Fibre Channel Initiators* and press Enter.
3. Highlight the initiator you want to add and press the spacebar to choose it.
4. Highlight *Add Marked Initiators* and press Enter.

The initiator is added to VTrak’s initiator list.

Managing SAS Connections

The SAS Management option appears only with VTrak Serial Attached SCSI models. SAS Management includes the following functions:

- Viewing SAS Port Information (page 190)
- Making SAS Port Settings (page 190)
- Viewing SAS Port Statistics (page 191)
- Viewing SAS Initiators (page 191)
- Adding a SAS Initiator (page 191)

Viewing SAS Port Information

There are two SAS ports on each controller. To view information about the SAS ports:

1. From the Main Menu, highlight *SAS Management* and press Enter.
2. Highlight *SAS Ports* and press Enter.
3. Highlight the port you want to see and press Enter.

The port information appears on the screen.

Adjustable Items

- Cable Signal Strength

See “Making SAS Port Settings” on page 190.

Making SAS Port Settings

There are two SAS ports on each controller. To make settings to the SAS ports:

1. From the Main Menu, highlight *SAS Management* and press Enter.
2. Highlight *SAS Ports* and press Enter.
3. Highlight the port you want to see and press Enter.
4. Highlight *SAS Port Settings* and press Enter.
5. Highlight *Cable Signal Strength*, press the backspace key to erase the current value, then type in the new value.

The range is 1 to 8. 1 is the default. Signal strength correlates to cable length in meters. Example: If you have a 2 m SAS cable, set signal strength to 2. If performance is unsatisfactory (see “Viewing SAS Port Statistics” on page 191), try settings of 1 and 3, then use the best setting for your system.

6. Press Ctrl-A to save your settings.

Viewing SAS Port Statistics

There are two SAS ports on each controller. To view information about the SAS ports:

1. From the Main Menu, highlight *SAS Management* and press Enter.
2. Highlight *SAS Ports* and press Enter.
3. Highlight the port you want to see and press Enter.
4. Highlight *SAS Port Statistics* and press Enter.

The statistics for the selected port appear on the screen.

Viewing SAS Initiators

There are two SAS ports on each controller, for a total of four SAS ports. To view a list of initiators currently logged any of the four SAS ports:

1. From the Main Menu, highlight *SAS Management* and press Enter.
2. Highlight *SAS Initiators* and press Enter.

A list of all currently logged-in initiators appears on the screen.

Adding a SAS Initiator

You must add an initiator to the VTrak's initiator list in order to use the initiator to create a LUN for your logical drive.

To add an initiator:

1. From the Main Menu, highlight *SAS Management* and press Enter.
2. Highlight *SAS Initiators* and press Enter.
3. Highlight the initiator you want to add and press the spacebar to choose it.
4. Highlight *Add Marked Initiators* and press Enter.

The initiator is added to VTrak's initiator list.

Managing Background Activity

Background activity refers to any of several functions that take place in the background while normal operation of the VTrak continues.

Background activities work in conjunction with disk arrays and logical drives. See “Managing Disk Arrays” on page 167 and “Managing Logical Drives” on page 181 for more information about how and when to use background activities.

Background Activity Management includes the following functions:

- Viewing Current Background Activities (page 192)
- Making Background Activity Settings (page 192)

Viewing Current Background Activities

From the Main Menu, highlight *Background Activity* and press Enter. A count of current background activities appears, including:

- Rebuild
- PDM (Predictive Data Migration)
- Synchronization
- Redundancy Check
- Migration
- Transition
- Initialization
- Media Patrol

Making Background Activity Settings

1. From the Main Menu, highlight *Background Activity* and press Enter.
2. Highlight *Background Activity Settings* and press Enter.
3. Highlight following and press the spacebar to toggle between *Enabled* and *Disabled*.
 - **Media Patrol** – Checks the magnetic media on physical drives
 - **Auto Rebuild** – If there is a spare drive of adequate capacity, a critical disk array will begin to rebuild automatically. If not spare drive is available, the disk array will begin to rebuild as soon as you replace the failed physical drive with an unconfigured physical drive of equal or greater size.
4. Highlight following and press the spacebar to toggle through *Low*, *Medium*, and *High* rates:
 - **Rebuild** – Checks the data integrity on disk arrays
 - **Migration** – Change RAID level or add physical drives to disk arrays

- **PDM** – Looks for bad blocks on the physical drives of disk arrays
- **Transition** – Returns a revertible spare drive to spare status
- **Synchronization** – Checks the data integrity on disk arrays
- **Initialization** – Sets all data bits in the logical drive to zero
- **Redundancy Check** – Checks, reports and can correct data inconsistencies in logical drives

The rates are defined as follows:

- **Low** – Fewer resources to activity, more to data read/write.
 - **Medium** – Balance of resources to activity and data read/write.
 - **High** – More resources to activity, fewer to data read/write.
5. Highlight the following PDM trigger settings and press the backspace key to erase the current value:
 - **Reassigned Block Threshold** – 1 to 512 blocks
 - **Error Block Threshold** – 1 to 1024 blocks
 6. Press Ctrl-A to save your settings.

Working with the Event Viewer

The Event Viewer displays log of subsystem events. Events are classified as:

- **Runtime Events** – A list of and information about the 1023 most recent runtime events recorded since the subsystem was started
- **NVRAM Events** – A list of and information about most important events over multiple subsystem startups. NVRAM events are stored in non-volatile memory

Working with the Event Viewer includes the following functions:

- Viewing Runtime Events (page 194)
- Clearing Runtime Events (page 194)
- Viewing NVRAM Events (page 194)
- Clearing NVRAM Events (page 195)

Viewing Runtime Events

To display Runtime Events:

1. From the Main Menu, highlight *Event Viewer* and press Enter.

The log of Runtime Events appears. Events are added to the top of the list. Each item includes:

- **Sequence number** – Begins with 0 at system startup.
- **Device** – Disk Array, Logical Drive, Physical Drive by its ID number.
- **Severity** – (lowest to highest) Information, Warning, Minor, Major, Critical and Fatal
- **Timestamp** – Date and time the event happened.
- **Description** – A description of the event in plain language.

2. Press the up and down arrow keys to scroll through the log.

Clearing Runtime Events

To clear the Runtime Event log:

1. From the Main Menu, highlight *Event Viewer* and press Enter.
2. Highlight *Clear Runtime Event Log* and press Enter.
3. Press Y to confirm.

Viewing NVRAM Events

This screen displays a list of and information about 63 most important events over multiple subsystem startups.

To display NVRAM events:

1. From the Main Menu, highlight *Event Viewer* and press Enter.
2. Highlight *NVRAM Events* and press Enter.

The log of NVRAM Events appears. Events are added to the top of the list. Each item includes:

- **Sequence number** – Begins with 0 at system startup.
 - **Device** – Disk Array, Logical Drive, Physical Drive by its ID number.
 - **Severity** – (lowest to highest) Information, Warning, Minor, Major, Critical and Fatal
 - **Timestamp** – Date and time the event happened.
 - **Description** – A description of the event in plain language.
3. Press the up and down arrow keys to scroll through the log.

Clearing NVRAM Events

To clear the Runtime Event log:

1. From the Main Menu, highlight *Event Viewer* and press Enter.
2. Highlight *NVRAM Events* and press Enter.
3. Highlight *Clear NVRAM Event Log* and press Enter.
4. Press Y to confirm.

Working with LUN Mapping

LUN Mapping includes the following functions:

- Viewing a List of Initiators (page 196)
- Enabling LUN Mapping (page 196)
- Creating an Initiator (page 196)
- Mapping a LUN to an Initiator (page 197)
- Deleting an Initiator (page 197)

Viewing a List of Initiators

LUN Mapping must be enabled in order for VTrak to recognize a Fibre Channel or SAS initiator. To view a list of initiators:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *LUN Mapping* and press Enter.
A list of the current initiators appears.

Enabling LUN Mapping

To enable LUN mapping:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *LUN Mapping* and press Enter.
A list of the current Fibre Channel or SAS initiators appears.

LUN Mapping must be enabled in order for VTrak to recognize the initiator. If LUN Mapping is currently disabled, highlight *Enable LUN Mapping* and press Enter.

Creating an Initiator

You must add an initiator to the VTrak's initiator list in order to use the initiator to create a LUN. You can also add initiators under Fibre Channel Management see page 189 or SAS Management, see page 191.

To create (add) a new initiator:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *LUN Mapping* and press Enter.
3. Highlight *Create New Initiator* and press Enter.
4. Type the name of the initiator.

- **Fibre Channel** – A Fibre Channel initiator name is the World Wide Port Name of the device and is composed of a series of eight, two-digit hexadecimal numbers.
- **SAS** – A SAS initiator name is the SAS address of the HBA card in the Host PC. Obtain the initiator name from the initiator utility on your host system.

Obtain the initiator name from the initiator utility on your host system.

Note that the initiator name you input must match exactly in order for the connection to work.

5. Press Ctrl-A to save the initiator.



Note

LUN Mapping must be enabled in order for VTrak to recognize the initiator.

Mapping a LUN to an Initiator

You must add an initiator to the VTrak's initiator list in order to use the initiator to create a LUN. You can add initiators under Fibre Channel Management see page 189, under SAS Management, see page 191, or under "Creating an Initiator" on page 196.

To map a LUN to an initiator:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *LUN Mapping* and press Enter.
3. Highlight an existing Initiator and press Enter.

A list of logical drives displays.

4. In the LUN field, press the backspace key to erase the current value, then type the LUN you want to assign to this initiator, from 0 to 255.
If you make a error, press Ctrl-R to restore the current LUN.
5. Press Ctrl-A to save the LUN map.

Deleting an Initiator

To delete an initiator:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *LUN Mapping* and press Enter.
3. Highlight the initiator you want to delete and press the spacebar to mark it.

The mark is an asterisk (*) to the left of the listing.

4. Highlight *Delete Marked Initiators* and press Enter.
5. Press Y to confirm the deletion.

Managing Users

User Management includes the following functions:

- Viewing User Information (page 199)
- Creating a User (page 199)
- Changing a User's Password (page 200)
- Changing a User's Display Name and Email Address (page 200)
- Changing a User's Privilege and Status (page 201)
- Deleting a User (page 201)

Viewing User Information

Each user types their user name and password to log into the CLI.

To view a list of current user accounts:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *User Management* and press Enter.
A list of the current users appears.

Creating a User

To create a new user account:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *User Management* and press Enter.
3. Highlight *Create New User* and press Enter.
4. Highlight each field and type in the appropriate information:
 - User name (no spaces)
 - Password (Optional. Maximum 32 characters. Use letters, numbers, space between words and underscore)
 - Display name (Optional)
5. Highlight *Privilege* and press the space bar to toggle through the options:
For definitions of each privilege level, see the List of User Privileges below.
6. Highlight *Status* and press the space bar to toggle between the options:
 - **Enabled** – Allows the user to log in to the system
 - **Disabled** – Prevents the user from logging in to the system
7. Press Ctrl-A to save the user.

List of User Privileges

- **View** – Allows the user to see all status and settings but not to make any changes
- **Maintenance** – Allows the user to perform maintenance tasks including Rebuilding, PDM, Media Patrol, and Redundancy Check
- **Power** – Allows the user to create (but not delete) disk arrays and logical drives, change RAID levels, change stripe size; change settings of components such as disk arrays, logical drives, physical drives, and the controller.
- **Super** – Allows the user full access to all functions including create and delete users and changing the settings of other users, and delete disk arrays and logical drives. The default “administrator” account is a Super User.

Changing a User’s Password

Each user can change their own password. A Super user can change other user’s passwords. To change a user’s password:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *User Management* and press Enter.
3. Highlight a User in the list and press Enter.
4. Highlight *Change Password...* and press Enter.
5. Highlight *New Password* and type the password.
6. Highlight *Retype Password* and type the password again to verify.
7. Press Ctrl-A to save the password.

Changing a User’s Display Name and Email Address

Each user can change their display name and email address. To change a display name or email address:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *User Management* and press Enter.
3. Highlight a User in the list and press Enter.
4. Highlight *Display Name* and press Enter.
5. Highlight the items you want and press the backspace key to erase the current value, then type the new value:
 - User name
 - Email address
6. Press Ctrl-A to save the settings.

Changing a User's Privilege and Status

No user can change their own privilege or status. To change another user's privilege or status.

1. Log in as the Administrator or a Super user.
2. From the Main Menu, highlight *Additional Info and Management* and press Enter.
3. Highlight *User Management* and press Enter.
4. Highlight a User in the list and press Enter.
5. Highlight *Display Name* and press Enter.
6. Highlight *Privilege* and press the space bar to toggle through the options:
For definitions of each privilege level, see "List of User Privileges" on page 200.
7. Highlight *Status* and press the space bar to toggle between the options:
 - **Enabled** – Allows the user to log in to the system
 - **Disabled** – Prevents the user from logging in to the system
8. Press Ctrl-A to save the settings.

Deleting a User

To delete a user:

1. Log in under a user name other than the one you want to delete.
2. From the Main Menu, highlight *Additional Info and Management* and press Enter.
3. Highlight *User Management* and press Enter.
4. Highlight the user you want to delete and press the spacebar to mark it.
The mark is an asterisk (*) to the left of the listing.
5. Highlight *Delete Marked Users* and press Enter.
6. Press Y to confirm the deletion.

Working with Software Management

Software Management includes the following functions:

- Making Email Settings (page 202)
- Making SLP Settings (page 203)
- Making Webserver Settings (page 203)
- Making Telnet Settings (page 204)
- Making SNMP Settings (page 204)
- Managing SNMP Trap Sinks (page 205)
- Making CIM Settings (page 206)
- Making Netsend Settings (page 207)
- Managing Netsend Recipients (page 207)

Making Email Settings

By default, Email service is set to Automatic and its normal status is Started.

To make Email service settings:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight *Email* and press Enter.
4. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
5. Highlight the following and press the backspace key to erase the current value, then type the new value:
 - Server IP address
 - Server Port number (25 is the default)
6. Highlight *Authentication* and press the spacebar to toggle between *Yes* and *No*.
If you selected *Yes*, type in a User name and Password in the fields provided.
7. The following items are optional but recommended. Highlight and press the backspace key to erase the current value, then type the new value:
 - Sender's email address
 - Subject Line for the email message
8. Press Ctrl-A to save your settings.

To start, stop or restart the Email service, highlight *Start*, *Stop* or *Restart* and press Enter.

Making SLP Settings

By default, SLP service is set to Automatic and its normal status is Started.

To make SLP service settings:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight *SLP* and press Enter.
4. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
5. Press Ctrl-A to save your settings.

To start, stop or restart the SLP service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Making Webserver Settings

By default, Webserver service is set to Automatic and its normal status is Started.

To make Webserver service settings:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight *Webserver* and press Enter.
4. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
5. Highlight the following and press the backspace key to erase the current value, then type the new value:
 - HTTP Port (80 is the default)
 - Session Time Out (24 minutes is the default. 1440 minutes = 24 hours)
6. Highlight *SSL* and press the spacebar to toggle between *Enabled* and *Disabled*.
7. Highlight *HTTPS Port* and press the backspace key to erase the current value, then type the new value. 443 is the default.
8. Press Ctrl-A to save your settings.

To start, stop or restart the Webserver service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Making Telnet Settings

By default, Telnet service is set to Automatic and its normal status is Started. To make Telnet service settings:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight *Telnet* and press Enter.
4. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
5. Highlight the following and press the backspace key to erase the current value, then type the new value:
 - Port number (2300 is the default)
 - Session Time Out (24 minutes is the default. 1440 minutes = 24 hours)
 - Maximum number of connections (4 is the default)
6. Press Ctrl-A to save your settings.

To start, stop or restart the Telnet service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Making SNMP Settings

By default, SNMP (Simple Network Management Protocol) service is set to Automatic and its normal status is Started.

To make SNMP service settings:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight *SNMP* and press Enter.
4. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
5. Highlight the following and press the backspace key to erase the current value, then type the new value:
 - **Port Number** – 161 is the default
 - **System Name** – (optional) Type a system name in this field
 - **System Location** – Type a country name in this field
 - **System Contact** – Type the email address of your system administrator in this field
 - **Read Community** – Type a community name in this field
 - **Write Community** – private (no change possible)

6. Press Ctrl-A to save your settings.

To start, stop or restart the SNMP service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Managing SNMP Trap Sinks

Creating a SNMP trap sink

To create a trap sink:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight *SNMP* and press Enter.
4. Highlight *Trap Sinks* and press Enter.
A list of the current trap sinks appears.

Adding a trap sink

To add a trap sink:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight *Create New Trap Sink* and press Enter
4. Highlight *Trap Sink IP address* and press the backspace key to erase the current value, then type the new IP address in this field.
5. Highlight *Trap Filter* and press the spacebar to toggle through the severity levels.
The Severity Levels are (lowest to highest) Information, Warning, Minor, Major, Critical and Fatal.
6. Press Ctrl-A to save the Trap Sink.

Deleting a trap sink

To delete a trap sink:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight the trap sink you want to delete and press the spacebar to mark it.
The mark is an asterisk (*) to the left of the listing.
4. Highlight *Delete Marked Entries* and press Enter.

Making CIM Settings

By default, CIM (Common Information Model [a protocol]) service is set to Automatic and its normal status is Started.

To make CIM service settings:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight *CIM* and press Enter.
4. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
5. Highlight *HTTP* and press the spacebar to toggle between *Enabled* and *Disabled*.
6. Highlight *HTTP Port*, press the backspace key to erase, type new value. 5988 is the default port number.
7. Highlight *HTTPS* and press the spacebar to toggle between *Enabled* and *Disabled*.
8. Highlight *HTTPS Port*, press the backspace key to erase, type new value. 5989 is the default port number.
9. Highlight *Authentication* and press the spacebar to toggle between *Enabled* and *Disabled*.

Note: There is only one user. The default name is **cim**. No changes are possible.

Note: CIM service must be running to change the password.

The default password is **password**.

10. Highlight *Change Password...* and press Enter to change the password.
11. Highlight *Old Password* and type the current password.
12. Highlight *New Password* and type a new password.
13. Highlight *Retype Password* and type the new password again.
14. Press Ctrl-A to save your settings.

To start, stop or restart the CIM service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Making Netsend Settings

By default, Netsend service is set to Manual and its normal status is Stopped.

To make Netsend service settings:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
3. Highlight *Netsend* and press Enter.
4. Highlight *Startup Type* and press the spacebar to toggle between *Automatic* and *Manual*.
5. Press Ctrl-A to save your settings.

To start, stop or restart the Netsend service, highlight *Start*, *Stop*, or *Restart* and press Enter.

Managing Netsend Recipients

Note that the Messenger service must be running on the recipient PC in order to receive reports.

Adding a recipient

To add a recipient:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
1. Highlight *Netsend* and press Enter.
2. Highlight *Message Recipient* and press Enter.
3. Highlight *Create New Message Recipient* and press Enter.
4. Type the recipient's IP address into the field provided.
5. Highlight *Message Event Severity Filter* and press the spacebar to change severity levels.

The selected level and all higher severity levels of severity will be reported. Severity levels (from lowest to highest) are: Info, Warning, Minor, Major, Critical, and Fatal.

6. Press Ctrl-A to save your settings.

Changing Recipient Settings

To change recipient settings:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.

2. Highlight *Software Management* and press Enter.
1. Highlight the recipient whose settings you want to change and press Enter.
2. Type the recipient's IP address into the field provided.
3. Highlight *Message Event Severity Filter* and press the spacebar to change severity levels.
4. Press Ctrl-A to save your settings.

Deleting a Recipient

To delete a recipient:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Software Management* and press Enter.
1. Highlight the recipient you want to delete and press the spacebar to mark it. The mark is an asterisk (*) to the left of the listing
2. Highlight *Delete Marked Entries* and press Enter.

Netsend Requirements

In order to use Netsend:

- NetSend must be running the VTrak
- You must provide the IP address for each recipient PC
- The Messenger service must be running on each recipient PC

If your Netsend and Messenger service settings are correct but the recipient PC does not receive event messages, check the recipient PC's Firewall settings. Refer to your OS documentation for more information.

Flashing through TFTP

Use this function to flash the VTrak's firmware. See "Updating the Firmware in the CLU" on page 221 for this procedure.

Viewing Flash Image Information

Flash image information refers to the package of firmware components running on your VTrak controller or controllers, including:

- Component name
- Version number
- Build date
- Flash (installation) date
- Controller number (1 or 2)

To view flash image information:

1. From the Main Menu, highlight *Additional Info and Management*, and press Enter.
2. Highlight *Flash Image Version Info* and press Enter.

The flash image information displays on the screen.

Running Image Info – The firmware package currently running on the controllers

Flashed Image Info – The firmware package flashed to memory

If the Running and Flashed Images do not match, the VTrak has not restarted since the firmware was last updated. Restart the VTrak to run the Flashed firmware package. See “Restarting the Subsystem” on page 215.

Note that all of these components are upgraded together in a package. See “Updating the Firmware in the CLU” on page 221.

Clearing Statistics

This function clears the statistical counts for the RAID controller, Fibre Channel ports, SAS ports, physical drives, and logical drives. To clear statistics:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Clear Statistics* and press Enter.
3. Press Y to confirm the deletion.

Restoring Factory Defaults

This function restores the factory default settings to the firmware and software items you select.



Caution

Use this function with care. Do not restore to default settings for any item unless you are sure this action is needed.

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Restore Factory Defaults* and press Enter.
3. Highlight the setting group you want and press the spacebar to toggle between *Yes* and *No*.
Yes means this setting will be restored to the default value.
4. Highlight *Restore Factory Defaults* and press Enter.
5. Press Y to confirm the reset.

Shutting Down the Subsystem

There are two methods for shutting down the subsystem. Choose one of the following procedures:

- Shutting down the VTrak – Telnet Connection (page 213)
- Shutting down the VTrak – Serial Connection (page 213)

Shutting down the VTrak – Telnet Connection

This function enables you to shutdown the VTrak subsystem on a Telnet connection. You can only do part of this procedure in the CLU. Additional action is required, as described below. To shutdown the VTrak:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Highlight *Shutdown or Restart* and press Enter.
4. Highlight *Option* and press the spacebar to display *Restart*.
5. Highlight *Submit* and press Enter.
A warning message appears.
6. Press Y to continue.
The screen will go blank.
7. Wait for no less than two minutes.
8. Manually turn off the power supply switches on the back of the subsystem.

Shutting down the VTrak – Serial Connection

This function enables you to shutdown the VTrak subsystem on a serial connection. You can only do part of this procedure in the CLU. Additional action is required, as described below. To shutdown the VTrak:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Highlight *Shutdown or Restart* and press Enter.
4. Highlight *Option* and press the spacebar to display *Restart*.
5. Highlight *Submit* and press Enter.
A warning message appears.
6. Press Y to continue.
7. Turn off the power supply switches when you see the following message:

Shutdown complete. It is now safe to power off the subsystem.

Restarting the Subsystem

There are two methods for restarting the subsystem. Choose one of the following procedures:

- Restarting the Subsystem (page 215)
- Restarting VTrak – Serial Connection (page 215)

Restarting VTrak – Telnet Connection

This function enables you to restart the VTrak subsystem on a Telnet connection. You can only do part of this procedure in the CLU. Additional action is required, as described below. To restart the VTrak:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Highlight *Option* and press the spacebar to display *Restart*.
4. Highlight *Submit* and press Enter.
A warning message appears.
5. Press Y to continue.
The screen will go blank.
6. Wait for no less than two minutes.
7. Re-establish your Telnet connection to the VTrak CLU.
If you cannot re-establish a connection, wait 30 seconds, then try again.

Restarting VTrak – Serial Connection

This function enables you to restart the VTrak subsystem on a serial connection. You can only do part of this procedure in the CLU. Additional action is required, as described below. To restart the VTrak:

1. From the Main Menu, highlight *Additional Info and Management* and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Highlight *Option* and press the spacebar to display *Restart*.
4. Highlight *Submit* and press Enter.
A warning message appears.
5. Press Y to continue.
The screen will display shutdown and startup functions.
6. When the `Log in:` prompt appears, log into the CLU again.

Making Buzzer Settings

This function enables the buzzer on the controller. When you first power-up the VTrak, it beeps twice to show normal operation. To change buzzer settings:

1. From the Main Menu, highlight *Buzzer* and press Enter.
A list of Controllers appears with the current buzzer setting and status.
2. Highlight the Controller whose buzzer you want to set and press Enter.
3. Highlight *Enabled* and press the spacebar to toggle between *Yes* and *No*.
4. Press Ctrl-A to save your settings.

