# RocketRAID 4520/4522 Series User Manual

April 9th , 2020 Revision 1.5 HighPoint Technologies, Inc.

#### Copyright

Copyright © 2020 HighPoint Technologies, Inc. This document contains materials protected by International Copyright Laws. All rights reserved. No part of this manual may be reproduced, transmitted or transcribed in any form and for any purpose without the express written permission of HighPoint Technologies, Inc.

#### Trademarks

Companies and products mentioned in this manual are for identification purpose only. Product names or brand names appearing in this manual may or may not be registered trademarks or copyrights of their respective owners. Backup your important data before using HighPoint's products and use at your own risk. In no event shall HighPoint be liable for any loss of profits, or for direct, indirect, special, incidental or consequential damages arising from any defect or error in HighPoint's products or manuals. Information in this manual is subject to change without notice and does not represent a commitment on the part of HighPoint.

#### Notice

Reasonable effort has been made to ensure that the information in this manual is accurate. HighPoint assumes no liability for technical inaccuracies, typographical, or other errors contained herein.

#### FCC Part 15 Class B Radio Frequency Interference statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

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.

#### European Union Compliance Statement

This Information Technologies Equipment has been tested and found to comply with the following European directives:

- European Standard EN55022 (1998) Class B
- European Standard EN55024 (1998)

## **Table of Contents**

Product Specifications	5
RocketRAID 4520/4522 Overview	6
What's in the Box	7
Getting Started	7
Step 1: Setting Up the Hardware	8
Step 2: Install/Update Drivers	9
Step 3A: Install HighPoint RAID Management (WebGUI)	15
Step 3B: Installing HighPoint Command Line Interface (CLI) (Windows / Linux / FreeBSD)	
Step 4A: Create RAID Arrays using WebGUI	20
Step 4B: Create RAID Array using RocketRAID BIOS (PC only)	23
Step 4C: Create RAID Arrays using CLI (Windows / Linux / FreeBSD)	
Step 5: Initialize and format the RAID Array	30
Manage your RAID array	36
RAID Spare Pool	36
Email Notifications	37
WebGUIRemote Login	38
Storage Health Inspection (SHI)	40
Utilizing the Health Inspector Scheduler	41
RAID Expansion (OCE/ORLM)	42
Updating RocketRAID HBA BIOS/Firmware	44
Updating BIOS/Firmware using WebGUI	44
Updating BIOS/Firmware using a bootable USB	44
Troubleshooting - Hardware	45
PC hangs during Boot Up	45
Troubleshooting - Software	46
WebGUI – Connection cannot be established	46
Troubleshooting - RAID	47
Critical Arrays	47
Disabled Arrays	48
Setting up a Bootable RAID	
Battery Backup Unit (BBU, sold separately)	. 50
Online Array Roaming	
Port Multiplier (PM) Compatibility	. 52
Appendix A: NavigatingRocketRAID 4522 BIOS Utility (PC only)	. 53

Appendix A-1: System Tab	55
Appendix A-2: Disk Tab	55
Appendix A-3: Array Tab	57
Appendix A-4: Controller Tab	60
Appendix A-5: Window Tab	62
Appendix B: Navigating the HighPointWebGUI	62
How to Login HighPointWebGUI	63
Appendix B-1: Global Tab	64
Appendix B-2: Physical Tab	65
Appendix B-3: Logical Tab	68
Appendix B-4: Setting Tab	77
Appendix B-5: Recover Tab	79
Appendix B-6: Event Tab	80
Appendix B-7: SHI (Storage Health Inspector)	81
Appendix C:WebGUI Icon Guide	82
Appendix D: RAID Level Reference Guide	84
Help	85
HighPoint List of Recommended Hard Drives	85
Contacting Technical Support	

## **Product Specifications**

RocketRAID 4522 Technie	cal Specification	15		
I/O Processor	6Gb/s RAID-on			
Cache Memory	512MB DDR3 C	Cache memory with ECC protection		
Battery Backup Unit	<b>Optional Batter</b>	y Backup Module (HPTBBU-05)		
Data Transfer Rate	Up to 6Gb/s pe	er port		
Number of Device Ports	8 6Gb/s SAS &			
Host Bus Interface	PCI Express 2.0			
Device Connector Type	Dual Mini-SAS			
Onboard Indicators /	Alarm Buzzer			
Monitor	Alarin Buzzer			
Device Supported	8 6Gb/s SAS &	SATA drives		
Backward Compatibility	Backward Com	patible with HighPoint RAID HBA		
Physical Form Factor	Low Profile			
Dimensions	6.57" L x 2.68"	H x 0.06" W		
RAID Feature Suite				
RAID 0, 1, 5, 6 , 1/0, 5/0, J				
Redundant RAID Configura		wailability		
<b>RAID Initialization Types</b>				
Background, Foreground a				
Native Command Queuing	(NCQ)			
Staggered Drive Spin Up				
Spin Down Idle Disk				
Enhanced data protection	with Write Journ	aling feature		
NVRAM keeps tracks I/O t	ransaction logs			
S.M.A.R.T Support				
Bootable RAID Array Supp	ort			
Auto Rebuild on spare driv	/e			
Hot-Plug and Hot-Swap su	pport			
Larger than 3 TB drive sup				
Write Back or Write Throug				
DV Mode Performance Ass	urance Technolo	ogy		
Supports OCE / ORLM				
4Kn Drive Compatible				
Configuration Management Suites:		User friendly Browser-based Management Interface Easy to use BIOS configuration Tool Linux Command Line Interface (CLI) – Scriptable configuration tool		
Monitoring and Management Support: SMTP, SES2, Event Log, SGPIO*, LED Statu (* = RR4520 only)				
Operating System Support:		Windows 10 / Windows Server 2016, Major Linux Distributions (RHEL, CentOS, SLES, Fedora, Ubuntu and Linux Open Source Drivers), FreeBSD, Mac OS X 10.6.x and later		
Operating Temperature:		Work Temp: $+5^{\circ}C \sim + 55^{\circ}C$ . Storage