The buzzer provides the audible alarm. See “VTrak is Beeping” on page 274.

Chapter 6: Maintenance

This chapter covers the following topics:

- Updating the Firmware in WebPAM PROe (page 217)
 - Updating the Firmware in the CLU (page 221)
 - Replacing a Power Supply (page 223)
 - Replacing a Cooling Unit Fan or Blower (page 224)
 - Replacing a Cache Battery (page 229)
 - Replacing a RAID Controller (page 233)
-

Updating the Firmware in WebPAM PROe

A firmware update consists of the following actions:

- Downloading the Firmware Image File (page 217)
- Updating the Firmware from one of these sources:
 - TFTP Server (page 217)
 - Your PC (page 218)
- Restarting the Subsystem (page 219)




Downloading the Firmware Image File

Go to the Promise website at <http://www.promise.com/support> and download the latest firmware image (.img) file to your TFTP server or your PC. The firmware update image file includes all of the files for the VTrak, including:

- Redboot ROM
- Kernel
- Firmware
- Software
- Ramdisk
- SEP Firmware
- OEM Customization
- Other files

Updating Firmware from TFTP Server

To update the firmware from a TFTP server:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Software Management  icon.
4. Click the **Firmware Update** tab.

5. Do one of the following actions:
 - Click the **Download from TFTP Server** option, then click the **Next** button.
 - From the Firmware Update tab dropdown menu, choose *Download from TFTP Server*.
6. Enter the hostname or IP address of your TFTP server in the field provided.
7. Enter the port number of your TFTP server in the field provided (69 is the default).
8. Enter the filename of the Firmware Update file in the field provided.
9. Click the **Submit** button.
10. When the download is completed, click the **Next** button.

A popup message appears warning you not to reboot the VTrak during the firmware update procedure.
11. In the popup message, click the **OK** button.

The update progress displays. Then a popup message appears to tell you to reboot the VTrak.
12. In the popup message, click the **OK** button.
13. Restart the VTrak. See “Restarting the Subsystem” on page 219.






Note

After you click the **Submit** button, if WebPAM PROe displays this message: **error transferring image**, you entered an incorrect file name or an incorrect location. Check the information and try again.

Updating Firmware from your PC

To update the firmware from your PC:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the Software Management  icon.
4. Click the **Firmware Update** tab.
5. Do one of the following actions:
 - Click the **Download Flash File from Local File through HTTP** option, then click the **Next** button.
 - From the Firmware Update tab dropdown menu, choose *Download from Local File*.

6. Enter the filename of the Firmware Update file in the field provided.
Or, click the **Browse...** button and choose the Firmware Update file in the Open dialog box.
7. Click the **Submit** button.
8. When the download is completed, click the **Next** button.
A popup message appears to warn you not to reboot the VTrak during the firmware update procedure.
9. In the popup message, click the **OK** button.
The update progress displays. Then a popup message appears to tell you to reboot the VTrak.
10. In the popup message, click the **OK** button.
11. Restart the VTrak. See “Restarting the Subsystem” on page 219.



Note

After you click the **Submit** button, if WebPAM PROe displays this message: **error transferring image**, you entered an incorrect file name or an incorrect location. Check the information and try again.



Restarting the Subsystem



Warning

Do not restart the VTrak during a firmware upgrade procedure. Wait until the upgrade is one and you are prompted to restart.

To restart the VTrak subsystem:

1. Click the Subsystem  icon in Tree View.
2. Click the Administrative Tools  icon.
3. Click the **Shutdown** link in Management View.
A Shutdown or Restart tab will appear.
4. On the Shutdown or Restart tab, choose *Restart* from the dropdown menu.
5. Click the **Submit** button.
6. In the warning box, click the **OK** button.
7. In the confirmation box, type the word **confirm** in the field provided.
8. Click the **OK** button.

When the controller shuts down, your WebPAM PROe connection will be lost.

9. Wait for two to three minutes.
10. In your browser, log into WebPAM PROe once again.
If you cannot log in, wait for 30 seconds, and try again. Repeat until login is successful.

Updating the Firmware in the CLU

A firmware update consists of the following actions:

- Downloading the Firmware Image File (page 221)
- Updating the Firmware (page 221)
- Restarting Subsystem over a Telnet Connection (page 222)
- Restarting Subsystem over a Serial Connection (page 222)

Downloading the Firmware Image File

Go to the Promise website at <http://www.promise.com/support> and download the latest firmware image file to your TFTP server.

Updating the Firmware

To update the firmware file in the CLU:

1. From the Main Menu, highlight *Additional Info and Management*, and press Enter.
2. Highlight *Flash through TFTP* and press Enter.
3. Highlight *TFTP Server* and type the IP address of your TFTP server in the field provided.
4. Highlight *Port Number* and press the backspace key to erase the current value, then type the new value. 69 is the default.

A list of the current users appears.

5. Highlight *File Name* and type the file name of the firmware image file in the field provided.
6. Highlight *Start* and press Enter.
A message appears to tell you to reboot the VTrak.
7. Restart the VTrak.

See “Restarting Subsystem over a Telnet Connection” on page 222 or “Restarting Subsystem over a Serial Connection” on page 222.

Restarting Subsystem over a Telnet Connection



Warning

Do not restart the VTrak during a firmware upgrade procedure. Wait until the upgrade is one and you are prompted to restart.

To restart the VTrak subsystem on a Telnet connection:

1. From the Main Menu, highlight *Additional Info and Management*, and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Press the spacebar to display *Restart* then press Enter.
A warning message appears.
4. Press Y to continue.
The screen will go blank.
5. Wait for two to three minutes.
6. Re-establish your Telnet connection to the VTrak CLU.
If you cannot re-establish a connection, wait 30 seconds, then try again.

Restarting Subsystem over a Serial Connection



Warning

Do not restart the VTrak during a firmware upgrade procedure. Wait until the upgrade is one and you are prompted to restart.

To restart the VTrak subsystem on a serial connection:

1. From the Main Menu, highlight *Additional Info and Management*, and press Enter.
2. Highlight *Shutdown or Restart* and press Enter.
3. Press the spacebar to display *Restart* then press Enter.
A warning message appears.
4. Press Y to continue.
The screen will display shutdown and startup functions.
5. When the `Log in :` prompt appears, log into the CLU again.

Replacing a Power Supply

The power supply and its fans are replaced as one unit. There are no individually serviceable parts. No tools are required for this procedure.

Remove the Old Power Supply

To remove the power supply:

1. Verify that the power supply LED is amber or red.
2. Switch off the power.
3. Unplug the power cord.
4. Press the release button and pull the handle downward as shown. See Figure 1 (E610f/s) or 2 (E310f/s).
5. Pull the power supply out of the VTrak enclosure.

Install a New Power Supply

To install the power supply:

1. Carefully slide the power supply into the enclosure.
2. Gently press the handle in and upward until it locks. See Figure 1 (E610f/s) or 2 (E310f/s).
3. Plug in the power cord.
4. Switch on the power supply.
5. Verify that the new power supply LED is green.

Figure 1. Replacing an E610f/s power supply



Figure 2. Replacing an E310f/s power supply



This completes the power supply replacement procedure.

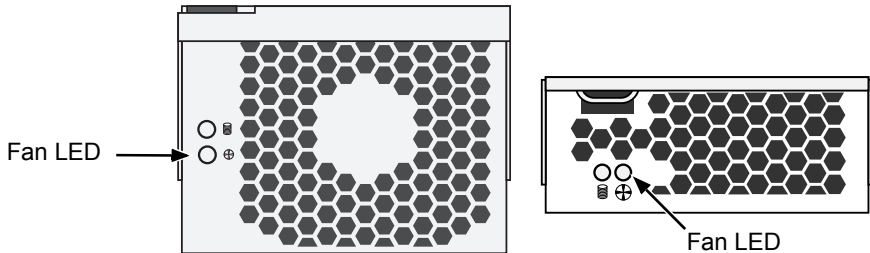
Replacing a Cooling Unit Fan or Blower

The fan or blower in each cooling unit is replaced as an individual part. No tools are required for this procedure.

To replace a fan or blower:

1. Verify that the Fan LED on the cooling unit is amber or red. See Figure 3.

Figure 3. Fan LED (left: E610f/s, right: E310f/s)



2. On the cooling unit, press the release button and pull the handle downward. See Figure 4 (E610f/s) or 5 (E310f/s).
3. Pull the cooling unit out of the VTrak enclosure.

Figure 4. Removing a cooling unit from the E610f/s

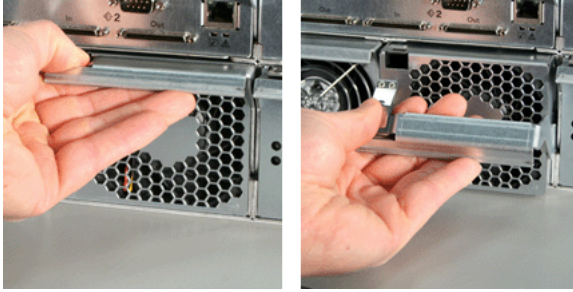
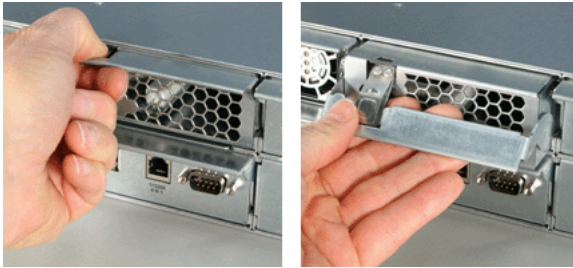
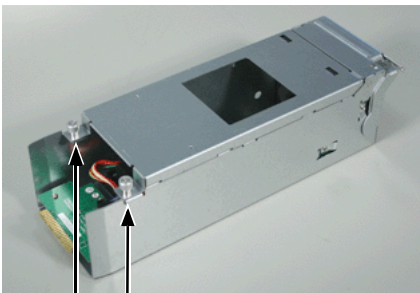


Figure 5. Removing a cooling unit from the E310f/s

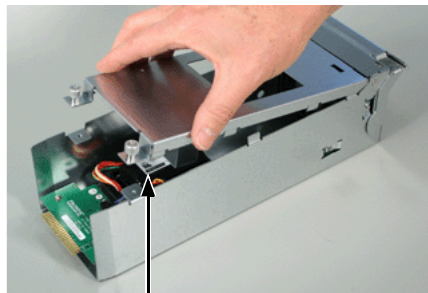


4. Loosen the thumbscrews. A retainer keeps the thumbscrews in place.
5. Grasp the top section near the thumbscrews and lift it off the bottom section. Separate the cooling unit sections to access the blower. See Figure 6 (E610f/s) or 7 (E310f/s).

Figure 6. Loosen the thumbscrews and remove the cover (E610f/s)

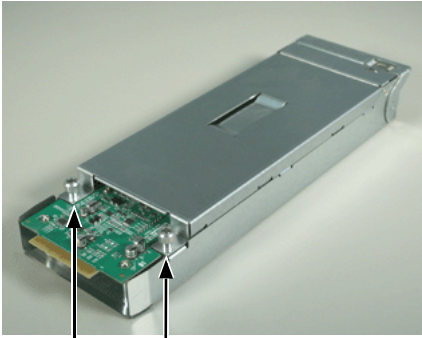


Loosen the thumbscrews

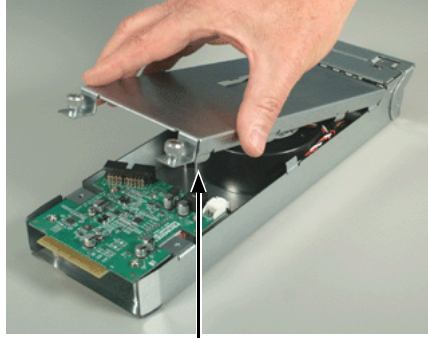


Lift the cover

Figure 7. Loosen the thumbscrews and remove the cover (E310f/s)



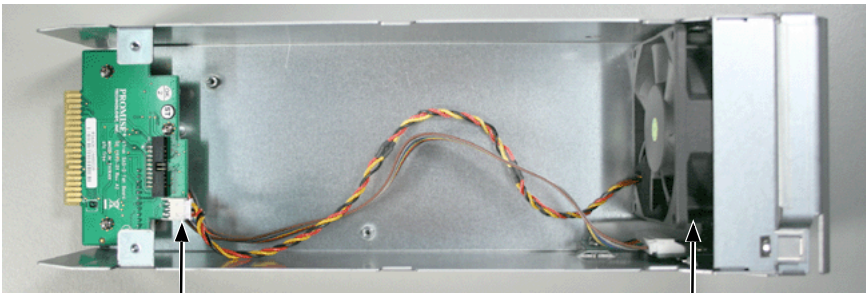
Loosen the thumbscrews



Lift the cover

6. Lift the fan or blower off the mounting pins and detach the electrical connector. See Figure 8 (E610f/s) or 9 (E310f/s).

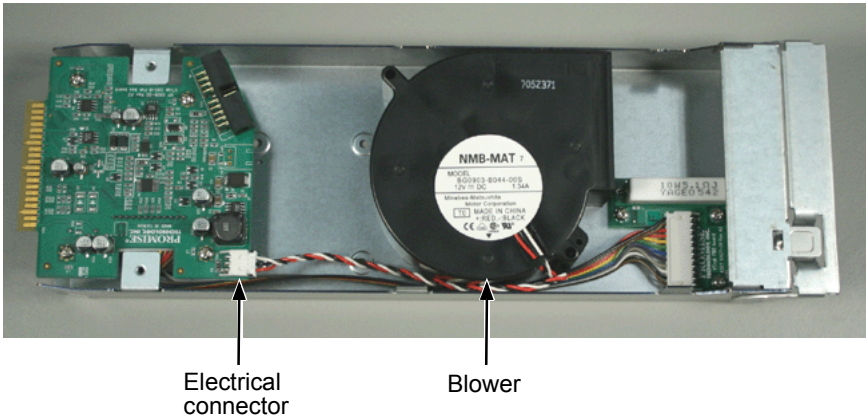
Figure 8. The E610f/s fan and its electrical connector



Electrical
connector

Fan

Figure 9. The E310f/s blower and its electrical connector



7. Attach the electrical connector of the new fan blower and set the fan or blower in place.

Be sure you position the fan or blower onto the mounting pins. See Figure 10 (E610f/s) or 11 (E310f/s).

Figure 10. Position the fan onto the mounting pins, pointed outward

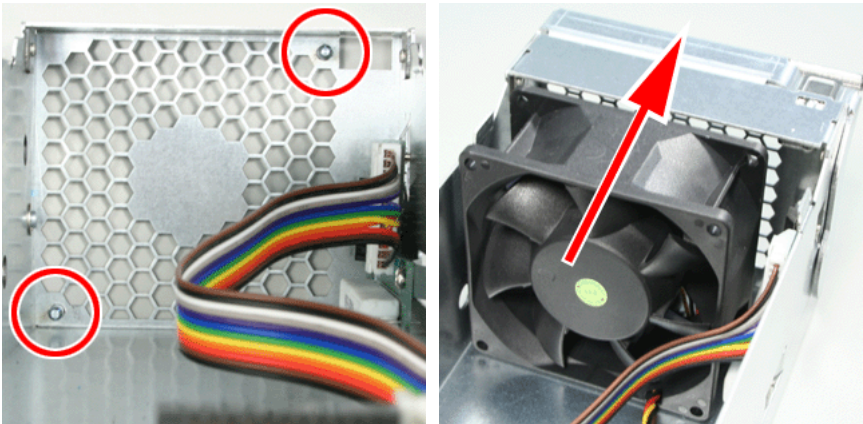
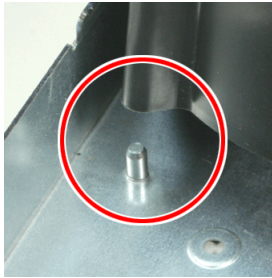


Figure 11. Positioning the blower onto the mounting pins, pointed outward



Be sure the blower points outward, towards the handle.

8. Place the top section of the cooling unit onto the bottom section and tighten the thumbscrews.
9. Carefully slide the cooling unit into the enclosure.
10. Gently press the handle in and upward until it locks. See Figure 12.

Figure 12. Locking the cooling unit handle (left: E610f/s, right: E310f/s)



11. Verify that the Fan LEDs are green.

This completes the fan replacement procedure.

Replacing a Cache Battery

The cache battery is located inside the cooling unit. The battery assembly is replaced as an individual part.



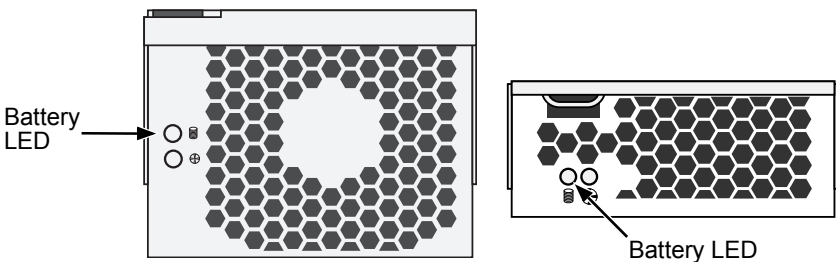
Cautions

- Try reconditioning the battery before you replace it. See page 117 or page 163 for more information.
- The battery assembly is replaced as a unit. Do not attempt to disconnect the battery by itself.
- Installing the wrong replacement battery can result in an explosion.
- Dispose of used batteries according to the instructions that accompany the battery.
- While the battery is removed, your system will be vulnerable to data loss if the power fails while data is being written to the logical drives.
- If power service has failed, do not remove the cooling unit if the Controller's Dirty Cache LED is flashing. See "Browser Does Not Connect to WebPAM PROe" on page 315.

To replace a cache battery:

1. Verify that the Battery LED is amber or red. See Figure 13.

Figure 13. Fan LED (left: E610f/s, right: E310f/s)



2. Press the release button and pull the handle downward as shown above.
3. Pull the cooling unit out of the VTrak enclosure. See Figure 14 (E610f/s) or 15 (E310f/s).

Figure 14. Removing the cooling unit from the enclosure from the E610f/s

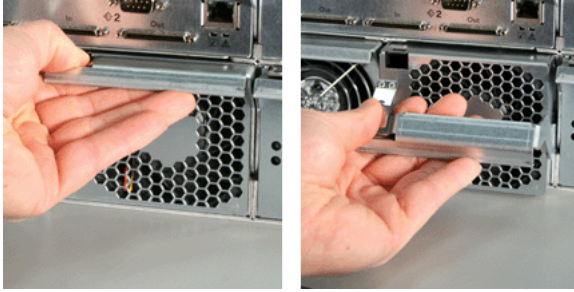
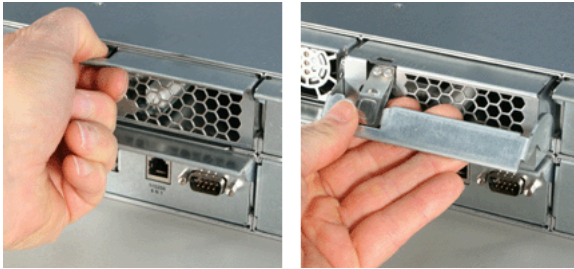
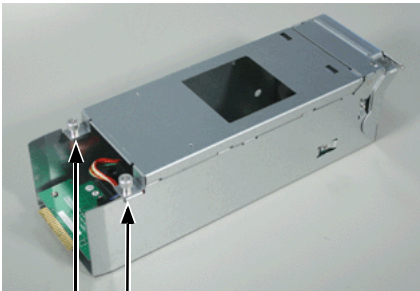


Figure 15. Removing the cooling unit from the enclosure from the E310f/s

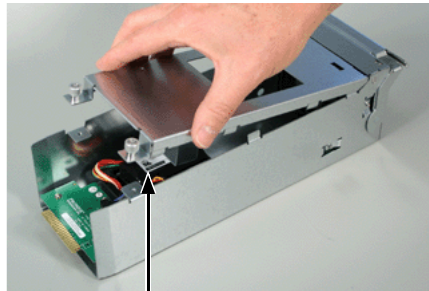


3. Loosen the thumbscrews. A retainer keeps the thumbscrews in place.
4. Grasp the top section near the thumbscrews and lift it off the bottom section. Separate the cooling unit sections to access the battery assemble. See Figure 16 (E610f/s) or 17 (E310f/s).

Figure 16. Loosen the thumbscrews and remove the cover (E610f/s)

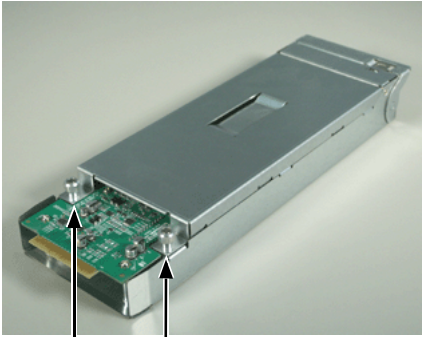


Loosen the thumbscrews

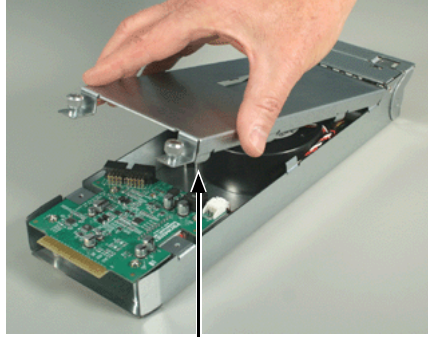


Lift the cover

Figure 17. Loosen the thumbscrews and remove the cover (E310f/s)



Loosen the thumbscrews



Lift the cover

5. Remove the two screws holding the battery assembly in place.
6. Detach the connector on the circuit board.

Do not detach any other connectors. See Figure 18 (E610f/s) or 19 (E310f/s).

Figure 18. Removing the battery assembly (E610f/s)

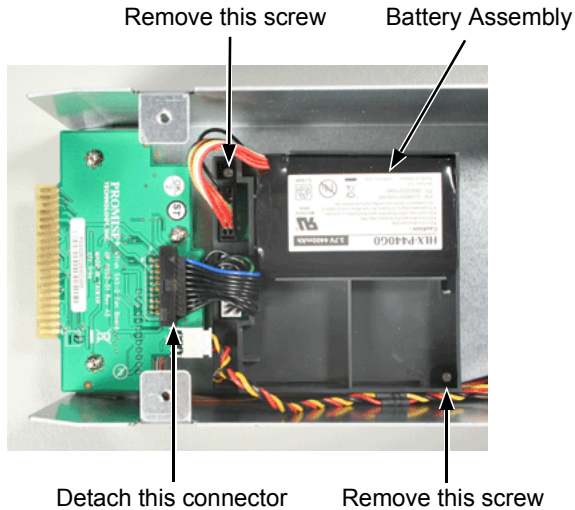
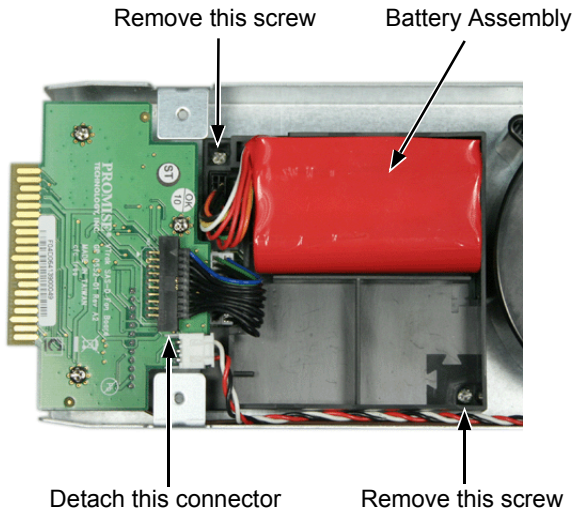
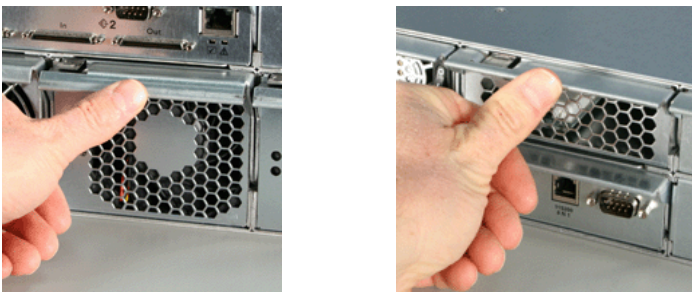


Figure 19. Removing the battery assembly (E310f/s)



7. Lift the battery assembly out of the cooling unit.
8. Place a new battery assembly into the cooling unit.
9. Attach the connector on the circuit board.
10. Install the two screws holding the battery assembly in place to the cooling unit.
11. Place the top section of the cooling unit onto the bottom section and tighten the thumbscrews.
12. Carefully slide the cooling unit into the enclosure.
13. Gently press the handle in and upward until it locks. See Figure 20.

Figure 20. Locking the cooling unit handle (left: E610f/s, right: E310f/s)



This completes the battery replacement procedure.

Replacing a RAID Controller

The RAID Controller monitors and manages the logical drives. When this controller is replaced, all of your logical drive data and configurations remain intact because this logical drive information is stored on the disk drives.



Caution

The RAID controller is NOT hot-swappable if your VTrak has only one controller. Power-down the VTrak before removing it.

If your VTrak has two RAID controllers, you can hot-swap one controller at a time.




Important

Do not replace the RAID Controller based on LED colors alone. Only replace the RAID Controller when directed to do so by Promise Technical Support. See page 320.

Dual Controller Subsystem

Before you install the replacement controller, be sure the replacement controller has:

- The same Firmware version as the original controller
- The same amount of SDRAM as the original controller

To obtain this information, click the Controller  icon, Information tab, and look for Firmware Version and Memory Size.

Removing the old controller

To remove a RAID Controller on a dual-controller subsystem:

1. Disconnect the Fibre Channel or SAS cables, management, serial, and power cables.
2. On the controller handle, press the release button and pull the handle downward. See Figure 21.
3. Pull the controller out of the VTrak enclosure.

Installing the new controller

To install the new controller:

1. Carefully slide the controller into the enclosure.
2. Gently press the handle in and upward until it locks. See Figure 21.
3. Connect the Fibre Channel or SAS cables, management, serial, and power cables.

Single Controller Subsystem

Removing the old controller

To remove the RAID Controller on a single-controller subsystem:

1. Shutdown the VTrak. See “Shutting Down the Subsystem” on page 106 (WebPAM PROe) or page 213 (CLU).
2. Switch off the power.
3. Disconnect the Fibre Channel or SAS cables, management, serial and power cables.
4. On the controller handle, press the release button and pull the handle downward. See Figure 21.
5. Pull the controller out of the VTrak enclosure.

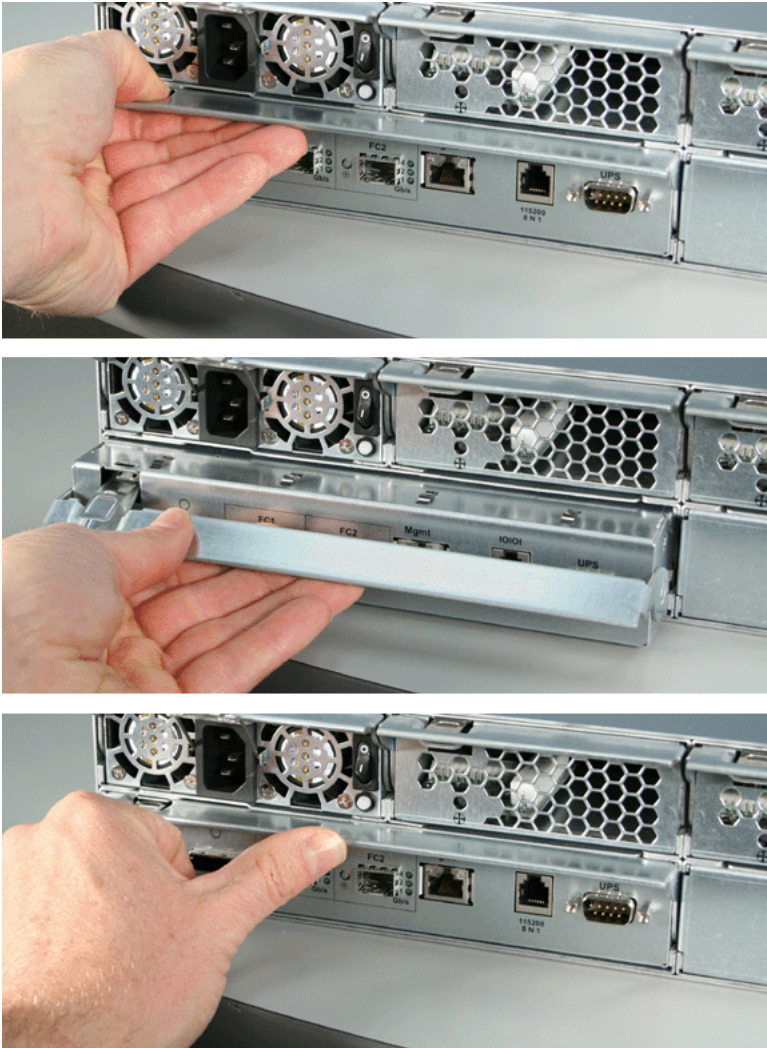
Installing the new controller

To install the new controller:

1. Carefully slide the controller into the enclosure.
2. Gently press the handle in and upward until it locks. See Figure 21.
3. Connect the Fibre Channel or SAS cables, management, serial and power cables.
4. Switch on the power.

The VTrak will restart. For more information about VTrak’s start-up behavior, see “Connecting the Power” on page 33.

Figure 21. Replacing the controller. The E310f/s is shown. The E610f/s is similar



Chapter 7: Technology Background

This chapter covers the following topics:

- Introduction to RAID (below)
 - Choosing a RAID Level (page 250)
 - Choosing Stripe Size (page 253)
 - Choosing Sector Size (page 253)
 - Cache Policy (page 254)
 - Cache Mirroring (page 256)
 - LUN Affinity (page 257)
 - Capacity Coercion (page 258)
 - Initialization (page 259)
 - Hot Spare Drive(s) (page 259)
 - Partition and Format the Logical Drive (page 260)
 - RAID Level Migration (page 260)
 - Media Patrol (page 267)
 - Predictive Data Migration (PDM) (page 268)
 - Transition (page 269)
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Introduction to RAID

RAID (Redundant Array of Independent Disks) allows multiple physical drives to be combined together in a disk array. Then all or a portion of the disk array is formed into a logical drive. The operating system sees the logical drive as a single storage device, and treats it as such.

The RAID software and controller manage all of the individual drives. The benefits of a RAID can include:

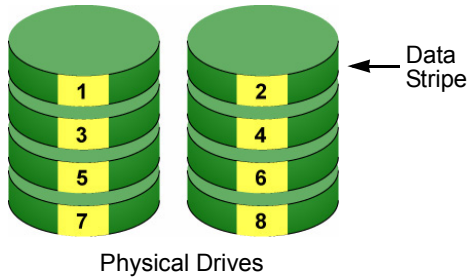
- Higher data transfer rates for increased server performance
- Increased overall storage capacity for a single drive designation (such as, C, D, E, etc.)
- Data redundancy/fault tolerance for ensuring continuous system operation in the event of a hard drive failure

Different types of logical drives use different organizational models and have varying benefits. Also see “Choosing a RAID Level” on page 250. The following outline breaks down the properties for each type of RAID logical drive:

RAID 0 – Stripe

When a logical drive is striped, the read and write blocks of data are interleaved between the sectors of multiple physical drives. Performance is increased, since the workload is balanced between drives or “members” that form the logical drive. Identical drives are recommended for performance as well as data storage efficiency.

Figure 1. RAID 0 Striping interleaves data across multiple drives



The disk array's data capacity is equal to the number of disk drive members multiplied by the smallest drive's capacity. For example, one 100 GB and three 120 GB drives will form a 400 GB (4 x 100 GB) disk array instead of 460 GB.

If physical drives of different capacities are used, there will also be unused capacity on the larger drives.

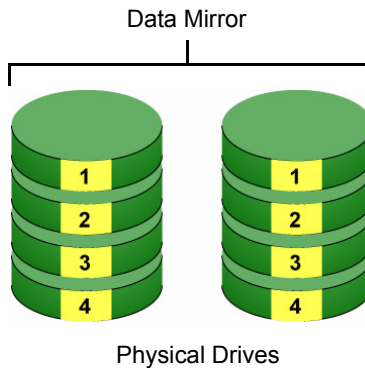
RAID 0 logical drives on VTrak consist of one or more physical drives.

RAID 1 – Mirror

When a logical drive is mirrored, identical data is written to a pair of physical drives, while reads are performed in parallel. The reads are performed using elevator seek and load balancing techniques where the workload is distributed in the most efficient manner. Whichever drive is not busy and is positioned closer to the data will be accessed first.

With RAID 1, if one physical drive fails or has errors, the other mirrored physical drive continues to function. Moreover, if a spare physical drive is present, the spare drive will be used as the replacement drive and data will begin to be mirrored to it from the remaining good drive.

Figure 2. RAID 1 Mirrors identical data to two drives



The logical drive's data capacity equals the smaller physical drive. For example, a 100 GB physical drive and a 120 GB physical drive have a combined capacity of 100 GB in a mirrored logical drive.

If physical drives of different capacities are used, there will be unused capacity on the larger drive.

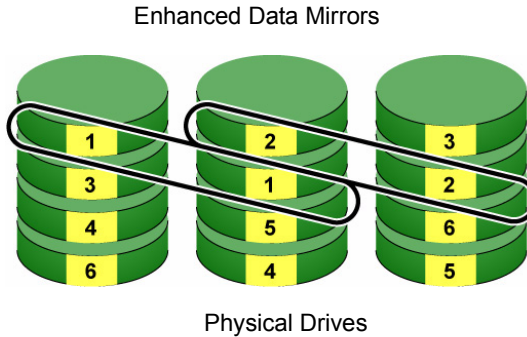
RAID 1 logical drives on VTrak consist of two physical drives.

If you want a mirrored logical drive with more than two physical drives, see "RAID 1E – Enhanced Mirror" on page 240 and "RAID 10 – Mirror / Stripe" on page 243.

RAID 1E – Enhanced Mirror

RAID 1E offers the security of mirrored data provided by RAID 1 plus the added capacity of more than two physical drives. It also offers overall increased read/write performance plus the flexibility of using an odd number of physical drives. With RAID 1E, each data stripe is mirrored onto two physical drives. If one drive fails or has errors, the other drives continue to function, providing fault tolerance.

Figure 3. RAID 1E can mirror data over an odd number of drives



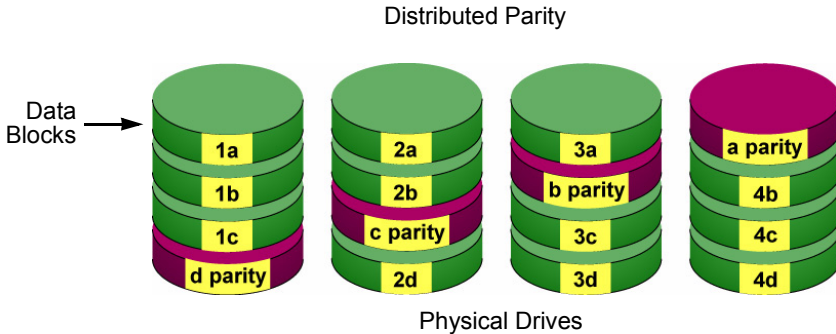
The advantage of RAID 1E is the ability to use an odd number of physical drives, unlike RAID 1 and RAID 10. You can also create a RAID 1E Logical Drive with an even number of physical drives. However, with an even number of drives, you will obtain somewhat greater security with comparable performance using RAID 10.

RAID 1E logical drives consist of three or more physical drives. You can create an array with just two physical drives and specify RAID 1E. But the resulting array will actually be a RAID 1.

RAID 5 – Block and Parity Stripe

RAID 5 organizes block data and parity data across the physical drives. Generally, RAID Level 5 tends to exhibit lower random write performance due to the heavy workload of parity recalculation for each I/O. RAID 5 is generally considered to be the most versatile RAID level. It works well for file, database, application and web servers.

Figure 4. RAID 5 stripes all drives with data and parity information



The capacity of a RAID 5 logical drive equals the smallest physical drive times the number of physical drives, minus one. Hence, a RAID 5 logical drive with four 100 GB physical drives will have a capacity of 300 GB. A RAID 5 logical drive with two 120 GB physical drives and one 100 GB physical drive will have a capacity of 200 GB.

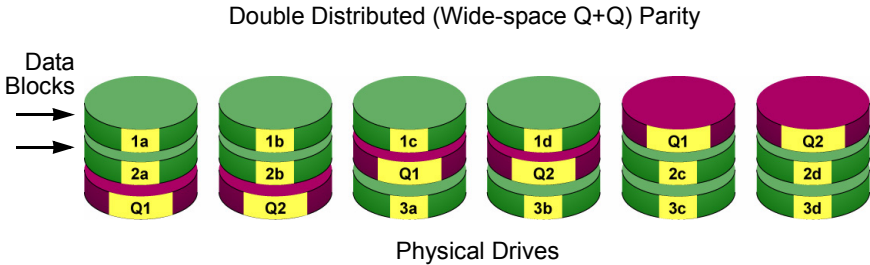
RAID 5 is generally considered to be the most versatile RAID level.

A RAID 5 on VTrak consists of 3 to 16 physical drives.

RAID 6 – Block and Double Parity Stripe

RAID level 6 stores dual parity data is rotated across the physical drives along with the block data. A RAID 6 logical drive can continue to accept I/O requests when any *two* physical drives fail.

Figure 5. RAID 6 stripes all drives with data and dual parity



Hence, a RAID 6 logical drive with (7) 100 GB physical drives will have a capacity of 500 GB. A RAID 6 logical drive with (4) 100 GB physical drives will have a capacity of 200 GB.

RAID 6 becomes more capacity efficient in terms of physical drives as the number of physical drives increases.

RAID 6 provides double fault tolerance. Your logical drive remains available when up to *two* physical drives fail.

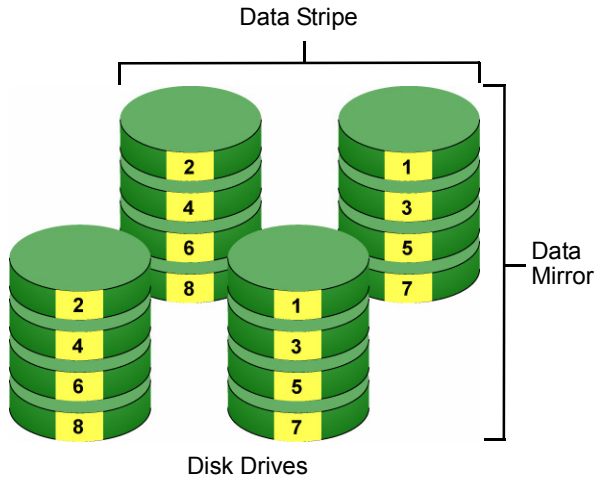
RAID 6 is generally considered to be the safest RAID level.

A RAID 6 on VTrak consists of 4 to 16 physical drives.

RAID 10 – Mirror / Stripe

Mirror/Stripe combines both of the RAID 0 and RAID 1 logical drive types. RAID 10 is similar though not identical to RAID 0+1. It can increase performance by reading and writing data in parallel while protecting data with duplication. The data on one drive pair is mirrored together, then striped over a second drive pair.

Figure 6. RAID 10 takes a data mirror on one drive pair and stripes it over a second drive pair



The data capacity RAID 10 logical drive equals the capacity of the smallest physical drive times the number of physical drives, divided by two.

In some cases, RAID 10 offers double fault tolerance, depending on which physical drives fail.

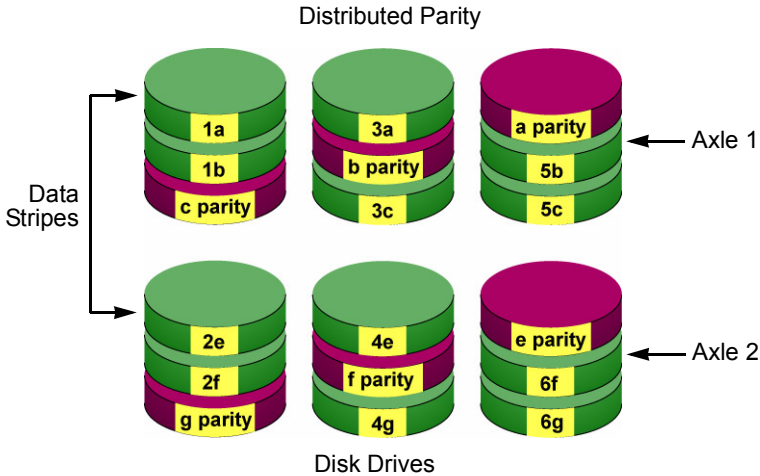
RAID 10 arrays require an even number of physical drives and a minimum of four.

For RAID 10 characteristics with an odd number of physical drives, use RAID 1E.

RAID 50 – Striping of Distributed Parity

RAID 50 combines both RAID 5 and RAID 0 features. Data is striped across physical drives as in RAID 0, and it uses distributed parity as in RAID 5. RAID 50 provides data reliability, good overall performance, and supports larger volume sizes.

Figure 7. RAID 50 is a combination of RAID 5 and RAID 0



The data capacity RAID 50 logical drive equals the capacity of the smallest physical drive times the number of physical drives, minus two.

RAID 50 also provides very high reliability because data is still available even if multiple physical drives fail (one in each axle). The greater the number of axles, the greater the number of physical drives that can fail without the RAID 50 logical drive going offline.

Component	Minimum	Maximum
Number of Axles	2	16
Physical Drives per Axle	3	16
Physical Drives per Logical Drive	6	256

RAID 50 Axles

When you create a RAID 50, you must specify the number of axles. An axle refers to a single RAID 5 logical drive that is striped with other RAID 5 logical drives to make RAID 50. An axle can have from 3 to 16 physical drives, depending on the number of physical drives in the logical drive.

The chart below shows RAID 50 logical drives with 6 to 16 physical drives, the available number of axles, and the resulting distribution of physical drives on each axle.

RAID 50 Logical Drive		
No. of Drives	No. of Axles	Drives per Axle
6	2	3,3
7	2	3,4
8	2	4,4
9	2	4,5
	3	3,3,3
10	2	5,5
	3	3,3,4
11	2	5,6
	3	3,4,4
12	2	6,6
	3	4,4,4
	4	3,3,3,3
13	2	6,7
	3	4,4,5
	4	3,3,3,4
14	2	7,7
	3	4,5,5
	4	3,3,4,4

RAID 50 Logical Drive		
No. of Drives	No. of Axles	Drives per Axle
15	2	7,8
	3	5,5,5
	4	3,4,4,4
	5	3,3,3,3,3
16	2	8,8
	3	5,5,6
	4	4,4,4,4
	5	3,3,3,3,4

RAID 60 – Striping of Double Parity

RAID 60 combines both RAID 6 and RAID 0 features. Data is striped across disks as in RAID 0, and it uses double distributed parity as in RAID 6. RAID 60 provides data reliability, good overall performance and supports larger volume sizes.

Figure 8. RAID 60 is a combination of RAID 6 and RAID 0

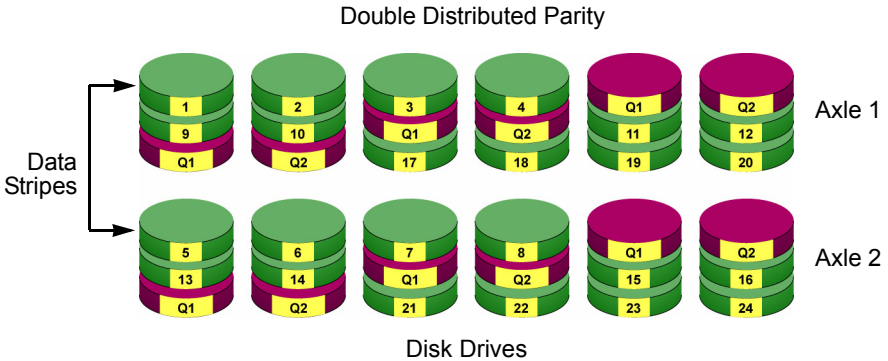


Figure 9. RAID 60 Striping of Double Distributed Parity disk arrays

The total capacity of a RAID 60 logical drive is the smallest physical drive times the number of physical drives, minus four.

RAID 60 also provides very high reliability because data is still available even if multiple physical drives fail (two in each axle). The greater the number of axles, the greater the number of physical drives that can fail without the RAID 60 logical drive going offline.

Component	Minimum	Maximum
Number of Axles	2	16
Physical Drives per Axle	4	16
Physical Drives per Logical Drive	8	256

RAID 60 Axles

When you create a RAID 60, you must specify the number of axles. An axle refers to a single RAID 6 logical drive that is striped with other RAID 6 logical drives to make RAID 60. An axle can have from 4 to 16 physical drives, depending on the number of physical drives in the logical drive.

The chart below shows RAID 60 logical drives with 8 to 20 physical drives, the available number of axles, and the resulting distribution of physical drives on each axle.

RAID 60 Logical Drive		
No. of Drives	No. of Axles	Drives per Axle
8	2	4,4
9	2	4,5
10	2	5,5
11	2	5,6
12	2	6,6
	3	4,4,4
13	2	6,7
	3	4,4,5
14	2	7,7
	3	4,5,5
15	2	7,8
	3	5,5,5
16	2	8,8
	3	5,5,6
	4	4,4,4,4
17	2	8,9
	3	5,6,6
	4	4,4,4,5

RAID 60 Logical Drive		
No. of Drives	No. of Axles	Drives per Axle
18	2	9,9
	3	6,6,6
	4	4,4,5,5
19	2	9,10
	3	6,6,7
	4	4,5,5,5
20	2	10,10
	3	6,7,7
	4	5,5,5,5
	5	4,4,4,4,4

Choosing a RAID Level

There are several issues to consider when choosing the RAID Level for your VTrak disk array. The following discussion summarizes some advantages, disadvantages, and applications for each choice.

RAID 0

Advantages	Disadvantages
Implements a striped disk array, the data is broken down into blocks and each block is written to a separate disk drive I/O performance is greatly improved by spreading the I/O load across many channels and drives No parity calculation overhead is involved	Not a true RAID because it is not fault-tolerant The failure of just one drive will result in all data in an disk array being lost Should not be used in mission critical environments

Recommended Applications for RAID 0

- Image Editing
- Pre-Press Applications
- Any application requiring high bandwidth

RAID 1

Advantages	Disadvantages
Simplest RAID storage subsystem design Can increase read performance by processing data requests in parallel since the same data resides on two different drives	Very high disk overhead - uses only 50% of total capacity

Recommended Applications for RAID 1

- Accounting
- Payroll
- Financial
- Any application requiring very high availability

RAID 1E

Advantages	Disadvantages
Implemented as a mirrored disk array whose segments are RAID 0 disk arrays High I/O rates are achieved thanks to multiple stripe segments Can use an odd number of disks	Very high disk overhead - uses only 50% of total capacity

Recommended Applications for RAID 1E

- Imaging applications
- Database servers
- General fileserver

RAID 5

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate	Disk failure has a medium impact on throughput

Recommended Applications for RAID 5

- File and Application servers
- WWW, E-mail, and News servers
- Intranet servers
- Most versatile RAID level

RAID 6

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate Safest RAID level, except for RAID 60	High disk overhead – equivalent of two drives used for parity Slightly lower performance than RAID 5

Recommended Applications for RAID 6

- Accounting and Financial
- Database servers
- Any application requiring very high availability

RAID 10

Advantages	Disadvantages
Implemented as a mirrored disk array whose segments are RAID 0 disk arrays High I/O rates are achieved thanks to multiple stripe segments	Very high disk overhead - uses only 50% of total capacity

Recommended Applications for RAID 10

- Imaging applications
- Database servers
- General fileserver

RAID 50

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate High reliability Supports large volume sizes	Higher disk overhead than RAID 5

Recommended Applications for RAID 50

- File and Application servers
- Transaction processing
- Office application with many users accessing small files

RAID 60

Advantages	Disadvantages
High Read data transaction rate Medium Write data transaction rate Good aggregate transfer rate Safest RAID level	High disk overhead – equivalent of two drives used for parity Slightly lower performance than RAID 50

Recommended Applications for RAID 60:

- Accounting and Financial
- Database servers
- Any application requiring very high availability

Choosing Stripe Size

Stripe Size, also called “Stripe Block Size”, refers to the size of the data blocks written to, and read from, the physical drives. Stripe Size is specified when you create a disk array. In order to change the Stripe Size of an existing disk array, you must delete the disk array and create a new one. You can choose Stripe Size directly when you use the Advanced function to create a disk array. If you use the Express function to create a disk array, WebPAM PRO selects the Stripe Size when you choose an Application Type.

The available Stripe Sizes are 64, 128, 256 KB, 512 KB, and 1 MB. 64 KB is the default. There are two issues to consider when selecting the Stripe Size.

First, you should choose a Stripe Size equal to, or smaller than, the smallest cache buffer found on any physical drive in the disk array. Selecting a larger value slows read/write performance because physical drives with smaller cache buffers need more time for multiple accesses to fill their buffers.

Second, if your data retrieval consists of fixed data blocks, such as with some database or video applications, then you should choose that size as your Stripe Size.

If you do not know the cache buffer or fixed data block sizes, Promise suggests you choose 64 KB as your Stripe Size. Generally speaking, email, POS, and web servers prefer smaller stripe sizes. Video and database applications prefer larger stripe sizes.

Choosing Sector Size

A sector is the smallest addressable area on a physical disk drive. Sector Size refers to the size of sector measured by the number of bytes of data it can hold. The most common sector size is 512 bytes (512 B). A smaller sector size results in a more efficient use of a disk drive’s capacity. 512 B is the default sector size for logical drives on VTrak.

The number of usable sectors is limited by the addressing method of the computer’s operating system:

- Windows 2000 and Windows XP (32-bit) support 10-bit logical bit addressing (LBA), so with 512 B sectors, they can only support up to 2 terabytes (TB) of data storage capacity. To increase the capacity, you must use larger sectors. See “2 TB Limitation” on page 254.
- Windows XP (64-bit), Windows 2003 Server, and Windows Vista support 64-bit LBA, so they are not affected by this limitation. For these OSes, always choose the default 512 B sector size.
- Linux operating systems with the 2.4 kernel do not support variable sector sizes. For these OSes, always choose the default 512 B sector size.

- Linux operating systems with the 2.6 kernel support 64-bit LBA. For these OSes, always choose the default 512 B sector size.

2 TB Limitation

If your Host PC runs Windows 2000 or Windows XP (32-bit), and you want to create logical drives larger than 2TB, you must choose a sector size larger than 512 B when you create the logical drive. The table below correlates sector size with logical drive capacity.

Logical Drive Size	Sector Size
8 to 16 TB	4096 bytes (4 KB)
4 to 8 TB	2048 bytes (2 KB)
2 to 4 TB	1024 bytes (1 KB)
0 to 2 TB	512 bytes (512 B)

Because logical drives can be expanded, you may encounter a situation where the usable capacity of your expanded logical drive is reduced by the addressing issue described above. There are two alternatives:

- Limit your logical drive expansion to within the limits described in the chart.
- Back up your data, then delete your existing logical drive and create a new one with a larger sector size.

Cache Policy

As it is used with VTrak, the term cache refers to any of several kinds of high-speed, volatile memory that hold data moving from your computer to the physical drives or vice-versa. Cache is important because it can read and write data much faster than a physical drive. There are read caches, which hold data as it is read from a physical drive; and write caches, which hold data as it is written to a physical drive.

In order to tune the cache for best performance in different applications, user-adjustable settings are provided. Cache settings are made in conjunction with logical drives:

- When you create a logical drive. See “Creating a Logical Drive” on page 130 or page 176
- On an existing logical drive. See “Making Logical Drive Settings” on page 139 or “Setting Write Cache Policy” on page 181

Read Cache Policy

- **Read Cache** – The read cache is enabled.
- **Read Ahead** – The read cache and the read-ahead feature are enabled. Read-ahead anticipates the next read and performs it before the request is made. Can increase read performance.
- **No Cache** – The read cache is disabled.

Write Cache Policy

- **Write Back** – Data is written first to the cache, then to the logical drive. Better performance. VTrak has a cache backup battery to protect data in the cache from a sudden power failure.
- **Write Thru** – Also “Write Through”. Data is written to the cache and the logical drive at the same time. Safer.

If your write cache policy is set to *Write Back*, the write policy automatically changes to *Write Thru* when all of the following conditions occur:

- The logical drive write policy is set to Write Back
- The Adaptive Writeback Cache feature is enabled
- The cache backup battery goes offline

When the battery comes back online, the write policy automatically changes back to Write Back.

Also see “Cache Mirroring” on page 256.

Adaptive Writeback Cache

On the VTrak subsystem, you can set the logical drive write cache policy to *Write Thru* or *Write Back*.

If you set the write cache policy to *Write Back*, your data is first written to the controller cache, and later to the logical drive. This action improves performance. To preserve the data in the cache in the event of a power failure, the subsystem has a backup battery that powers the cache. To see an estimate of how long the battery will power the cache, see “Checking the Batteries” on page 116 or page 162.

The Adaptive Writeback Cache feature protects your data by changing the write cache settings while the cache backup battery is offline. When all of the following conditions occur:

- The logical drive write policy is set to Write Back
- The Adaptive Writeback Cache feature is enabled
- The cache backup battery goes offline

The write policy automatically changes to *Write Thru*. When the battery comes back online, the write policy automatically changes back to *Write Back*.

To enable the Adaptive Writeback Cache option, see “Making Controller Settings” on page 110 or page 158.

Also see “Replacing a Cache Battery” on page 229.

Cache Mirroring

VTrak subsystems with two controllers include a Cache Mirroring feature. Cache Mirroring causes the local controller to mirror write data to the remote controller. That means, when there is write data in the cache of the controller managing the target logical drive, the same write data is copied to the cache of the other controller as well. This arrangement protects the data from loss, in the event that the local controller fails before the data is written to the logical drive.

Cache Mirroring works whether the write cache policy of your logical drives is set to *Write Back* or *Write Through*. However, you only realize the advantage of Cache Mirroring when the write cache policy is set to *Write Back*.

With Cache Mirroring **enabled**, any write data in the controller cache that has not been written to the logical drive, will be written to the logical drive, even if the controller fails. Enable Cache Mirroring when you require failover/failback protection.

With Cache Mirroring **disabled**, any write data in the controller cache that has not been written to the logical drive, will be lost if the controller fails. On the other hand, write performance increases because of greater bandwidth. Disable Cache Mirroring when you require maximum performance.

To use Cache Mirroring you must:

- Have two controllers in the subsystem
- Set Redundancy Type to Active-Active.
See “Setting Redundancy for the Subsystem” on page 62 or page 154
- Enable Cache Mirroring under subsystem settings.
See “Setting Redundancy for the Subsystem” on page 62 or page 154

On subsystems with two controllers, when Cache Mirroring is disabled, LUN Affinity is enabled automatically. See “LUN Affinity” on page 257

Failover and Failback

When one controller fails, the surviving controller takes over logical drive access until the failed controller is brought back online or is replaced. For example, Cache Mirroring is enabled and your logical drives are assigned to Controller 1.

The following actions will happen:

- If Controller 1 goes offline, Controller 2 takes over access to the logical drives assigned to Controller 1.
- All write data that is still in the controller cache will be written to the logical drives, even though the controller managing them has failed.
- If Controller 1 comes back online, Controller 1 takes back access to the logical drives assigned to it.
- If Controller 1 is replaced, the new controller takes over access to the logical drives assigned to Controller 1.

LUN Affinity

VTrak subsystems with two controllers include a LUN Affinity feature. Normally, either controller can access all logical drives. LUN Affinity enables you to specify which controller can access each logical drive. Use this feature to balance the load of your logical drives between the two controllers.

To use LUN Affinity you must:

- Have two controllers in the subsystem
- Enable LUN Affinity under controller settings. See page 110 or page 158

On subsystems with two controllers, when Cache Mirroring is disabled, LUN Affinity is enabled automatically. See “Cache Mirroring” on page 256.

Disk Array Creation

When you create a logical drive using the Advanced method of disk array creation, you can specify the Preferred Controller ID:

- Controller 1 – Assign all logical drives to Controller 1
- Controller 2 – Assign all logical drives to Controller 2
- Automatic – Alternate logical drive assignments between Controllers 1 and 2

Automatic is the default and preferred setting because it will balance the logical drive assignments for you.

When you create a logical drive using the Automatic or Express disk array creation, the logical drives are assigned alternatively between Controllers 1 and 2 automatically.

See “Creating a Disk Array – Automatic” on page 125,
“Creating a Disk Array – Express” on page 125, and
“Creating a Disk Array – Advanced” on page 127

Logical Drive Settings

After you have created a logical drive, you can click the Settings tab and manually change the Preferred Controller ID between Controller 1 and Controller 2. See “Making Logical Drive Settings” on page 139.

If you create logical drives with LUN Affinity disabled, the Preferred Controller ID will show N/A, and your logical drives will be visible to both controllers.

If you create logical drives with LUN Affinity disabled, and later you enable LUN Affinity, all of your logical drives will be assigned to Controller 1. To balance the load, you can reassign some of your logical drives to Controller 2 under the Preferred Controller ID in the Settings tab. See “Making Logical Drive Settings” on page 139.

When you delete a logical drive, the remaining logical drives keep the same Controller assignments. If you want to rebalance controller assignments of the remaining logical drives, change their Preferred Controller IDs in the Settings tab.

Failover and Failback

When one controller fails, the surviving controller takes over logical drive access until the failed controller is brought back online or is replaced. For example, LUN Affinity is enabled and your logical drives are assigned to Controller 1. The following actions will happen:

- If Controller 1 goes offline, Controller 2 takes over access to the logical drives assigned to Controller 1.
- If Controller 1 comes back online, Controller 1 takes back access to the logical drives assigned to it.
- If Controller 1 is replaced, the new controller takes over access to the logical drives assigned to Controller 1.
- All logical drives assigned to Controller 2 remain accessible by Controller 2. Controller 1 cannot access them at any time.

Capacity Coercion

This feature is designed for fault-tolerant logical drives (RAID 1, 1E, 5, 10, 50, and 60). It is generally recommended to use physical drives of the same size in your disk arrays. When this is not possible, physical drives of different sizes will work but the system must adjust for the size differences by reducing or coercing the capacity of the larger drives to match the smaller ones. With VTrak, you can choose to enable Capacity Coercion and any one of four methods.

Enable Capacity Coercion and choose the Method in the Controller Settings menu. See page 110. The choices are:

- GB Truncate – (Default) Reduces the useful capacity to the nearest 1,000,000,000 byte boundary.
- 10GB Truncate – Reduces the useful capacity to the nearest 10,000,000,000 byte boundary.
- Group Rounding – Uses an algorithm to determine how much to truncate. Results in the maximum amount of usable drive capacity.
- Table Rounding – Applies a predefined table to determine how much to truncate.

Capacity Coercion also affects a replacement drive used in a disk array. Normally, when a physical drive fails, the replacement drive must be the same capacity or larger. However, the Capacity Coercion feature permits the installation of a replacement drive that is slightly smaller (within 1 gigabyte) than the remaining working drive. For example, the remaining working drives can be 80.5 GB and the replacement drive can be 80.3, since all are rounded down to 80 GB. This permits the smaller drive to be used.

Without Capacity Coercion, the controller will not permit the use of a replacement physical drive that is slightly smaller than the remaining working drive(s).

Initialization

Initialization is done to logical drives after they are created from a disk array. Initialization sets all data bits in the logical drive to zero. The action is useful because there may be residual data on the logical drives left behind from earlier configurations. For this reason, Initialization is recommended for all new logical drives. See “Initializing a Logical Drive” on page 140.



Caution

When you initialize a logical drive, all the data on the logical drive will be lost. Backup any important data before you initialize a logical drive.

Hot Spare Drive(s)

A hot spare is a disk drive that is connected to the disk array system but is not assigned as a member of the disk array. In the event of the failure of a drive within a functioning fault tolerant disk array, the hot spare is activated as a member of the disk array to replace a drive that has failed.

VTrak will replace a failing disk drive in a disk array with an unassigned drive, if one is available. The unassigned drive is not part of any disk array. Such a drive is called a *hot spare* drive. There are two types:

- **Global** – An unassigned disk drive available to any disk array on the VTrak.

- **Dedicated** – An unassigned disk drive that can only be used by a specified disk array.

The hot spare policy function lets you choose whether a disk array will access any unassigned disk drive or a designated drive in the event of disk drive failure. See “Managing Spare Drives” on page 144 (WebPAM PROe) or page 178 (CLU) for information on how to make this setting.

The spare drive effectively takes the place of the failed drive and the RAID system immediately begins to rebuild data onto the drive. When the rebuild is complete, the disk array is returned to fault tolerant status.

VTrak includes a function that enables you to return a hot spare drive from a disk array back to spare status. When you create the hot spare drive, check the Revertible box to enable this feature. See “Transition” on page 269.

See also “Critical & Offline Disk Arrays” on page 301.

Partition and Format the Logical Drive

Like any other type of fixed disk media in your system, a RAID logical drive must also be partitioned and formatted before use. Use the same method of partitioning and formatting on an logical drive as you would any other fixed disk.

Depending on the operating system you use, there may or may not be various capacity limitations applicable for the different types of partitions.

RAID Level Migration

To *migrate* a disk array is to do one or both:

- Change its RAID level
- Increase the number of disk drives (sometimes called Expansion)

On VTrak, RAID level migration is performed on the disk array but it applies to the logical drives. Migration takes place on an existing Functional disk array without disturbing the existing data. While the disk array is migrating, you can access the data as before. When migration is complete, your disk array will have a different RAID level and/or a larger capacity.

In most cases, you must add one or more physical drives during the migration process. You can never reduce the number of physical drives.

The tables below shows the migration options for a source logical drive according to its RAID level. The available target RAID levels are shown with their requirements.

See “Migrating a Disk Array” on page 132 or page 174.

RAID 0

A RAID 0 source logical drive can migrate to the following target logical drives:

Target	Requirements
RAID 0	Add physical drives.
RAID 1	2 physical drives only. Only a single-drive RAID 0 can migrate to RAID 1 by adding 1 physical drive.
RAID 1E	3 or more physical drives. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 5	3 physical drives minimum, 16 maximum. RAID 0 must have less than 16 physical drives. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 6	4 physical drives minimum, 16 maximum. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 10	4 physical drives minimum. Even number of physical drives. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 60	8 physical drives minimum, 16 per axle maximum. If existing physical drives have no unused space, add 1 or more physical drives.

RAID 1

A RAID 1 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	3 or more physical drives. Add 1 or more physical drives.
RAID 5	3 physical drives minimum, 16 maximum. RAID 1 must have less than 16 physical drives. Add 1 or more physical drives.
RAID 10	4 physical drives minimum. Even number of physical drives. Add 2 or more physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum. Add 4 or more physical drives.

RAID 1E

A RAID 1E Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	Add physical drives.
RAID 5	3 physical drives minimum, 16 maximum. RAID 1E must have less than 16 physical drives. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 10	4 physical drives minimum. Even number of physical drives. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.

RAID 5

A RAID 5 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	None.
RAID 5	Add physical drives. 16 maximum.
RAID 6	4 physical drives minimum, 16 maximum. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 10	4 physical drives minimum. Even number of physical drives. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 60	8 physical drives minimum, 16 per axle maximum. If existing physical drives have no unused space, add 1 or more physical drives.

RAID 6

A RAID 6 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 6	Add physical drives. 16 maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum. If existing physical drives have no unused space, add 1 or more physical drives.

RAID 10

A RAID 10 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	None.
RAID 5	3 physical drives minimum, 16 maximum. RAID 10 must have less than 16 physical drives.
RAID 6	4 physical drives minimum, 16 maximum. RAID 10 must have less than 16 physical drives. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 10	Add physical drives. Even number of physical drives.
RAID 50	6 physical drives minimum, 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum. If existing physical drives have no unused space, add 1 or more physical drives.

RAID 50

A RAID 50 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 0	None.
RAID 1E	None.
RAID 5	16 physical drives maximum. RAID 50 must have less than 16 physical drives.
RAID 6	16 physical drives maximum. RAID 50 must have less than 16 physical drives. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 10	Even number of physical drives.
RAID 50	Add physical drives. 16 per axle maximum.
RAID 60	8 physical drives minimum, 16 per axle maximum. If existing physical drives have no unused space, add 1 or more physical drives.

RAID 60

A RAID 60 Source logical drive can migrate to the following Target logical drives:

Target	Requirements
RAID 6	16 physical drives maximum. RAID 60 must have less than 16 physical drives. If existing physical drives have no unused space, add 1 or more physical drives.
RAID 60	Add physical drives. 16 per axle maximum.



Important

- The Target disk array may require more physical drives than the Source disk array
 - If the Target disk array requires an EVEN number of physical drives but the Source disk array has an ODD number, ADD a physical drive as part of the migration process
 - You cannot reduce the number of physical drives in your disk array, even if the Target disk array requires fewer physical drives than the Source disk array
 - RAID 1 (mirroring) works with two drives only. Only a single-drive RAID 0 disk array can migrate to RAID 1. Other RAID Levels use too many drives to migrate
 - You cannot migrate a disk array when it is Critical or performing activities such as Synchronizing, Rebuilding, and PDM
 - For RAID 6 or RAID 60, you can only migrate between these two RAID levels. Destination RAID 60 axes can have up to 16 physical drives. Other limitations might apply
-

Ranges of Disk Array Expansion

The Windows 2000 and Windows XP (32-bit) operating systems support a 10-byte LBA format. As a result, these OSes can only recognize 4 billion addresses. If you create a logical drive using the default 512 B sector size, the logical drive will be limited to 2 TB of data, even if there is more space available on your disk drives.

This limitation does not apply to Windows XP (64-bit), 2003 Server, Vista, and Linux OSes with the 2.6 kernel. Linux OSes with the 2.4 kernel do not support variable sector sizes, therefore you cannot apply the solution described here to those OSes.

Note that once you create your logical drive, you cannot change the size of the sectors. Nor can you increase the number of address blocks that the OS recognizes.

You can direct WebPAM PROe to expand a logical drive beyond the maximum expansion size. When the expansion is finished:

- WebPAM PROe will show the logical drive in the desired size.
- Your operating system might show the logical drive at the maximum size listed in the table below.
- Additional capacity might appear as unpartitioned and unformatted.

Current LD Size	Maximum LD Expansion Size	Sector Size
8 to 16 TB	16 TB	4096 bytes
4 to 8 TB	8 TB	2048 bytes
2 to 4 TB	4 TB	1024 bytes
up to 2 TB	2 TB	512 bytes

At this point, you have the choice of:

- Format the unpartitioned/unformatted capacity as a *second* logical drive
- Delete the existing disk array and create a new one in the desired size

Delete and Recreate

If you require a logical drive larger than the maximum expansion size:

1. Backup the data from the current logical drive.
2. Delete the current logical drive.
See page 132 (WebPAM PROe) or page 177 (CLU).
3. Create a new logical drive with the desired capacity.
See page 130 (WebPAM PROe) or page 176 (CLU).
4. Restore the data to the new logical drive.

Media Patrol

Media Patrol is a routine maintenance procedure that checks the magnetic media on each disk drive. Media Patrol checks all physical drives assigned to disk arrays. Media Patrol does not check unconfigured drives.

Media Patrol will also check spare drives, if those drives have Media Patrol enabled. Media Patrol for spare drives is enabled by default. You can disable it in VTrak's Command Line Interface (CLI).

Unlike Synchronization and Redundancy Check, Media Patrol is concerned with the condition of the media itself, not the data recorded on the media. If Media Patrol encounters a critical error, it triggers PDM if PDM is enabled.

You can run Media Patrol from the subsystem. See "Running Media Patrol" on page 68 (WebPAM PROe) or page 155 (CLU).

You can also run Media Patrol on a disk array. See "Running Media Patrol on a Disk Array" on page 134 (WebPAM PROe) or page 173 (CLU).

Predictive Data Migration (PDM)

Predictive Data Migration (PDM) is the migration of data from the suspect disk drive to a spare disk drive, similar to Rebuilding a Logical Drive. But unlike Rebuilding, PDM constantly monitors your disk drives and automatically copies your data to a spare disk drive *before* the disk drive fails and your Logical Drive goes Critical. See “Running PDM” on page 68 for WebPAM PROe or page 175 for the CLU.

After the data is copied from the suspect disk drive, the controller marks it with a Stale configuration and a PFA error.

You can clear the Stale configuration and PFA error and put the disk drive back into service. See “Clearing Stale and PFA Conditions” on page 122 for WebPAM PROe or page 165 for the CLU. In some cases, however, you might remove the disk drive for repair or replacement.

PDM Triggers

The following actions trigger PDM:

- A disk drive with unhealthy status (see below)
- Media Patrol finds a disk critical error*
- You initiate PDM manually

*PDM also counts the number of media errors reported by Media Patrol.

A disk drive becomes unhealthy when:

- A SMART error is reported
- The bad sector remapping table fills to the specified level

Because data would be lost if written to a bad sector, when a bad sector is detected, the disk drive creates a map around it. These maps are saved in the bad sector remapping table, which has a capacity of 512 reassigned blocks and 1024 error blocks.

When the table fills to a specified percentage of its capacity, PDM triggers a migration of data from the suspect drive (the disk drive with the bad sectors) to a spare disk drive.

During data migration, you will have access to the Logical Drive but it will respond more slowly to read/write tasks because of the additional operation. The time required for data migration depends on the size of the disk drive.

See “Making Background Activity Settings” on page 66 (WebPAM PROe) or page 192 (CLU).

Transition

The Transition feature enables you to specify “permanent” spare drives for your VTrak subsystem. Transition is the process of replacing a revertible spare drive that is currently part of a disk array with an unconfigured physical drive or a non-revertible spare. The revertible spare drive returns to its original status.

Transition happens *automatically* when the following sequence of events takes place:

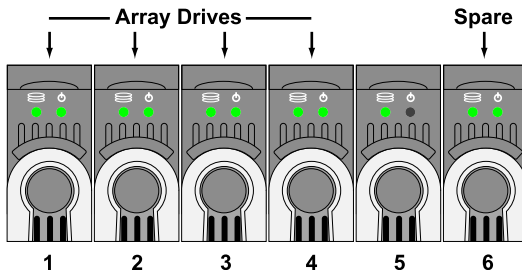
- You create a revertible spare drive.
See page 145 (WebPAM PROe) or page 178 (CLU).
- A physical drive assigned to your disk array fails and the array goes critical or degraded.
- VTrak automatically rebuilds your array to the revertible spare drive and the array becomes functional again.
- You replace the failed physical drive with a new physical drive of equal or greater capacity.
- VTrak automatically transitions (moves) the data from the revertible spare to the new physical drive.
- The new physical drive becomes part of the array and the revertible spare drive returns to its original spare status.

Transition happens *manually* when you specify a different unconfigured physical drive to transition (move) the data from the revertible spare drive.

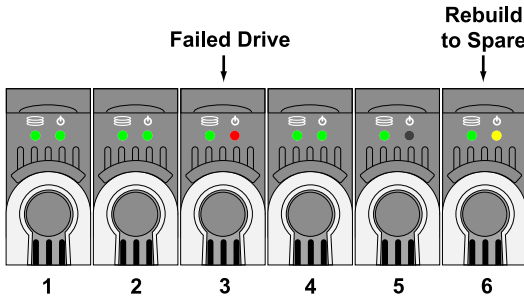
See the example below.

Example

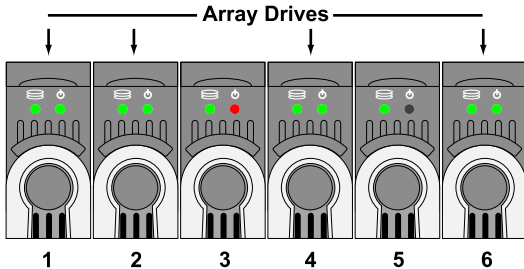
Following is an example to explain the Transition function.



In the example above, there is a four-drive RAID 5 disk array and a global spare drive. Physical drives 1, 2, 3, and 4 belong to the disk array. Physical drive 5 remains unconfigured. Physical drive 6 is a revertible spare drive.



If a physical drive fails in a disk array and there is a spare drive of adequate capacity available, the controller automatically rebuilds the array using the spare drive. In this example, physical drive 3 failed and the array is rebuilt using physical drive 6, the revertible spare drive.

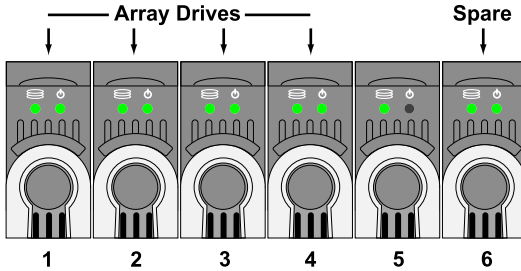


When the rebuild is complete, the spare drive has replaced the failed drive. In this example, failed drive 3 was replaced by spare drive 6. The disk array now consists of physical drives 1, 2, 4, and 6.

There is no spare drive at this moment. Even if physical drive 5 is of adequate capacity, it has not been designated as a spare, therefore the controller cannot use it as a spare.

Automatic Transition

At this juncture, you would replace the failed drive in slot 3 with a new one of the same or greater capacity.



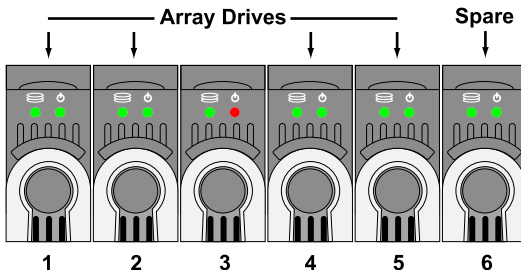
When the VTrak controller detects the new drive in slot 3, it will:

- Automatically transition the data on drive 6 to drive 3
- Return drive 6 to spare status

When the Automatic Transition is finished, physical drives 1, 2, 3, and 4 belong to the disk array and physical drive 6 is a revertible spare drive. The original configuration is restored.

Manual Transition

If you wanted to use the drive in slot 5 as a member of the disk array, rather than the drive in slot 3, you would run the Transition function manually. See page 135 (WebPAM PROe) or page 175 (CLU).



When the Manual Transition is finished, physical drives 1, 2, 4, and 5 belong to the disk array and physical drive 6 is a revertible spare drive.

At this point, you would replace the drive in slot 3. The new drive in slot 3 will be unconfigured until you assign it to a disk array or as a spare.

Chapter 8: Troubleshooting

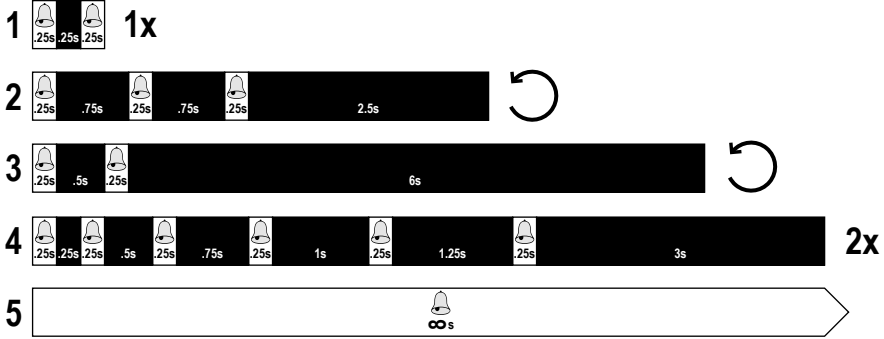
This chapter covers the following topics:

- VTrak is Beeping (page 274)
 - LEDs Display Amber or Red (page 275)
 - CLU Reports a Problem (page 281)
 - WebPAM PROe Reports a Problem (page 283)
 - LEDs Display Amber or Red (page 275)
 - Event Notification Response (page 286)
 - Critical & Offline Disk Arrays (page 301)
 - Incomplete Array (page 304)
 - Physical Drive Problems (page 305)
 - Enclosure Problems (page 307)
 - Controller Enters Maintenance Mode (page 310)
 - Connection Problems (page 313)
 - Browser Does Not Connect to WebPAM PROe (page 315)
 - Unsaved Data in the Controller Cache (page 316)
-

VTrak is Beeping

VTrak's alarm has five different patterns, as shown below.

Figure 1. Audible alarm sound patterns



When you first power-up the VTrak, it beeps twice to show normal operation.

The audible alarm sounds at other times to inform you that the VTrak needs attention. But the alarm does not specify the condition. When the alarm sounds:

- Check the front and back of VTrak for red or amber LEDs, as described above.
- If email notification is enabled, check for new messages.
- Check for yellow !s 🟡 or red Xs 🔴 in Tree View (see page 283).
- Check the event log. See page 63 (WebPAM PROe) or page 194 (CLU).

When a continuous tone sounds, there are multiple alarm patterns sounding at the same time.

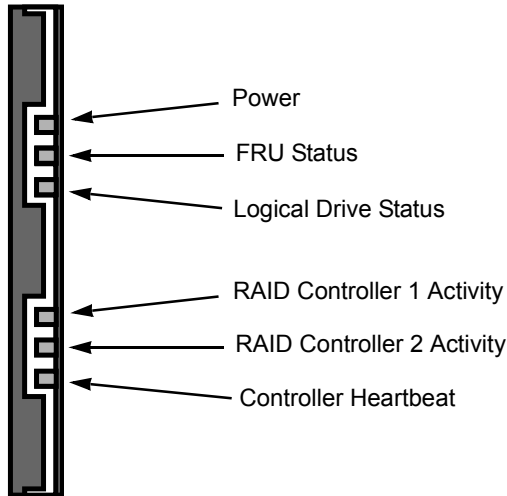
To make alarm settings or cancel an alarm, see page 117 (WebPAM PROe) or page 216 (CLU).

LEDs Display Amber or Red

Front Panel

When the power is switched on, the LEDs on the front of the VTrak will light up.

Figure 2. VTrak front panel LED display. The E310f/s is shown. the E610f/s is similar



When boot-up is finished and the VTrak is functioning normally:

- Controller Heartbeat LED blinks once every two seconds.
- Power, FRU and Logical Drive LEDs display green continuously.
- The RAID Controller LEDs flash green if there is activity on that controller.

See the table below.

LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power	System Off	Normal			
FRU*	System Off	Normal		Fan, battery or PSU Problem	Fan, battery or PSU Failed
Logical Drive	System Off	Normal		Logical Drive Critical	Logical Drive Offline
Controller Activity	No Activity		Activity		
Controller Heartbeat	System Off		Normal**		

* Field Replacement Unit: includes fan, battery, and power supply unit (PSU).
 ** Blinks once every two seconds.

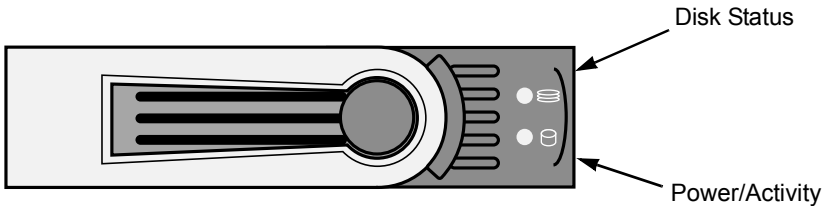
See page 217 for more information about field-replaceable components.
 See page 301 for a discussion of critical and offline logical drives.

Drive Status Indicators

There are two LEDs on each Drive Carrier. They report the presence of power and a disk drive, and the current condition of the drive.

The VTrak spins up the disk drives sequentially in order to equalize power draw during start-up. After a few moments the Power/Activity and Disk Status LEDs should display green.

Figure 3. VTrak drive carrier LEDs



LEDs	State				
	Dark	Steady Green	Flashing Green	Amber	Red
Power/Activity	No Drive	Drive Present	Activity		
Status	No Power/ No Drive	Drive OK		Drive Rebuilding	Drive Error

See “Critical & Offline Disk Arrays” on page 301 for a discussion of rebuilding and failed disk drives.

Back of Enclosure

When the FRU Status LED on VTrak’s front panel shows Amber or Red, check the LEDs on the back of VTrak. These LEDs give the status of the field replaceable units.

Figure 1. VTrak E610f rear view

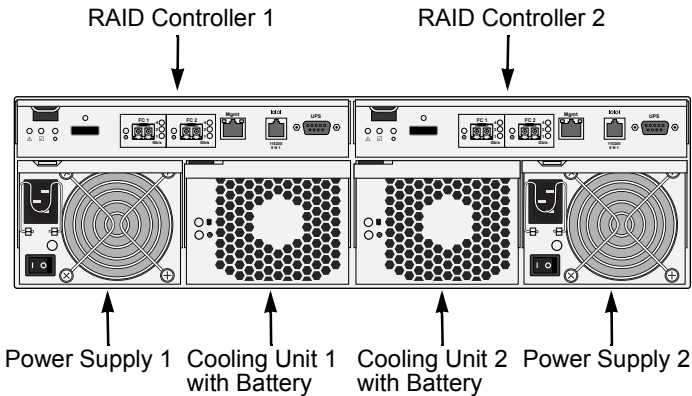


Figure 2. VTrak E610s rear view

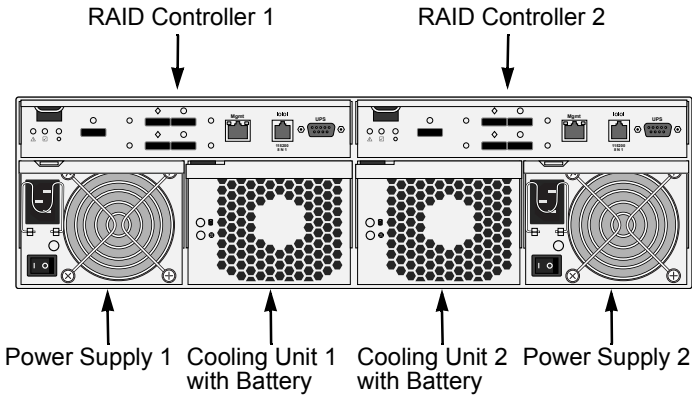


Figure 4. VTrak E310f rear view

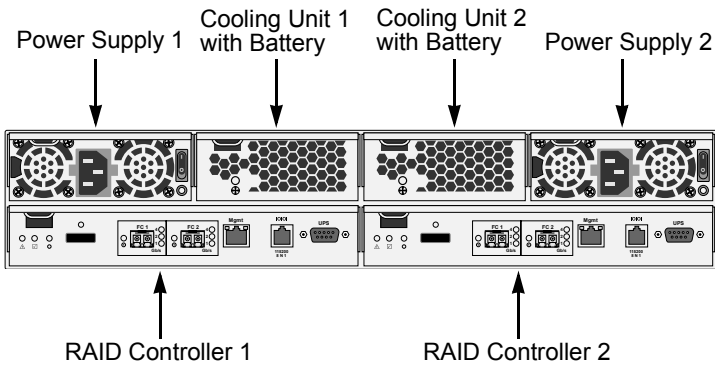


Figure 5. VTrak E310s rear view

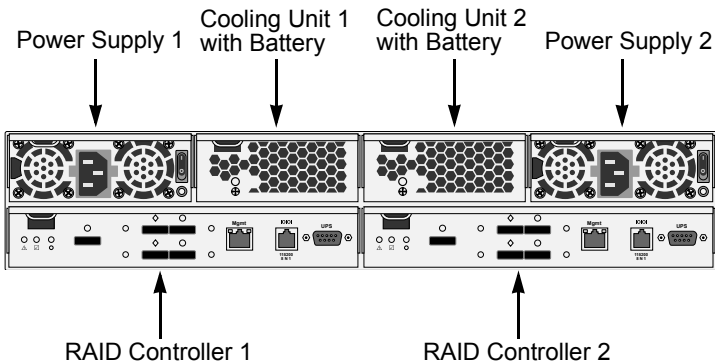
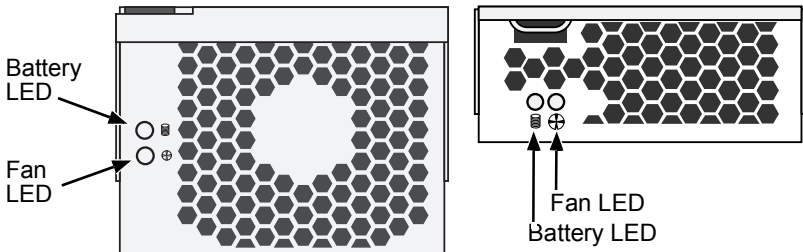


Figure 6. Battery and Fan LEDs (left: E610f/s, right: E310f/s)

Under normal conditions, the power supply and fan LEDs should display green.

LEDs	State			
	Dark	Green	Amber	Red
Power supply	Not detected	OK	Fan failed	Failed
Battery	Not detected	OK		
Fan	Not detected	OK	Wrong speed	Failed

To check a component's installation, follow the same procedure as replacing the component, except that you reinstall the original component rather than a new one. In most cases, this action fixes a bad connection and allows VTrak to detect the component. If this action does not correct the problem, replace the unit. See page 217 for instructions.

The Controller Location LEDs, on the back of the VTrak subsystem, will flash for one minute.

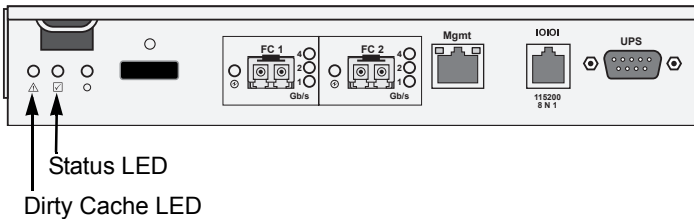
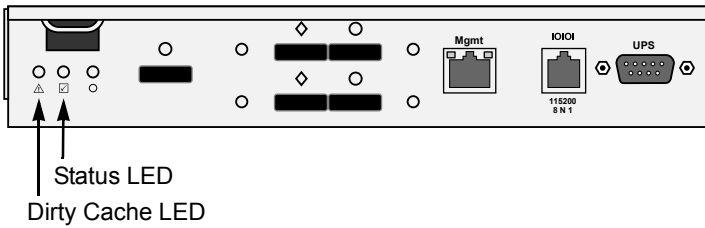
Figure 7. The VTrak E610f/E310f controller LEDs

Figure 8. The VTrak E610f/E310s controller LEDs



Under normal conditions, the Controller Status LED (marked with icon) is green and the Dirty Cache LED (marked with icon) is dark. See the table below.

LEDs	State			
	Dark	Green	Amber	Flashing Amber
Status	no power	OK	Error	
Dirty Cache	OK		Unsaved data in cache	OK

If the Controller Status LED is amber, restart the VTrak. See “Restarting the Subsystem” on page 107 or page 215.

If the Controller Status LED continues to display amber after startup, contact Promise Technical Support. See “Contacting Technical Support” on page 319.

The Dirty Cache LED flashes during input/output operation. If the LED shines amber and the power is off, there is unsaved data in the cache. Do NOT power down the VTrak while this LED is on. See “Browser Does Not Connect to WebPAM PROe” on page 315 for more information.

CLU Reports a Problem

The CLU reports information passively—you must determine which functions to check based on the sound of the VTrak's audible alarm (see page 274) and any amber or red LEDs (see page 275).

Check the event logs first. Then check the reported component.

Viewing Runtime Events

To display Runtime Events:

1. From the Main Menu, highlight *Event Viewer* and press Enter.

The log of Runtime Events appears. Events are added to the top of the list. Each item includes:

- Sequence number – Begins with 0 at system startup.
- Device – Disk Array, Logical Drive, Physical Drive by its ID number.
- Severity – (lowest to highest) Information, Warning, Minor, Major, Critical and Fatal
- Timestamp – Date and time the event happened.
- Description – A description of the event in plain language.

Press the up and down arrow keys to scroll through the log.

Viewing NVRAM Events

This screen displays a list of and information about 63 most important events over multiple subsystem startups.

To display NVRAM events:

1. From the Main Menu, highlight *Event Viewer* and press Enter.
2. Highlight *NVRAM Events* and press Enter.

The log of NVRAM Events appears. Events are added to the top of the list. Each item includes:

- Sequence number – Begins with 0 at system startup.
 - Device – Disk Array, Logical Drive, Physical Drive by its ID number.
 - Severity – (lowest to highest) Information, Warning, Minor, Major, Critical and Fatal
 - Timestamp – Date and time the event happened.
 - Description – A description of the event in plain language.
3. Press the up and down arrow keys to scroll through the log.

Checking a Reported Component

In this example, let us check disk array status.

1. Open the CLU.
2. Highlight *Disk Array Management* and press Enter.
3. Observe the status of your disk arrays.

DaId	Alias	OpStatus	CfgCapacity	FreeCapacity	MaxContiguousCap
0	DA0	OK	75.44GB	66.06GB	66.06GB
1	DA1	Degraded	189.06GB	179.68GB	179.68GB
2	DA2	OK	73.57GB	64.20GB	64.20GB

At this point, you can highlight the Degraded array and press Enter to see more information. See below.

```

Disk Array ID      : 1          Physical Capacity   : 189.06GB
OperationalStatus : Degraded   MaxContiguousCapacity : 11.18GB
FreeCapacity      : 179.68 GB  ConfigurableCapacity : 179.68GB
SupportedRAIDLevels: 0 5 10 1E
    
```

```

Disk Array Alias   : DA1
MediaPatrol       : Enabled
PDM               : Enabled
    
```

```

Transport
Rebuild
Predictive Data Migration
Transition
Dedicated Spare Drives in the Array
Physical Drives in the Array
Logical Drives in the Array
[Locate Disk Array]
    
```

```

Save Settings      [CTRL-A]
Restore Settings   [CTRL-R]
Return to Previous Menu
    
```

From this screen:

- Highlight *Physical Drives in the Array* and press Enter to identify the failed disk drive
- Highlight *Rebuild* and press Enter to rebuild the array after you replace the failed disk drive

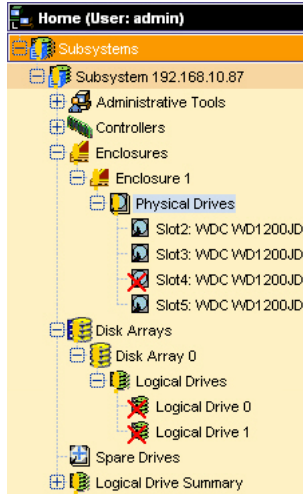
For more information, see “Critical & Offline Disk Arrays” on page 301.

WebPAM PROe Reports a Problem

WebPAM PROe aids in troubleshooting your logical drives and enclosure by continuous monitoring and reporting to the User in the following ways:

- Displays yellow !s and red Xs in Tree View.

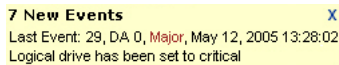
Figure 9. Yellow !s and red Xs in Tree View



- Sends email messages, per your configuration.
- Displays popup messages, per your configuration.

To set up email and popup message notification, see “Setting-up User Event Subscriptions” on page 73.

Figure 10. An example of a popup message



- Keeps a record in the Event Log.

Figure 11. The Event Log

#	Device	Event ID	Severity	Time	Description
34	DA 0	0x000F0001	Info	May 12, 2005 13:28:47	Rebuild is completed
33	LD 0	0x00090006	Info	May 12, 2005 13:28:47	Rebuild marks the logical drive synchronized upon rebuild completion
32	LD 0	0x00090002	Info	May 12, 2005 13:28:47	Logical drive has been placed online
31	DA 0	0x000F0000	Info	May 12, 2005 13:28:03	Rebuild is started
30	PD 5	0x000D000B	Info	May 12, 2005 13:28:02	Physical Disk has been removed
29	LD 0	0x00090004	Major	May 12, 2005 13:28:02	Logical drive has been set to critical
28	PD 5	0x000D001A	Major	May 12, 2005 13:28:02	Physical Disk is marked as DEAD due to removal
27	Spare 0	0x001D0001	Info	May 12, 2005 02:00:26	Spare check completed successfully on the given spare drive
26	Spare 1	0x001D0001	Info	May 12, 2005 02:00:26	Spare check completed successfully on the given spare drive
25	Spare 0	0x001D0000	Info	May 12, 2005 02:00:26	Spare check started on the given spare drive

- Keeps a record in the Event Log.
- Displays full information in Management View.

Figure 12. A failed disk drive shown in Management View

Logical Drive 0
Help

Information
Settings
Background Activity
Check Table
LUN Map

Enclosure Front View

Physical drives used by the logical drive are highlighted. Click one of them to locate the logical drive.

Logical Drive Information

Logical Drive ID	0
Alias	
RAID Level	RAID5
Operational Status	Critical, Rebuilding
Capacity	147.15GB
Physical Capacity	220.72GB
Number of Axes	1
Number of Used Physical Drives	3
Stripe Size	64KB
Sector Size	512Bytes
Disk Array ID	0
Read Policy	ReadAhead
Write Policy	WriteBack
Serial Number	00000000000000000000000000000000064982F237DBD288
WWN	2226-0001-5558-d0c8
Synchronized	Yes
Tolerable Number of Dead Drives	1
Parity Pace	N/A
Codec Scheme	N/A

Also see these troubleshooting topics:

- “Event Notification Response” on page 286
- “Critical & Offline Disk Arrays” on page 301
- “Frequently Asked Questions” on page 317

Event Notification Response

When you choose Event Notification, WebPAM PROe sends popup and/or email messages regarding its status. The messages you see depend on your notification selection and what is currently happening in the VTrak. See “Setting-up User Event Subscriptions” on page 73.

The table below cites:

- **Reported Events** – Events that require you to take action
- **Corrective Actions** – The action you should take in response to the event

A list of event categories is shown below.

- Battery (page 286)
- Blowers (page 287)
- Cache (page 288)
- Controller (page 288)
- Disk Array (page 288)
- Drive Interface Controller (page 289)
- Enclosure (page 289)
- Event Log (page 289)
- Fibre Channel (page 290)
- Host Interface Controller (page 290)
- Logical Drive (page 291)
- Media Patrol (page 292)
- Online Capacity Expansion (page 292)
- PDM (page 293)
- Physical Disk (page 293)
- PSU (Power Supply Units) (page 295)
- PSU Fans (page 295)
- RAID Level Migration (page 295)
- Rebuild (page 296)
- Redundancy Check (page 297)
- Resource (page 297)
- Spare Check (page 297)
- Spare Drives (page 298)
- SMART (page 298)
- Stripe Level Migration (page 298)
- Synchronization (page 299)
- System (VTrak) (page 299)
- Transition (page 299)
- Watermark (page 300)

Reported Event	Corrective Action
Battery	
Battery temperature is above the threshold	The battery is too hot. Verify proper airflow around the through the VTrak. If airflow is OK, replace the battery. See page 229.
Battery temperature is normal	Normal.
Battery capacity is below the threshold	Battery is drained. Run battery reconditioning. See page 117 or page 162.

Reported Event	Corrective Action
Battery capacity is normal	Normal.
Battery is discharging	Battery is undergoing reconditioning.
Battery is charging	Battery is being recharged.
Battery reconditioning is complete	Battery reconditioning is finished.
Battery is malfunctioning	Run battery reconditioning. See page 117 or page 162. If this message reappears, replace the battery.
Battery reconditioned successfully	Battery reconditioning is finished.
Battery reconditioning has failed	Replace the battery. See page 229.
Battery is reaching end of life	Replace the battery. See page 229.
Battery is removed	The battery was disconnected or removed. Reinstall the battery. See page 229.
Battery charging failed	Replace the battery. See page 229.
Battery reconditioning started	Battery reconditioning has begun.
Battery recondition terminated	The battery was disconnected or removed during reconditioning. Reinstall the battery. See page 229.
Blowers	
Blowers have started	Normal.
Blowers have stopped	Verify that the cooling unit is properly installed. If the blower still does not turn, replace the blowers. See page 224.
Blower speed is increased	Check the VTrak for overheating. See page 307.
Blower speed is decreased	Temporary overheat condition was corrected.
Blowers are NOT functioning	Replace the blowers. See page 224.
Blowers have been inserted	Normal.

Reported Event	Corrective Action
Blowers have been removed	Reinstall the cooling unit(s). If the blowers does not turn, replace the blowers. See page 224.
Blowers are functioning normally	Normal.
Blowers are NOT installed	Reinstall the cooling unit(s). If the blowers does not turn, replace the blowers. See page 224.
Blower status is unknown	Check for airflow out of the cooling unit. If there is none, check for proper installation.
Cache	
BBU flushing has started	VTrak's cache is being flushed.
BBU flushing has ended	VTrak's cache has been flushed.
BBU flushing has failed	VTrak's cache could not be flushed. Check your cache flush interval setting. See page 110.
Controller	
The controller parameter(s) changed by user	The user successfully change controller settings. See page 110.
The controller has new crash information	Check the event logs. See page 63.
Controller temperature is above the threshold/warning threshold	The VTrak controller is overheating. Check for airflow around and through the controller, and verify that all fans are working. Replace fans as needed.
Controller temperature is above the critical threshold	The VTrak controller is seriously overheating. Check for airflow around and through the controller, and verify that all fans are working. Replace fans as needed.
Disk Array	
New disk array has been created	Result of settings or user action. Normal.
Disk array has been deleted	Result of settings or user action. Normal.
Disk array has been added	Result of settings or user action. Normal.
Disk array has been removed	The physical drives of the disk array were removed from the enclosure.

Reported Event	Corrective Action
Disk array settings have been changed	The user successfully logical drive settings. See page 130.
Drive Interface Controller	
Drive-interface controller found	Normal.
Drive-interface controller is NOT found	Restart the VTrak. See page 219. If this message appears repeatedly, contact Technical Support. See page 319.
Drive-interface diagnostics has passed	Normal.
Drive-interface diagnostics has failed	Restart the VTrak. See page 219. If this message appears repeatedly, contact Technical Support. See page 319.
Drive-interface controller has generated a general/ data parity error.	Drive-to-controller parity error. If this message appears repeatedly, contact Technical Support. See page 319.
Enclosure	
Enclosure temperature is above the threshold/ warning threshold	The VTrak is overheating. Check for airflow around and through the VTrak, and verify that all fans are working. Replace fans as needed.
Enclosure temperature is above the critical threshold	The VTrak is seriously overheating. Check for airflow around and through the VTrak, and verify that all fans are working. Replace fans as needed.
Enclosure temperature is within the normal range	Normal.
Event Log	
Event logging is enabled	Event logging has been successfully enabled.
Event logging is disabled	Event logging has been disabled.
Event log buffer is cleared in RAM	The event log was cleared.
Event log buffer is cleared in NVRAM	The non-volatile RAM event log was cleared.
Event log buffer is cleared in MDD	The MDD (disk drive) event log was cleared.

Reported Event	Corrective Action
Fibre Channel	
Fibre Channel controller has detected bus reset	The initiator sent a reset command. If this message appears repeatedly, contact Technical Support. See page 319.
Fibre Channel controller has received a LUN reset command.	Result of user action. Normal.
Fibre Channel controller has encountered a fatal error	Restart the VTrak. See page 219. If this message appears repeatedly, contact Technical Support. See page 319.
Fibre Channel link is up	FC link connected and ready. Normal.
Fibre Channel link is down	FC link disconnected or otherwise not working.
Fibre Channel controller settings have changed	Result of user action. Normal.
Host Interface Controller	
Host-interface controller has detected bus reset	The initiator sent a reset command. If this message appears repeatedly, contact Technical Support. See page 319.
Host-interface controller has encountered an unrecoverable error	Restart the VTrak. See page 219.
Host-interface controller has received an abort-task/ abort task set/clear task set command.	Result of user action. Normal.
Host-interface controller has received an clear ACA command.	Result of clearing an auto contingent alliance condition. If this message appears repeatedly, contact Technical Support. See page 319.
Host-interface controller has received a LUN reset command.	Result of user action. Normal.
Host-interface controller has received a bus reboot	The VTrak rebooted itself. If this message appears repeatedly, contact Technical Support. See page 319.

Reported Event	Corrective Action
Host-interface controller has encountered an unknown error	An unidentified error occurred. If this message appears repeatedly, contact Technical Support. See page 319.
Host-interface controller has encountered a system error	A VTrak system error occurred. If this message appears repeatedly, contact Technical Support. See page 319.
Host-interface controller has encountered a fatal error	Restart the VTrak. See page 219. If this message appears repeatedly, contact Technical Support. See page 319.
Host-interface controller settings have changed	Result of user action. Normal.
Logical Drive	
Logical drive initialization has started	Result of user action. Normal.
Logical drive initialization has completed	Logical drive is ready to use. Normal.
Logical drive initialization has paused	Initialization paused because of user intervention, schedule or a higher priority background activity.
Logical drive initialization has resumed	Initialization has resumed again after a pause.
Logical drive initialization has stopped	Initialization stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Logical drive initialization marks the logical drive offline	Initialization failure due to a failed disk drive. Replace the disk drive, delete and recreate the logical drive. See page 17 and page 130.
Logical drive initialization is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 219.
Logical drive initialization is queued	Initialization has been set manually or by schedule.
A new logical drive has been created	Result of user action. Normal.
Logical drive has been deleted	Result of user action. Normal.
Logical drive has been placed online	The physical drives of the array are restored to online status.

Reported Event	Corrective Action
Logical drive has been placed online. Possible data loss	One or more physical drives in the array went offline. See page 301.
Logical drive has been set to critical.	One or more physical drives in the array went offline. See page 301.
Logical drive axle has been placed online	RAID 50. One of the axles (RAID 5 arrays) returned on online status.
Media Patrol	
Media patrol is started	Result of settings or user action. Normal.
Media patrol is completed	Normal.
Media patrol is paused	Media patrol paused because of user intervention, schedule or a higher priority background activity.
Media patrol is resumed	Media patrol has resumed again after a pause.
Media patrol is stopped	Media patrol stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Media patrol is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 219.
Media patrol is queued	Media patrol has been set manually or by schedule.
Media patrol is stopped internally	Media patrol stopped because the disk array was deleted or removed.
Online Capacity Expansion	
Online capacity expansion has started	Result of settings or user action. Normal.
Online capacity expansion has completed	Normal.
Online capacity expansion has paused	Expansion paused because of user intervention, schedule or higher priority background activity.
Online capacity expansion has resumed	Expansion has resumed again after a pause or a reboot.
Online capacity expansion has stopped	Expansion stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.

Reported Event	Corrective Action
Online capacity expansion has encountered a physical disk error	Bad block found on a disk drive. Migration will finish. Check the disk drive check table after migration and replace disk drive as needed. See page 141.
Online capacity expansion is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 219.
Online capacity expansion is queued	Synchronization has been set manually or by schedule.
PDM	
PDM is started	Result of settings or user action. Normal.
PDM is completed	Normal.
PDM is paused	PDM paused because of user intervention, schedule or a higher priority background activity.
PDM is resumed	PDM has resumed again after a pause.
PDM is stopped	PDM stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
PDM is switched to rebuild.	PDM changed to rebuild because the logical drive went critical
PDM is stopped internally	The destination drive was removed or used for a rebuild.
Physical Disk	
Physical disk is marked online	Disk drive restored to normal operation.
Physical disk is marked online	Disk drive removed from service due to errors. If necessary, try to force the disk online. See page 122 or page 166.
Physical disk is marked as dead.	Disk drive failure. Replace the disk drive. See page 17.
Physical disk has been reset	Disk drive reset after error and should function normally.
Physical disk assigned as global spare	Result of settings or user action. Normal.
Physical disk is no longer assigned as global spare	Result of settings or user action. Normal.

Reported Event	Corrective Action
Physical disk assigned as dedicated spare	Result of settings or user action. Normal.
Physical disk is no longer assigned as dedicated spare	Result of settings or user action. Normal.
Physical disk has been inserted	A disk drive has been inserted into the VTrak subsystem.
Physical disk has been removed	A disk drive has been removed from the VTrak subsystem.
Bad sector is found on physical disk	Disk drive has a bad sector. The drive should remap around the bad sector. If this message appears repeatedly, replace the disk drive.
Error is detected in remap sectors	Disk drive has a bad remap sectors. If this message appears repeatedly, replace the disk drive.
Command times out on physical drive	Disk drive not responding to commands. If this message appears repeatedly, replace the disk drive.
Physical disk negotiation speed is decreased.	Disk drive had to reduce its data rate. If this message appears repeatedly, replace the disk drive.
Previously configured disk is no longer found	Disk drive may have failed or was removed from the enclosure. Replace or reinstall the disk drive as needed.
A physical disk has encountered an unknown (non-ECC) media error.	Disk drive experienced an unknown error. If this message appears repeatedly, replace the disk drive.
A physical disk has encountered PFA condition	A potentially faulty address or bad sector was found.
A configured dead physical drive has been inserted	The disk drive inserted into the VTrak was marked as dead and will not work on the VTrak. Replace the disk drive.
A physical drive page 0/1 settings have been changed	Result of settings or user action. Normal.
Physical disk is marked as dead due to removal/ failure of reassign sectors/PFA condition/ forced offline state	Replace the disk drive.

Reported Event	Corrective Action
PSU (Power Supply Units)	
PSU is not inserted/has been removed	A power supply unit is missing from the VTrak. Reinstall the power supply unit.
PSU is off	A power supply unit is present but turned off. Turn on the power supply.
PSU is on	Normal.
PSU is installed/operational and turned on	Normal.
PSU is installed/operational and turned off	A power supply unit is present but turned off. Turn on the power supply.
PSU is malfunctioning and turned on/off	Replace the power supply unit.
PSU 12V/5V/3.3V power is out of the threshold range	Replace the power supply unit.
PSU 12V/5V/3.3V power is within the range	Normal.
PSU Fans	
PSU fan has turned on.	Normal.
PSU fan has turned off.	Verify that the power supply is turned on. If the fan still does not turn, replace the power supply. See page 223.
PSU fan speed increased.	Check the VTrak for overheating. See page 307.
PSU fan speed decreased.	Temporary overheat condition was corrected.
PSU fan is malfunctioning	Replace the power supply. See page 223.
PSU fan is functioning normally	Normal.
PSU fan status is unknown.	Check for airflow out of the power supply. If there is none, check for proper installation and turn the power supply on.
RAID Level Migration	
RAID Level migration is started	Result of settings or user action. Normal.

Reported Event	Corrective Action
RAID Level migration is completed	Normal.
RAID Level migration is paused	Migration paused because of user intervention, schedule or a higher priority background activity.
RAID Level migration is resumed	Migration has resumed again after a pause.
RAID Level migration is stopped	Migration stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
RAID Level migration has encountered a physical disk error	Bad block found on a disk drive. Migration will finish. Check the disk drive check table after migration and replace disk drive as needed. See page 141.
RAID Level migration is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 219.
RAID Level migration is queued	Migration has been set manually or by schedule.
Migration has detected/ cleared stale NV Watermark	Watermarks are progress markers left as the result of interrupted RAID migrations. If the watermark was cleared, migration should finish.
Array was incomplete due to missing NV Watermark	RAID migration was interrupted by a shutdown. If array is online, try migration again. See page 132. If array is offline, delete and recreate array. See page 129 and page 127.
Rebuild	
Rebuild is started	Result of settings or user action. Normal.
Rebuild is completed	Normal.
Rebuild is paused	Rebuild paused because of user intervention, schedule or a higher priority background activity.
Rebuild is resumed	Rebuild has resumed again after a pause.
Rebuild is stopped	Rebuild stopped because of user intervention, schedule or the logical drive was deleted or the target disk drive encountered an error. If rebuild stopped by user intervention, restart the rebuild. See page 133.
Rebuild stopped internally	The logical drive is offline. See page 301.
Rebuild is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 219.

Reported Event	Corrective Action
Rebuild is queued	Rebuild has been set manually or by schedule.
Rebuild marks logical drive synchronized upon rebuild completion	Result of successful rebuild. Normal.
Redundancy Check	
Redundancy Check is started	Redundancy Check has started manually or by schedule.
Redundancy Check is completed	Redundancy Check has finished.
Redundancy Check is paused	Redundancy Check paused because of user intervention, schedule or a higher priority background activity.
Redundancy Check is resumed	Redundancy Check has resumed again after a pause.
Redundancy Check is stopped	Redundancy Check stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Redundancy Check is aborted due to internal error	System resources are low. Reduce system load or restart the VTrak. See page 219.
Redundancy Check encountered inconsistent block(s)	Check the logical drive's inconsistent block table. See page 141. Rebuild the disk array if necessary. page 133.
Redundancy Check task is queued	Redundancy Check has been set manually or by schedule.
Redundancy Check task is stopped internally	The logical drive is offline. See page 301.
Resource	
Resource is NOT available	System resources are low. Reduce system load or restart the VTrak. See page 219.
Spare Check	
Spare check started on the given spare drive	Result of settings or user action. Normal.

Reported Event	Corrective Action
Spare check completed successfully on the given spare drive	Normal.
Spare Drives	
Physical disk assigned as global spare	Result of settings or user action. Normal.
Physical disk is no longer assigned as global spare	Result of settings or user action. Normal.
Global Spare has been deleted	Result of settings or user action. Normal.
Physical disk assigned as dedicated spare	Result of settings or user action. Normal.
Physical disk is no longer assigned as dedicated spare	Result of settings or user action. Normal.
Dedicated Spare has been deleted	Result of settings or user action. Normal.
SMART	
SMART error is received	A disk drive reported a SMART error. If this message appears repeatedly, replace the disk drive.
Stripe Level Migration	
Stripe Level migration is started	Result of settings or user action. Normal.
Stripe Level migration is completed	Normal.
Stripe Level migration is paused	Migration paused because of user intervention, schedule or a higher priority background activity.
Stripe Level migration is resumed	Migration has resumed again after a pause.
Stripe Level migration is stopped	Migration stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Stripe Level migration has encountered a physical disk error	Bad block found on a disk drive. Migration will finish. Check the disk drive check table after migration and replace disk drive as needed. See page 141.

Reported Event	Corrective Action
Stripe Level migration is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 219.
Stripe Level migration is queued	Migration has been set manually or by schedule.
Synchronization	
Synchronization is started	Result of settings or user action. Normal.
Synchronization is completed	Normal.
Synchronization is paused	Synchronization paused because of user intervention, schedule or higher priority background activity.
Synchronization is resumed	Synchronization has resumed again after a pause or a reboot.
Synchronization is stopped	Synchronization stopped because of user intervention, schedule or the logical drive was deleted or went critical or offline.
Synchronization is aborted due to an internal error.	System resources are low. Reduce system load or restart the VTrak. See page 219.
Synchronization is queued	Synchronization is already running on another logical drive in the same array.
Synchronization is stopped internally	Synchronization stopped because the disk array was deleted or removed.
System (VTrak)	
The system is started	The VTrak has been started.
The system is stopped	The VTrak was shut down.
Transition	
Transition is started	Result of settings or user action. Normal.
Transition is completed	Normal.
Transition is paused	Transition paused because of user intervention, schedule or a higher priority background activity.
Transition is resumed	Transition has resumed again after a pause.
Transition is stopped	Transition stopped because of user intervention or the logical drive was deleted.

Reported Event	Corrective Action
Transition was switched to rebuild	Transition changed to rebuild because the logical drive went critical.
Watermark	
Migration has detected/ cleared stale NV Watermark	Watermarks are progress markers left as the result of interrupted RAID migrations. If the watermark was cleared, migration should finish.
Array was incomplete due to missing NV Watermark	RAID migration was interrupted by a shutdown. If array is online, try migration again. See page 132. If array is offline, delete and recreate array. See page 129 and page 127.

Critical & Offline Disk Arrays

A fault-tolerant disk array—RAID 1, 1E, 5, 10, and 50—goes *critical* when a disk drive is removed or fails. A RAID 6 or 60 disk array—goes *degraded* when a disk drive is removed or fails and *critical* when two disk drives are removed or fail.

Due to the fault tolerance of the disk array, the data is still available and online. However, once the disk array goes critical, the disk array has lost its fault tolerance, and performance may be adversely affected.

If the fault was caused by a failed drive that was removed, the drive must be replaced by another drive, either identical or larger, in order for the RAID system to rebuild and restore optimal configuration.

If your fault-tolerant disk array—RAID 1, 1E, 5, 6, 10, 50, and 60—goes *offline*, contact Promise Technical Support. See “Contacting Technical Support” on page 319.



Warning

Take no further corrective action until you have consulted with Promise Technical Support.

A non-fault tolerant disk array—RAID 0—goes *offline* when a disk drive is removed or fails. Since the disk array is not fault tolerant, the data stored in the disk array is no longer accessible.

If one disk drive fails, all of the data on the disk array is lost. You must replace the failed drive. Then, if the disk array had more than one disk drive, delete the disk array and re-create it. Restore the data from a backup source.

When a Physical Drive Fails

VTrak provides both audible and visual indicators to alert you of a disk drive failure. The following will occur when a disk drive fails or goes offline:

- The Logical Drive LED changes from green to amber. See page 275.
- The Disk Carrier Status LED changes from green to red. See page 276.
- The audible alarm repeatedly sounds two short beeps. See page 274.
- WebPAM PROe reports the condition. See page 283.

Also see “Physical Drive Problems” on page 305.

With a Hot Spare Drive

When a physical drive in a disk array fails and a spare drive of adequate capacity is available, the disk array will begin to rebuild automatically using the spare drive.

After the disk array rebuilds itself using the spare drive, you must replace the failed drive.

To set up a spare drive, see “Creating a Spare Drive” on page 145 (WebPAM PROe) or page 178 (CLU).

Without a Hot Spare Drive

If there is no hot spare drive of adequate capacity, you must remove the failed drive and install an unconfigured replacement drive of the same or greater capacity in the same slot as the failed drive. Until you install the replacement drive, the logical drive will remain Degraded.

- If the Auto Rebuild function is ENABLED, the disk array will begin to rebuild automatically as soon as you replace the failed drive.
- If the Auto Rebuild function is DISABLED, you must manually rebuild the disk array after you replace the failed drive.

To enable Automatic Rebuild, see “Making Background Activity Settings” on page 66 (WebPAM PROe) or page 192 (CLU).

To set Hot Spare Policy, see “Making Spare Drive Settings” on page 146 (WebPAM PROe) or page 179 (CLU).



Important

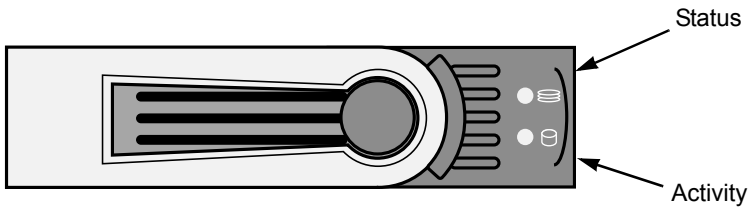
If your replacement disk drive was formerly part of a different disk array or logical drive, you must clear the configuration data on the replacement drive before you use it.

See “Clearing Stale and PFA Conditions” on page 122 (WebPAM PROe) or page 165 (CLU).

Rebuild Operation

During rebuild:

- The alarm sounds a single short beep, repeated
- No warning icon displays over the Disk Array or Logical Drive in the Tree. Management View reports the Disk Array’s Operational Status as OK, Rebuilding.
- The drive carrier holding the rebuilding physical drive displays a green Activity (lower) LED while the Status (upper) LED flashes green once per second.

Figure 13. Drive carrier LEDs

During rebuilding, you can still read and write data to the logical drive. However, fault tolerance is lost until the Disk Array returns to OK (not-rebuilding) status.

After a successful rebuild:

- The alarm is silent
- The Disk Array's Operational Status as OK
- The rebuilt disk drive Status LED displays steady green

Incomplete Array

An incomplete array can result from any of the following conditions:

- The NVRAM watermark for the RAID level migration currently in progress is missing or cannot be found
- A physical drive goes missing during transport

See “Physical Drive Failed” on page 305 for more information.

When VTrak discovers an incomplete array, WebPAM PROe displays a dialog box asking you to:

- Click the **OK** button to accept the incomplete array
- Click the **Cancel** button to reject the incomplete array

Before you accept the incomplete array, be sure all of the physical drives are present and that their drive carriers are properly installed into the enclosure. See “Installing Disk Drives” on page 18.

If you choose to accept the incomplete array:

1. Click **OK** in the incomplete array dialog box.
2. Check the operational status of the logical drives in the array.
 - If the logical drives are *critical* or *degraded*, proceed with a rebuild. See “Rebuilding a Disk Array” on page 133 or page 174.
 - If the logical drives are *offline*, contact Technical Support. See “Contacting Technical Support” on page 319
3. Restore your data from a backup source, if required.

The CLU displays the option *Accept Incomplete Array* on the Disk Array Info and Settings screen. Highlight the option and press Enter to accept the incomplete array.

If you choose NOT to accept the incomplete array:

1. Click **Cancel** in the incomplete array dialog box.
2. Do one of the following:
 - Delete the array. See “Deleting a Disk Array” on page 129 or page 171.
 - Replace the missing physical drive.

Physical Drive Problems

Physical Drive Offline

Check the drive for:

- **PFA Condition** – Caused by a bad block or sector. See “Clearing Stale and PFA Conditions” on page 122.
- **Stale Configuration** – Caused by obsolete array information on the physical drive. Identify the disk array to which the physical drive belongs. Then delete the disk array. See “Deleting a Disk Array” on page 129.

If the error condition remains on the physical drive, clear the error condition. See “Clearing Stale and PFA Conditions” on page 122.

Physical Drive Not Usable

This condition occurs when you have:

- Two controllers in your VTrak subsystem and a SATA drive without an AAMUX adapter. See “AAMUX Adapter” on page 18.
- A missing or defective SAS cable between the VTrak subsystem and a JBOD enclosure.

Physical Drive Failed

When physical drive status shows *failed*, the physical drive cannot be repaired. You must replace the failed drive.

Physical Drive Fails during Migration

VTrak has two methods for migrating a disk array:

- **DDF** – The default setting. Slower but reliable
- **NVRAM** – An optional setting that requires special access. Faster but risks data loss

Normally, RAID level migration is done under the default Disk Data Format (DDF) setting. If a physical drive or the controller fails during migration, the disk array goes critical, and you can rebuild it. Migration under DDF can take up to several hours depending on the number and size of the physical drives and data input/output activity.

You can set the VTrak to migrate disk arrays under Non-Volatile Random Access Memory (NVRAM), a much faster process because it writes data to the memory in the controller. However, if a physical drive or the controller fails during migration, the logical drives will go offline and you will lose data. See “Incomplete Array” on page 304.

Because the setting for migration under NVRAM requires special access, most users will not encounter this condition.

Physical Drive Fails during Transport

Transport is the action of moving the physical drives of a disk array:

- To different slots in the same VTrak enclosure
- From one VTrak enclosure to another

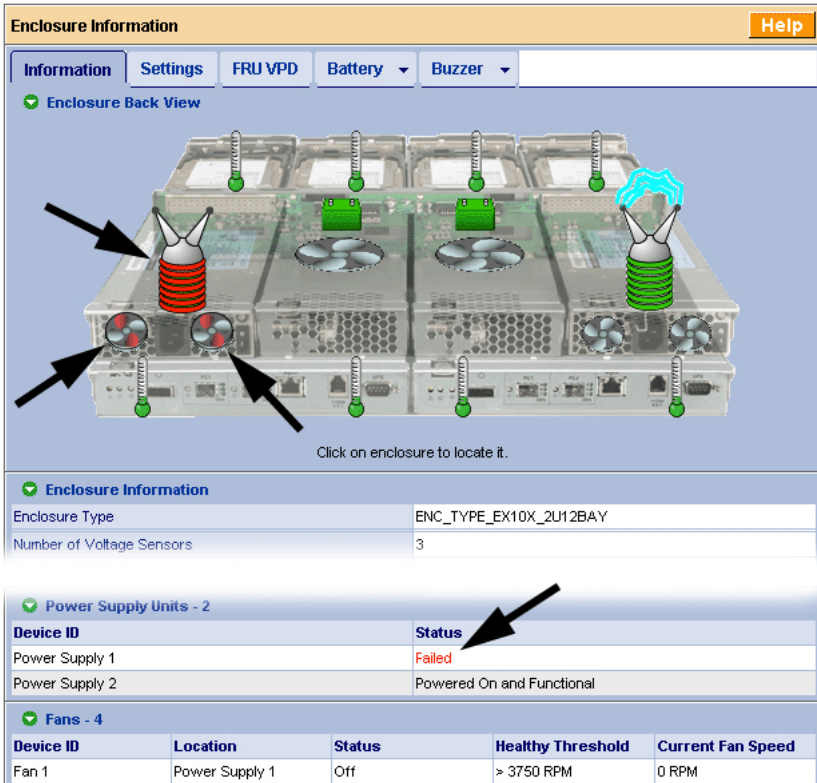
If a physical drive fails during a transport, or you do not move all of the physical drives to their new locations, WebPAM PROe will display an incomplete array. See "Incomplete Array" on page 304.

Enclosure Problems

WebPAM PROe displays yellow !s and red Xs in Tree View to identify components that need attention.

When a yellow ! appears over a Subsystem in Tree View, click the Enclosure icon. The Enclosure screen will display (below).

Figure 14. Enclosure information in Management View



Enclosure Information Help

Information Settings FRU VPD Battery Buzzer

Enclosure Back View

Click on enclosure to locate it.

Enclosure Information

Enclosure Type	ENC_TYPE_EX10X_2U12BAY
Number of Voltage Sensors	3

Power Supply Units - 2

Device ID	Status
Power Supply 1	Failed
Power Supply 2	Powered On and Functional

Fans - 4

Device ID	Location	Status	Healthy Threshold	Current Fan Speed
Fan 1	Power Supply 1	Off	> 3750 RPM	0 RPM

In this example, a power supply has failed. The Enclosure Diagram displays color and motion changes to identify the failed power supply. In this case, you must replace the power supply.

Note that the image above was shortened to fit on the page.

Overheating

Temperature Sensors



Overheating



Too Warm



Normal

Overheating is a potentially serious condition because the excessively high temperatures can lead to disk drive failure and controller malfunction.

Overheating usually results from:

- Fan failure
- Poor air circulation around the enclosure

WebPAM PROe reports failed fans along with elevated temperature. On VTrak, there are two kinds of fans:

- Power supply, 2 fans each
- Cooling units, 1 fan each

If a power supply fan fails, you must replace the power supply. If a cooling unit fan fails, you can remove the cooling unit and replace only the fan itself.

Cooling Unit Fan Condition



OK



Replace Now

No tools are required for either procedure. See page 224 for instructions on replacing the fans.

Air circulation around the VTrak enclosure may be a more complex problem. Use the thermometer icons to help you locate the specific hot spot. Check for these conditions:

Power Supply Fan Condition



OK



Replace Now

- Accumulated dust or objects blocking the fans
- Less than a minimum of 5 inches (13 cm) space between the back of the VTrak and the wall or other object
- Ambient temperature above 95°F (35°C) where the VTrak is operating

To cool down a VTrak:

- Correct any problems identified above
- Power it down and let it sit for an hour or longer

Power Supplies



OK

VTraks are equipped with redundant power supplies. The advantage of dual power supplies is that, should one fail, the other will continue powering the subsystem until the faulty one can be replaced. VTrak is capable of operating on a single power supply. As a result, if one power supply fails you must watch the front panel LEDs or WebPAM PROe in order to become aware of the condition.



Replace Soon

The power supplies are hot-swappable, meaning you can leave the VTrak running when you replace the bad one. Be careful, however, to remove the faulty power supply and not the good one, or VTrak will come to an immediate stop and your data will be unavailable until the system is powered and booted again.



Replace Now

As noted above, if a power supply fan fails, you must replace the power supply. Without the fan to cool it, the power supply will overheat and eventually fail anyway.

No tools are required for the procedure. See your page 223 for instructions on replacing a power supply.

Battery

Battery
Condition

OK

VTrak uses a battery as backup power for the cache. Should a power failure occur, the battery enables the cache to hold data up to 72 hours. The battery recharges during normal VTrak operation.



Replace Soon

In most cases, installing a replacement battery will correct a marginal or failed condition. The battery is located in the cooling unit above the controller. Remove the cooling unit for access. The battery is hot-swappable.



Replace now

No tools are required for the procedure. See page 229 for instructions on replacing the battery.

Also see “Reconditioning a Battery” on page 117 or page 163.

Controller Enters Maintenance Mode

For VTraks with two controllers, one of the controllers will enter *maintenance mode* in the event of a problem with the controller. When a controller enters maintenance mode, it goes offline and it displays *Missing* under Readiness Status.

You must take the following actions:

- Find and correct the cause of the problem (see below)
- Take the controller out of maintenance mode (see page 311)

Finding and Correcting the Cause of the Problem


Make the following external checks to your VTrak system. Be sure that:

- Both controllers are present, fully inserted into their slots, and locked into place.
- The controllers match, meaning both are Fibre Channel or both are SAS.
- All data cables to external JBOD enclosures in good condition and are securely attached.

A disconnected data cable to an external JBOD enclosure causes the two controllers to see a different set of configured drives. This condition is the most common cause of a controller entering maintenance mode.

If all external checks are OK, take the following actions:

1. Shut down the VTrak.
2. Remove one of the controllers.
3. Restart the VTrak.
4. After the VTrak is fully booted, access the CLI, the CLU, or WebPAM PROe.
5. Observe and record the following information about the first controller:
 - Memory size
 - Hardware version
 - Firmware version

To view this information in WebPAM PROe, click the Controller  icon, **Information** tab.

6. Shut down the VTrak.
7. Remove the first controller and install the second controller.
8. Repeat steps 3 through 6.
9. Compare your records.
10. Correct any differences between the two controllers.

Taking a Controller out of Maintenance Mode

If you shut down the VTrak in the process of correcting the problem, the controller will be in normal mode when the VTrak finishes booting. No further action is required.

If you corrected the problem without shutting down the VTrak, choose one of the following methods to take the controller out of maintenance mode:

- Reboot the VTrak
- Establish a serial connection, then use the CLI (see below)
- Establish a Telnet connection, then use the CLI (see page 312)

Serial Connection

To clear maintenance mode using a serial connection to the controller:

1. Change your terminal emulation program settings to match the following specifications:

- Bits per second: 115200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: none

2. Start your PC's terminal VT100 or ANSI emulation program.
3. Press Enter once to launch the CLI.

The login screen appears.

The following steps show the default Administrator user name and password. Use your own user name and password if you have changed these.

4. At the Login prompt, type **administrator** and press Enter.
5. At the Password prompt, type **password** and press Enter.

The CLI screen appears.

The prompt should display MAINTENANCE MODE@cli>. If the prompt displays your login name, such as administrator@cli>, log into the other controller.

6. At the MAINTENANCE MODE@cli> prompt, type **maintenance -a exit** and press Enter.

The controller reboots. The login screen again appears.

7. Close the Serial connection.

Telnet Connection

This procedure requires you to know the IP address of the controller.

To clear maintenance mode using a Telnet connection to the controller:

1. Go to the command line prompt (Windows) or click the terminal icon (Linux), then run:

telnet 192.168.1.56 2300

The IP address above is only an example. 2300 is the Telnet port for VTrak.

The login screen appears.

The following steps show the default Administrator user name and password. Use your own user name and password if you have changed these.

2. At the Login prompt, type **administrator** and press Enter.
3. At the Password prompt, type **password** and press Enter.

The CLI screen appears.

The prompt should display MAINTENANCE MODE@cli>. If the prompt displays your login name, such as administrator@cli>, log into the other controller.

4. At the MAINTENANCE MODE@cli> prompt, type **maintenance -a exit** and press Enter.

The controller reboots. The Telnet session ends.

Connection Problems

When you install your Promise product following the instructions in the *Quick Start Guide* and this *Product Manual*, you should have little trouble getting your equipment to work the first time. But connection problems can arise that are not the User's or Installer's fault. Every conceivable problem cannot be covered in the documentation but some guidelines could be helpful.

Connection problems cause a majority of failures in almost any electrical system. While the installation of the cables and components was correct, they don't function properly, or at all, because:

- A connector is dirty or corroded
- A connector is loose or damaged
- A cable looks OK outside but has an open circuit inside
- The wrong cable was used

VTraks ship with a full set of new cables, as required for each specific model. Be sure to use these components because: 1.) They are the proper ones for your RAID subsystem, 2.) They are in brand-new condition, and 3.) You paid for them with the purchase of your VTrak.

Serial Connections

VTrak uses a serial connection for the command line interface (CLI) and the command line utility (CLU). After you set the IP address, you can access the CLI and CLU through a network connection, also. Normally, users prefer WebPAM PROe because of its graphic user interface. But the CLI and CLU can do the same jobs. And they will work when your network connection is down.

For VTrak, you must use the CLI or CLU to set the Management Port IP address in order for WebPAM PROe to connect with it. See "Setting up the Serial Connection" on page 35. This issue is discussed further under Network Connections (below). See the See "Setting Up Serial Cable Connections" on page 32. for more information on making the connection.

The CLI and CLU control and manage but they do not move data. They communicates through a null-modem cable, supplied with the VTrak. A straight-through serial cable will not work for this purpose. You may choose not use the CLI or CLU often and want to disconnect and store the cable. Consider leaving it connected, to be sure it will be there when you need it.

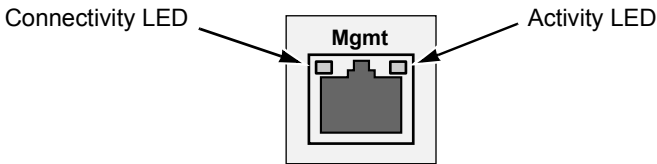
Network Connections

Each controller has an Ethernet (RJ45) Management Port connector on the back of the enclosure. This is a Gigabit Ethernet connector designed to connect to

your network. The VTrak becomes a node on your network like any other PC, server or other component with an IP address.

VTrak ships from the factory an IP address of 10.0.0.2. You must change this address to one that will work with your network. You make the initial IP address setting using the CLI or CLU. See “Setting up the Serial Connection” on page 35.

Figure 15. Management port connection on the RAID controller



LEDs	State			
	Dark	Amber	Green	Flashing Green
Connectivity	10BaseT	1000BaseT	100BaseT	
Activity	No activity			Activity

Note that VTrak Management Port can accept IP address assignments from a DHCP server. Use VTrak’s Command Line Utility (CLU) to enable this feature. If you have not activated DHCP support but there is a DHCP server on your network, there is a chance that it will inadvertently assign the VTrak’s Management Port IP address to another node. You might see a warning to this effect on your PC’s monitor. If this happens, WebPAM PROe may not be able to connect. See your network administrator to work out a suitable arrangement.

Fibre Channel Connections

When there is a connection failure, use WebPAM PROe to verify that VTrak sees the initiator(s). See “Viewing Fibre Channel Initiators” on page 84.

If VTrak sees some initiators but not the one you want, the problem is most likely elsewhere in the loop or fabric. If VTrak does not see any initiators:

- Check all of the Fibre Channel connections
- Verify that all nodes are properly connected and powered
- Verify that the fabric router or switch is properly connected powered

The Fibre Channel ports, transceivers, and controller on VTrak function the same as comparable components on other nodes.

For more information, see “Managing Fibre Channel Connections” on page 79.

Browser Does Not Connect to WebPAM PROe

If you successfully setup and connected to WebPAM PROe, then suddenly you can no longer connect, it might be the result of the following three conditions:

- DHCP is enabled on your VTrak's virtual management port
- The DHCP server does not have a dedicated IP address for the VTrak
- The VTrak restarted and your DHCP server assigned a new IP address

You must obtain the new IP Address for the virtual management port in order to direct your browser to the VTrak and start WebPAM PROe.

To access the new IP address:

1. Start your PC's terminal VT100 or ANSI emulation program.
2. Press Enter once to launch the CLI.
3. At the Login prompt, type **administrator** and press Enter.
4. At the Password prompt, type **password** and press Enter.
5. Type **net** and press Enter.

```
administrator@cli> net
```

```
=====
CIId  Port Type  IP           Mask           Gateway         Link
=====
Virtual    Mgmt 192.168.10.85 255.255.255.0 192.168.10.1  Up
```

The new virtual management port IP address and other network settings display.

6. Enter the new IP address into your browser to log into WebPAM PROe.

For more information, see "Setting up the Serial Connection" on page 35 and "Logging into WebPAM PROe" on page 42.

Unsaved Data in the Controller Cache


An LED (marked with the ) is provided to inform you that there is data in the cache that has not been saved to non-volatile memory. Such data is sometimes called “dirty,” not to suggest it is corrupted in some way but because it has not been saved to a disk drive.

Figure 16. The VTrak E610f/E310f dirty cache LED

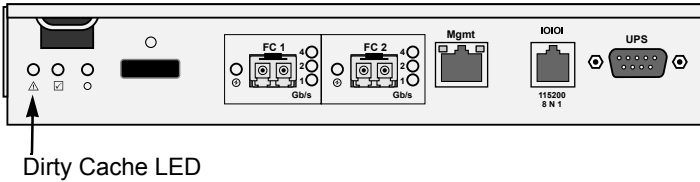
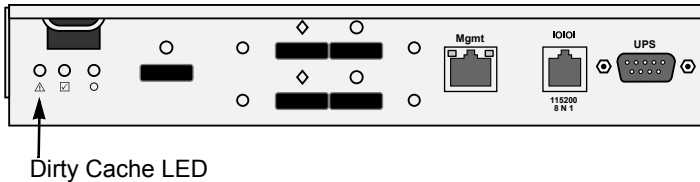


Figure 17. The VTrak E610s/E310s dirty cache LED



If there is unsaved data in the controller's cache, the Dirty Cache LED shines amber. During this time, do NOT power down the VTrak. Wait until the LED will go dark.

Chapter 9: Support

This chapter covers the following topics:

- Frequently Asked Questions (below)
 - Contacting Technical Support (page 319)
 - Limited Warranty (page 322)
 - Returning product for repair (page 323)
-

Frequently Asked Questions

What kind of disk drives can I use with VTrak?

VTrak supports 1.5 and 3.0 GB/s Serial ATA disk drives and 3.0 Gb/s SAS drives.

Can I take the disk drives from my UltraTrak, put them into the VTrak and keep my disk array or logical drive intact?

Yes. UltraTrak and early VTrak subsystems used a proprietary method of disk metadata, stored in the reserve sector of each physical drive. VTrak E-Class uses the industry-standard DDF and has a metadata-to-DDF conversion feature. To use the conversion feature, you must restart the VTrak after installing disk drives from an older system.

VTrak E-Class does not support Parallel ATA (PATA) disk drives.

Note that if you move the disk drives from the VTrak E610f/s or E310f/s to the older subsystems, they will not recognize your disk array or logical drive.

How can I tell when the VTrak has fully booted?

When the VTrak is fully booted up, the Power and FRU LEDs will light up green. If a disk array is present, the Logical Drive LED will light up green also. The Controller heartbeat LED blinks once every two seconds.

Why does VTrak come with a Command Line Utility?

First, to assign your VTrak an IP address in order for the WebPAM management software to connect to it. Second, in the event of a network failure, you can still access the VTrak. Third, some users prefer the Command Line Utility.

WebPAM connection was working OK. But later on, it timed out. What do I do now?

The network condition can time-out for several reasons. When an open connection has no action for a specific amount of time (the Administrator can change it), the connection times-out automatically for security reasons. When you attempt to use WebPAM, it returns to the login screen. Enter your user name and password and click Login, and WebPAM will establish a new connection. See "Making Web Server Settings" on page 92.

I can access the VTrak over my company's intranet. But I can't access it from an outside Internet connection. How do I make the Internet connection work?

This condition is not related to VTrak, but is due to your firewall and network connection protocol. Contact your MIS Administrator.

With other Promise VTraks, I used the Server's IP address in WebPAM to connect with the RAID subsystem. Why is this VTrak E-Class different?

VTrak E-Class has the server software embedded. With the E-Class, you point your browser directly to the VTrak rather than a server. Also, with E-Class, you do not have to create a subsystem because the subsystem already exists.

Why can a RAID 1 logical drive on VTrak consist of only two disk drives?

On VTrak, RAID 1 logical drives work in mirrored physical drive pairs. You could create up to six RAID 1 logical drives. Or you can create a single RAID 10 logical drive with data mirroring and up to 12 physical drives. If you have an odd number of drives but still want data mirroring, use RAID 1E.

See "Installing Disk Drives" on page 17 and "Introduction to RAID" on page 237 for more information on the number of physical drives you can use for each RAID level.

Are logical drives on VTrak limited to 2 TB?

No. But verify that your operating system *supports* logical drives over 2 TB. Also, for the operating system to *recognize* the full capacity of logical drives over 2 TB, you must specify a sector size of 1 KB or larger when you create the logical drive. See "Choosing Sector Size" on page 253 or more information.

I have two UltraTraks and use WebPAM to monitor them. Can I use my existing WebPAM setup to monitor the VTraks also?

No. Use the WebPAM embedded with the VTrak E-Class.

How can I be sure everything is working OK on the VTrak?

Locally: The VTrak enclosure has LEDs on the front to monitor the status of power, field replaceable units (FRUs) and logical drives. When these are green, VTrak is functioning normally.

Remotely: Check the Tree Icons in WebPAM. If there are no yellow or red warning icons displayed, VTrak is functioning normally.

What happens if a logical drive goes critical?

On the front of VTrak, the logical drive LED turns amber and an audible alarm sounds. See “Critical & Offline Disk Arrays” on page 301.

Can VTrak run using just one power supply?

Yes, it is possible to run VTrak on a single power supply. There are two power supplies so that VTrak will continue running if one of the power supply fails. But deliberately leaving one power supply off negates this advantage.

In addition, leaving one power supply off reduces air flow through the VTrak enclosure and can contribute to overheating. Always switch on both power supplies.

VTrak’s Netsend service does not report all events to Windows PCs.

This condition results from a shortcoming in Windows Messenger that causes miscommunication with Netsend. Promise is developing a workaround at the time of this writing. Note that all events are correctly reported in the Event Viewer.

Contacting Technical Support

Promise Technical Support provides several support options for Promise users to access information and updates. We encourage you to use one of our electronic services, which provide product information updates for the most efficient service and support.

If you decide to contact us, please have the following information available:

- Product model and serial number
- BIOS, firmware, and driver version numbers
- A description of the problem / situation
- System configuration information, including: motherboard and CPU type, hard drive model(s), SAS/SATA/ATA/ATAPI drives & devices, and other controllers.

Technical Support Services

Promise Online™ Web Site	http://www.promise.com/support (technical documents, drivers, utilities, etc.)
--------------------------	--

United States

E-mail Support	e-Support On-Line
Fax Support	(408) 228-1097 Attn: Technical Support
Phone Support	(408) 228-1400 option 4
If you wish to write us for support:	Promise Technology, Inc. 580 Cottonwood Drive Milpitas, CA 95035, USA

The Netherlands

E-mail Support	e-Support On-Line
Fax Support	+31 (0) 40 256 9463 Attn: Technical Support
Phone Support	+31 (0) 40 235 2600
If you wish to write us for support:	Promise Technology Europe B.V. Science Park Eindhoven 5542 5692 EL Son, The Netherlands

Germany

E-mail Support	e-Support On-Line
Fax Technical Support	+49 (0) 2 31 56 76 48 - 29 Attn: Technical Support
Phone Technical Support	+49 (0) 2 31 56 76 48 - 10
If you wish to write us for support:	Promise Technology Germany Europaplatz 9 44269 Dortmund, Germany

Italy

E-mail Support	e-Support On-Line
Fax Support	0039 06 367 12400 Attn: Technical Support
Phone Support	0039 06 367 12626
If you wish to write us for support:	Promise Technology Italy Piazza del Popolo 18 00187 Roma, Italia

Taiwan

E-mail Support	e-Support On-Line
Fax Support	+886 3 578 2390 Attn: Technical Support
Phone Support	+886 3 578 2395 (ext. 8811)
If you wish to write us for support:	Promise Technology, Inc. 2F, No. 30, Industry E. Rd. IX Science-based Industrial Park Hsin-Chu 30075, Taiwan (R.O.C.)

China

E-mail Support	e-Support On-Line
Fax Support	+86-10-8857-8015 Attn: Technical Support
Phone Support	+86-10-8857-8085/8095
If you wish to write us for support:	Promise Technology China Room 1205, Tower C Webok Time Center, No.17 South Zhong Guan Cun Street Hai Dian District, Beijing 100081, China

Limited Warranty

Promise Technology, Inc. (“Promise”) warrants that for three (3) years from the time of the delivery of the product to the original end user:

- a) the product will conform to Promise’s specifications;
- b) the product will be free from defects in material and workmanship under normal use and service.

This warranty:

- a) applies only to products which are new and in cartons on the date of purchase;
- b) is not transferable;
- c) is valid only when accompanied by a copy of the original purchase invoice.
- d) Is not valid on spare parts, fans, and power supplies

This warranty shall not apply to defects resulting from:

- a) improper or inadequate maintenance, or unauthorized modification(s), performed by the end user;
- b) operation outside the environmental specifications for the product;
- c) accident, misuse, negligence, misapplication, abuse, natural or personal disaster, or maintenance by anyone other than a Promise or a Promise-authorized service center.

Disclaimer of other warranties

This warranty covers only parts and labor, and excludes coverage on software items as expressly set above.

Except as expressly set forth above, Promise **DISCLAIMS** any warranties, expressed or implied, by statute or otherwise, regarding the product, including, without limitation, any warranties for fitness for any purpose, quality, merchantability, non-infringement, or otherwise. Promise makes no warranty or representation concerning the suitability of any product for use with any other item. You assume full responsibility for selecting products and for ensuring that the products selected are compatible and appropriate for use with other goods with which they will be used.

Promise **DOES NOT WARRANT** that any product is free from errors or that it will interface without problems with your computer system. It is your responsibility to back up or otherwise save important data before installing any product and continue to back up your important data regularly.

No other document, statement or representation may be relied on to vary the terms of this limited warranty.

Promise's sole responsibility with respect to any product is to do one of the following:

- a) replace the product with a conforming unit of the same or superior product;
- b) repair the product.

Promise shall not be liable for the cost of procuring substitute goods, services, lost profits, unrealized savings, equipment damage, costs of recovering, reprogramming, or reproducing of programs or data stored in or used with the products, or for any other general, special, consequential, indirect, incidental, or punitive damages, whether in contract, tort, or otherwise, notwithstanding the failure of the essential purpose of the foregoing remedy and regardless of whether Promise has been advised of the possibility of such damages. Promise is not an insurer. If you desire insurance against such damage, you must obtain insurance from another party.

Some states do not allow the exclusion or limitation of incidental or consequential damages for consumer products, so the above limitation may not apply to you.

This warranty gives specific legal rights, and you may also have other rights that vary from state to state. This limited warranty is governed by the State of California.

Your Responsibilities

You are responsible for determining whether the product is appropriate for your use and will interface with your equipment without malfunction or damage. You are also responsible for backing up your data before installing any product and for regularly backing up your data after installing the product. Promise is not liable for any damage to equipment or data loss resulting from the use of any product.

Returning Product For Repair

If you suspect a product is not working properly, or if you have any questions about your product, contact our Technical Support Staff through one of our Technical Services, making sure to provide the following information:

- Product model and serial number (required)
- Return shipping address
- Daytime phone number
- Description of the problem
- Copy of the original purchase invoice

The technician will assist you in determining whether the product requires repair. If the product needs repair, the Technical Support Department will issue an RMA (Return Merchandise Authorization) number.



Important

Obtain an RMA number from Technical Support *before* you return the product and write the RMA number on the label. The RMA number is essential for tracking your product and providing the proper service.

Return **ONLY** the specific product covered by the warranty (do not ship cables, manuals, diskettes, etc.), with a copy of your proof of purchase to:

USA and Canada: Promise Technology, Inc.
Customer Service Dept.
Attn.: RMA # _____
47654 Kato Road
Fremont, CA 94538

Other Countries: Return the product to your dealer
or retailer.
Contact them for instructions
before shipping the product.

You must follow the packaging guidelines for returning products:

- Use the original shipping carton and packaging
- Include a summary of the product's problem(s)
- Write an attention line on the box with the RMA number
- Include a copy of proof of purchase

You are responsible for the cost of insurance and shipment of the product to Promise. Note that damage incurred due to improper transport or packaging is not covered under the Limited Warranty.

When repairing returned product(s), Promise may replace defective parts with new or reconditioned parts, or replace the entire unit with a new or reconditioned unit. In the event of a replacement, the replacement unit will be under warranty for the remainder of the original warranty term from purchase date, or 30 days, whichever is longer.

Promise will pay for standard return shipping charges only. You will be required to pay for any additional shipping options (such as express shipping).

Appendix A: Useful Information

The appendix covers the following topics:

- SNMP MIB Files (below)
 - Adding a Second Controller (page 325)
-

SNMP MIB Files

Promise supplies two MIB files to integrate the VTrak E610f/s or E310f/s subsystem into your SNMP system. These files are in the SNMP folder on the VTrak Product CD.

The MIB files are:


- FCMGMT-MIB.mib
- raidv4.mib

For help loading the MIB files, see the instructions that came with your MIB browser.

Adding a Second Controller

If your VTrak E-Class subsystem shipped with one controller, you can add a second controller. The second controller must have:

- The same Firmware version as the currently installed controller
- The same amount of SDRAM as the currently installed controller

To obtain this information for the currently installed controller, click the Controller  icon, Information tab, and look for Firmware Version and Memory Size.

Obtain your second controller through Promise Technology. Promise Support will prepare the new controller with Firmware and SDRAM to match your current VTrak subsystem.


When you order the second controller, you should also order a second cache battery to power the new controller's cache in the event of a power failure.

The VTrak subsystem boots its controllers sequentially. With a second controller installed, your subsystem will take about a minute longer to boot. This condition is normal.

Installing a Second Controller

To install a second controller in your VTrak subsystem:

1. Shut down the subsystem.
 2. Remove the blank cover from the right controller slot.
-

3. Carefully slide the new controller into the slot until the handle locks in place.
4. Attach your data and management cables to the new controller, as needed. See the “Making Management and Data Connections” on page 21 for cable connection information.
5. Power up the subsystem and launch WebPAM PROe.
6. Click the Controllers  icon in the Tree, then look at the Information tab in Management view.
 - If the controllers’ Operational Status is OK, the installation was successful.
 - If one of the controller’s Operational Status is Missing, one of the controllers went into maintenance mode. See page 310.
7. With the second controller successfully installed, make the following settings:
 - Redundancy Type to Active-Active or Active-Standby. See page 62.
 - LUN Affinity if you choose Active-Active redundancy. See page 110.

Dual Controllers and SATA Drives

If your VTrak subsystem has SATA disk drives installed, you must install an AAMUX adapter on each of the SATA drives.

Without the AAMUX adapter, SATA drives will display Not Usable under Operational Status.

See the “Installing Disk Drives” on page 17 for installation instructions.

This condition does not apply to SAS disk drives.

Obtain AAMUX adapters though Promise Technology.

Installing a Second Cache Battery

The cache battery comes as an assembly, with attaching screws and a wiring harness. Install the new cache battery into the cooling unit above the new controller.

To install a new cache battery:

1. On the cooling unit above the new controller, press the release button and pull the handle downward.
2. Pull the cooling unit out of the VTrak enclosure.
3. Loosen the thumbscrews. A retainer keeps the thumbscrews in place.
4. Grasp the top section near the thumbscrews and lift it off the bottom section.
5. Place the battery assembly into the bottom section of the cooling unit as shown in Figure 1 (E610f/s) or 2 (E310f/s).
6. Install the two screws that came with the battery assembly as shown.
7. Attach the wiring harness from the battery assembly to the circuit board in the cooling unit as shown.

Figure 1. IE610f/s cache battery installation

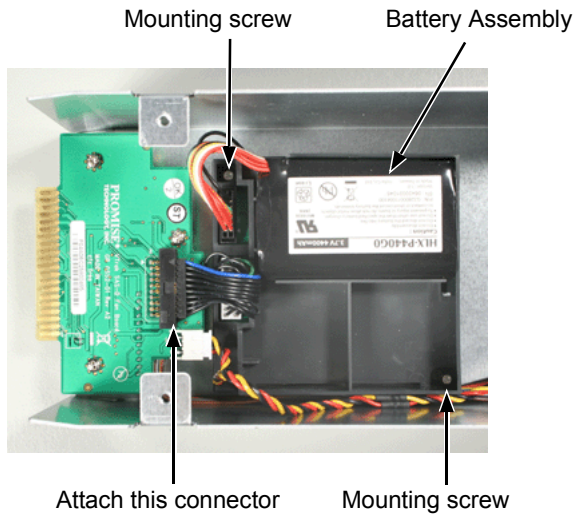
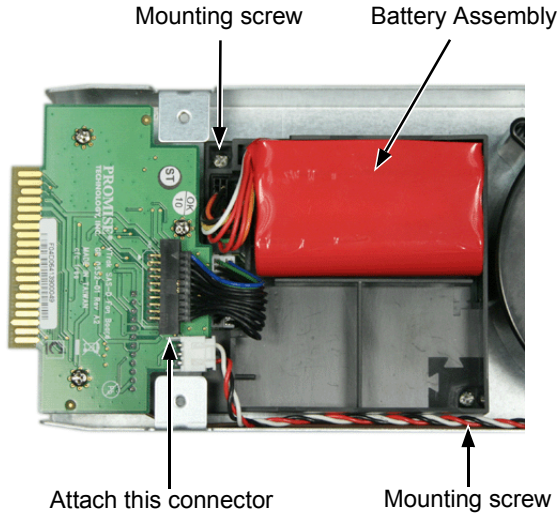


Figure 2. E310f/s cache battery installation



8. Place the top section of the cooling unit onto the bottom section and tighten the thumbscrews.
9. Carefully slide the cooling unit into the enclosure.
10. Gently press the handle in and upward until it locks.

Index

Numerics

- 10GB Truncate 111, 158, 259
- 2 TB Limitation 254, 318

A

- AAMUX adapter 18, 326
- about this manual 1
- Active-Active 62, 154, 326
- adaptive writeback cache 111, 158
- adaptive writeback cache, defined 255
- add
 - controller 325
 - LUN map 89, 197
- alarm
 - cancel 118, 216
 - sounds 274, 301
- alias
 - controller 110, 158
 - disk array 127, 130, 131, 170, 176
 - logical drive 47, 127, 139, 170
 - physical drive 121, 165
 - subsystem 62, 154
- architectural description 4
- array incomplete, reported events 300
- Auto Fix 69, 141, 183
- Auto Rebuild
 - enable 67, 192
 - function 134, 302
- axles
 - RAID 50 47, 127, 131, 170, 177, 245
 - RAID 60 47, 127, 131, 170, 177, 248

B

- background activities
 - deleting schedule 70
 - list of scheduled 68
 - running 67
 - scheduling 69
 - settings 66, 192
 - view 66
- battery
 - checking 116, 162
 - failure 309
 - LED 279
 - reconditioning 117, 163
 - replace 229
 - reported events 286, 287
- BBU, reported events 288
- blower, reported events 287, 288
- browser, does not connect 315
- buzzer
 - settings 118, 216
 - silence 118
 - sounding 274, 301
 - test 118

C

- cable, RJ11-to-DB9 32, 150
- Cache Mirroring
 - defined 256
 - setting 62, 154
- cancel alarm 118, 216
- capacity coercion
 - defined 258
 - setting 111, 158
- capacity, specify for logical drive 47, 127, 131, 170, 176
- CE statement 9
- certificate, security 49
- change RAID level 132, 174, 260
- check table, logical drive 141

CIM

- service 97, 206
- settings 96, 206

circle-icon port 24, 28, 30, 85

clear statistics 105, 211

clear tab, controller 111

CLU

- log in 150
- log out 152
- main menu 151
- online help 152
- problem reporting 281
- serial connection 150
- Telnet connection 150

Command Line Interface (CLI) 35

Command Line Utility (CLU) 35, 317

command queuing, physical drives 120, 164

configuration script, import 101

configuration status, physical drive 120

connections

- Fibre Channel 21
- power 33
- problems 313
- SAS 26
- serial 32

connector, RJ45 21, 26, 313

controller

- adaptive writeback cache 111
- adding second 325
- alias 110, 158
- cache flush interval 111, 158
- clear tab 111
- dual controllers and SATA drive 326
- failover and failback 256
- heartbeat LED 33, 275
- information 109, 157
- locate 108, 159

controller, cont.

- maintenance mode 310
- management port settings 77
- missing 310, 326
- replace 233
- reported events 288, 289, 290, 291
- settings 110, 158
- statistics 110
- status LED 280
- unsaved data in cache 316
- view 108

cooling unit

- LED 279
- status 115, 161

counter-sink screws 18

create 44

disk array 124, 167, 257

logical drive 130

spare drive 145, 178

user 75, 199

critical

- disk array 129, 172
- logical drive 137

D

DAS

- Fibre Channel 22
- SAS 27

data connector

- Fibre Channel 21
- SAS 26

data port, SAS 26, 27, 28, 85

data/cascade port, SAS 26, 27, 28, 85

date and time, subsystem 37, 39, 63, 156

DB9 connector 32

dedicated spare drive 144, 145, 146, 178, 179, 259

default settings, restore 104, 212

definitions, FC properties 81, 188

delete

- disk array 129, 171
- initiator 89, 197
- logical drive 132, 177
- spare drive 146
- user 76, 201

deleting schedule, background activities 70

DHCP server changed IP address 315

diamond-icon port 24, 28, 30, 85

dirty cache LED 280

Discover button 60

disk array

- advanced creation 47, 127, 170
- alias 127, 130, 131, 170, 176
- automatic creation 45, 125, 168
- create 44, 124, 167, 257
- critical 129, 172, 301
- delete 129, 171
- expand 174
- expansion 266
- express creation 46, 125, 169
- incomplete array 173
- information 129, 172
- locate 176
- manual rebuild 134
- Media Patrol 134
- migrate 132, 174
- offline 301
- operational status 129, 172
- PDM 135, 175, 176
- physical drive selection 47, 127, 170
- rebuild 133, 174, 302
- rebuilding 130, 172
- reported events 288
- settings 130, 172, 173

disk array, cont.

- synchronizing 129, 172
- transition 135
- transport 136, 173
- transport ready 130, 172
- view 124

disk drive

- carrier 18
- installing 17

disk status LED 34, 113, 276, 301, 302, 303

DMA mode, SATA drives 120, 164
download firmware image file 217, 221

drive slot numbering 17

E

edit LUN map 90, 197

email

- service 92, 202
- settings 91, 202
- test message 74, 91

email messages 283

enable LUN masking 89, 196

enclosure

- information 115, 160
- locate 113, 163
- overheat 308
- reported events 289
- settings 115, 162
- temperature 115, 161
- topology 114, 163
- view 113
- voltage 115, 161

error block threshold 67, 193

event

- notification response 286
- severity 73, 97, 207
- subscriptions 73

event log
 clear 64, 66, 194, 195
 NVRAM 194, 281
 problem reporting 283
 reported events 289
 runtime 63, 194, 281
 save 64, 65
expand disk array 132, 174
expansion port, SAS 26
expansion ranges 266
export user database 99

F

failed
 battery 309
 physical drive 305
 power supply 307, 309
 power supply fan 308

failover and failback 256
 LUN Affinity 258

failure recovery, physical drive 301

FCC statement 9

Features
 highlights 5
 operational 6
 subsystem and controller 6
 system management 7

Fibre Channel
 connections 314
 DAS 22
 data connection 21
 definitions 81, 188
 HBA 84
 HBA card 21, 22, 24
 initiator 84, 143, 189
 logged-in devices 83, 186
 node information 79, 186
 port settings 79, 80, 186
 port statistics 81, 188
 reported events 290

Fibre Channel, cont.
 SAN 21
 switch 21, 22, 24, 84
 topology 81, 187

firmware image file, download 217, 221

firmware update
 from PC 218
 from TFTP server 217, 221
 WebPAM PROe 217, 221

firmware version 103, 210

flash image information 103, 210

flush interval, controller cache 111, 158

force offline 122, 166

force online 122, 166

forced unlock 71

FRU
 LED 33, 275
 status LED 277
 VPD 116, 160

full initialization 140, 182

G

GB Truncate 111, 158, 259

global spare drive 144, 145, 146, 178, 179

GOST-R statement 9

Group Rounding 111, 158, 259

H

HBA card
 Fibre Channel 21, 22
 SAS 27, 28, 30

Head Unit 113

heartbeat LED 33, 275

hot spare drive 259, 301

I

- import configuration script 101
- import user database 100
- incomplete array 173, 304
- inconsistent block table 142
- information
 - controller 109, 157
 - disk array 129, 172
 - enclosure 115, 160
 - Fibre Channel node 79, 186
 - flash image 103, 210
 - FRU VPD 116, 160
 - logical drive 137, 148, 181
 - physical drive 120, 165
 - SAS port settings 85, 190
 - subsystem 61
- initialization
 - defined 259
 - rate 66, 193
- initialize logical drive 140, 182
- initiator
 - delete 89, 197
 - Fibre Channel 84, 143, 189
 - Fibre Channel, add 84, 88, 189, 196
 - SAS 86, 143, 191
 - SAS, add 87, 88, 191, 196
- installing disk drives 17
- Internet access to WebPAM PROe 49
- intranet access to WebPAM PROe 318
- IP address
 - defaults 36
 - DHCP or static 36
 - DHCP server changed 315
 - maintenance mode 37, 38, 41, 78, 185
 - management port 52
 - Netsend recipient 98, 208

- IP address, cont.

- virtual management port 37, 42, 184, 314, 315

- IRAM statement 9

J

- JBOD expansion 24, 30, 115, 163

L

- language selection, WebPAM
 - PROe 44, 54

LED

- battery 279
- controller 33, 275, 317
- controller status 108, 159, 280
- cooling unit 279
- dirty cache 108, 159, 280, 316
- disk status 34, 113, 276, 301, 302, 303
- Ethernet connector 314
- fan 279
- FRU 33, 317 275
- FRU status 277
- heartbeat 33, 275, 317
- logical drive 33, 275, 301
- power 33, 275, 317
- power supply 279
- power/activity 33, 276
- red or amber 275
- RJ45 connector 314

locate

- controller 108, 159
- disk array 176
- enclosure 113, 163
- logical drive 183
- physical drive 119, 120, 166
- power supply 115, 161
- spare drive 144

lock
 releasing 71, 156
 renewing 71, 156
 setting 70, 155
 subsystem 70, 155
 view status 70, 155

log in
 CLI 35, 311, 312, 315
 CLU 150
 WebPAM PROe 42, 52

log out
 CLU 152
 WebPAM PROe 48, 59

logged-in devices
 Fibre Channel 83, 186

logical drive
 alias 47, 127, 139, 170
 capacity 47, 127, 131, 170, 176
 check table 141
 create 130, 175
 critical 137
 delete 132, 177
 information 137, 148, 181
 initialize 140, 182
 LED 33, 301
 locate 183
 LUN 142
 offline 138
 partition and format 260
 RAID level 47, 127, 131, 170
 rebuilding 137
 Redundancy Check 140, 183
 reported events 291, 292
 settings 139, 181, 182, 258
 status 137
 Summary 148
 synchronization 138
 synchronizing 137
 transport ready 138
 view list of all 148

logout other users 76

LUN affinity 48, 110, 128, 139, 158, 326
 defined 257

LUN map
 add 89, 197
 edit 90
 logical drive 142
 view 89

LUN masking, enable 89, 196

M

MAC address 36

main menu, CLU 151

maintenance mode 37, 40, 77, 184, 310

management connection
 Fibre Channel 21
 SAS 26

management port, virtual 36

Media Patrol 134
 defined 267
 enable 47, 67, 127, 170, 173, 192
 reported events 292
 run 68, 155
 schedule 69

MIB files 325

MIC statement 10

migrate
 disk array 132, 174
 rate 66, 192
 reported events 295

missing controller 310

N

Netsend
 event reporting to Windows 319
 recipients 97, 207

- Netsend, cont.
 - requirements 98, 208
 - service 98, 207
 - settings 97, 207
- network interface card (NIC) 21, 22, 24, 27, 28, 30
- network switch 21, 22, 24, 27, 28, 30
- numbering drive slots 17
- NVRAM event log 194, 281

- O**
- offline
 - logical drive 138
 - physical drive 122, 166, 305
- online capacity expansion 260
 - reported events 292, 293
- online help
 - CLU 152
 - WebPAM PROe 56
- operational status, disk array 129, 172
- orphan watermark 111, 157
- overheated enclosure 308
- overview of VTrak 2

- P**
- partition and format 260
- password
 - CLI/CLU 35, 150
 - CLU 200
 - WebPAM PROe 43, 52, 74
- Pause On Error 69, 141, 183
- PDM
 - defined 268
 - enable 47, 127, 170, 173
 - rate 67, 193
 - reported events 293
 - running 68, 135, 175
 - triggers 67, 193, 268
- PFA condition 122, 165
- physical drive
 - AAMUX 18
 - alias 121, 165
 - capacity coercion 111, 158, 258
 - command queuing 120, 164
 - configurational status 120
 - DMA mode 120, 164
 - failed 305
 - failure recovery 301
 - force offline or online 122, 166
 - from older subsystem 317
 - global settings 119, 164
 - information 120, 165
 - installing 17
 - list 119
 - locate 119, 120, 166
 - not usable 305
 - operational status 120
 - read cache 120, 164
 - reported events 293, 294
 - select for array 47, 127, 170
 - select for spare 145, 178
 - settings 121
 - state and PFA condition 122, 165, 302, 305
 - statistics 121
 - supported 317
 - write cache 120, 164
- popup messages 283
- port
 - circle icon 24, 28, 30, 85
 - diamond icon 24, 28, 30, 85
 - SAS 24, 30
- port settings
 - Fibre Channel 79, 80, 186
 - SAS 85, 190
- port statistics
 - Fibre Channel 81, 188
 - SAS 86, 191

- power
 - connection 33
 - LED 33, 275
- power supply
 - failed 307, 309
 - fan failure 308
 - LED 279
 - locate 161
 - replace 223
 - reported events 295
 - status 115, 160
- power supply fan reported events 295
- power/activity LED 33, 276
- Predictive Data Migration 268
- preferred controller ID 48, 128, 131, 139, 170, 176
- privileges
 - CLU user 200
 - WebPAM PROe user 75
- problem reporting
 - CLU 281
 - WebPAM PROe 283, 301

Q

- quick initialization 182

R

- rackmount
 - E310f/s 14
 - E610f/s 12
- RAID
 - block and double parity stripe 242
 - block and parity stripe 241
 - enhanced mirror 240
 - introduction 237
 - mirror 239
 - mirror + stripe 243
 - stripe 238

- RAID, cont.
 - striping of distributed parity 244
 - striping of double parity 247
- RAID levels
 - changing 260
 - choosing 250
 - logical drive 47, 127, 131, 170
 - RAID 0 238, 250
 - RAID 1 239, 250
 - RAID 10 243, 252
 - RAID 1E 240, 251
 - RAID 5 241, 251
 - RAID 50 244, 252
 - RAID 6 242, 251
 - RAID 60 247, 252
- read cache
 - physical drive 120, 164
 - policy 48, 128, 131, 139, 170, 176
 - policy, defined 255
- read check table 142
- reassigned block threshold 67, 193
- rebuild
 - disk array 133, 174, 302
 - manual 134
 - rate 66, 192
 - reported events 296
- rebuilding
 - disk array 130, 172
 - logical drive 137
- recipients, Netsend 97
- recondition a battery 117, 163
- red X 274, 283, 307
- Redundancy Check 69, 140, 183
 - rate 66, 193
 - reported events 297
- redundancy, subsystem 62, 154
- regulatory statements 9
- releasing lock 71, 156
- renewing lock 71, 156

repair, returning product for 323

replace

battery 229

blower 224

controller 233

fan 224

power supply 223

reported events

array incomplete 300

battery 286, 287

BBU 288

blower 287, 288

controller 288, 289, 290, 291

disk array 288

enclosure 289

event log 289

Fibre Channel 290

logical drive 291, 292

Media Patrol 292

online capacity expansion 292,
293

PDM 293

physical drive 293, 294

power supply 295

power supply fan 295

RAID level migration 295

rebuild 296

Redundancy Check 297

resource not available 297

SMART error 298

Spare Check 297

spare drive 298

stripe level migration 298

synchronization 299

system 299

transition 299

watermark 300

resource not available reported

event 297

restart the subsystem 107, 215,

219, 222

restore default settings 104, 212

returning product for repair 323

revertible spare drive 135, 144,
145, 146, 178, 179, 269

RJ11-to-DB9 cable 11, 32, 150

RJ45 connector 21, 26, 313

RMA number 324

running background activities 67

runtime event log 63, 194, 281

S

SAN, Fibre Channel 21

SAS

DAS 27

data connection 26

data port 26, 27, 28, 85

data/cascade port 26, 27, 28,
85

expansion port 26

HBA card 27, 28, 30

initiator 86, 143, 191

management connection 26

port settings 85, 190

port statistics 86, 191

SAS port 24, 30

scheduling background activities
69

sector size 48, 128, 131, 170, 176
defined 253

security certificate 49

Serial cable connections 32

serial connection 150

setting up 35

setting lock 70, 155

settings

background activities 66, 192

buzzer 118, 216

CIM 96, 206

controller 110, 158

controller management port 77

disk array 130, 172, 173

settings, cont.

- email 91, 202
- enclosure 115, 162
- Fibre Channel ports 80, 186
- logical drive 139, 181, 182, 258
- Netsend 97, 207
- physical drive 121
- physical drives 119, 164
- restore default 104, 212
- SLP 92, 203
- SNMP 94, 204
- spare drive 146, 179
- subsystem management port 77, 184
- Telnet 94, 204
- temperature 115, 162
- user 72, 73, 200, 201
- Web Server 92, 203

severity of events 73, 97, 207

SFP information 82, 187

shutdown the subsystem 106, 213

SLP

- service 92, 203
- settings 92, 203

SMART 110, 158

SMART error 298

SNMP

- MIB files 325
- service 96, 205
- settings 94, 204
- trap sinks 95, 205

Software Services 91

Spare Check 69, 147, 179

- reported events 297

spare drive 259, 301

- create 145, 178
- delete 146
- locate 144
- reported events 298
- select physical drive 145, 178

spare drive, cont.

- settings 146, 179
- Spare Check 147, 179
- transition 135
- view 144

specifications 8

stale condition 122, 165

statistics

- clear 105, 211
- controller 110, 157
- Fibre Channel 81, 188
- physical drive 121, 165
- SAS 86, 191

status

- controller 108, 157
- cooling unit 115, 161
- Fibre Channel 79
- logical drive 137, 181
- physical drive 120, 165
- power supply 115, 160
- spare drive 144
- subsystem lock 70, 155

Storage Network 60

stripe level migration reported event 298

stripe size 47, 128, 131, 170, 176 defined 253

subsystem

- alias 62, 154
- cascading 28, 115, 163
- date and time 37, 39, 63, 156
- fully booted 317
- information 61
- lock 70, 155
- logging into 60
- maintenance 217
- management port settings 77, 184
- Media Patrol 155
- redundancy 62, 154
- restart 107, 215, 219, 222

subsystem, cont.
 service report, save as text file
 62
 shutdown 106, 213
 storage network 60
synchronization
 disk array 129, 172
 logical drive 137, 138
 new logical drive 132
 rate 66, 193
 reported events 299
system reported event 299

T

Table Rounding 111, 158, 259
Technical Support, contact 319
Telnet
 connection 150
 service 94, 204
 settings 94, 204
temperature, enclosure 115, 161
terminal emulation program 35
test
 buzzer 118
 email 74, 91
TFTP server 217, 221
timing out, WebPAM PROe 318
topology
 enclosure 114, 163
 Fibre Channel 81, 187
Transition
 automatic 271
 defined 269
 manual 271
 rate 67, 193
 reported events 299
 spare drive 135
transport disk array 136, 173
transport ready
 disk array 130, 172
 logical drive 138

trap sinks 95, 205

U

unpacking the VTrak 11
UPS support 32
user
 create 75, 199
 database, export 99
 database, import 100
 delete 76, 201
 event subscriptions 73
 logout others 76
 password, change 74
 privileges 75, 200
 settings 72, 73, 200, 201
 view 72, 199
 view sessions 76
username and password
 CLI/CLU 35, 150
 WebPAM PROe 43, 52

V

view
 background activities 66
 controllers 108
 disk arrays 124
 enclosure 113
 Fibre Channel logged in devices 83, 186
 Fibre Channel port settings 79, 186
 Fibre Channel port statistics 81, 188
 list of all logical drives 148
 lock status 70
 LUN map 89
 physical drives 119
 scheduled activities 68
 SFP information 82, 187
 spare drives 144

view, cont.

users 72, 199

virtual management port 36, 77,
184, 315

voltage, enclosure 115, 161

VTrak

architectural description 4

beeping 274, 301

features and benefits 5

overview 2

rackmount E310f/s 14

rackmount E610f/s 12

specifications 8

unpacking 11

warranty 9

W

warranty 322

watermark

orphan 111, 157

reported events 300

Web Server

service 93, 203

settings 92, 203

WebPAM PROe 44, 54

access over an intranet 318

access over the Internet 49

Event Frame 58

Header 56

initial setup using 42

interface 55

log in 42, 52

log out 48, 59

Management View 58

no browser connection 315

problem reporting 283, 301

times out 318

Tree View 57

username and password 43,
52

write cache policy 48, 128, 131,
139, 170, 176

defined 255

physical drive 120, 164

write check table 142

Y

yellow ! 274, 283, 307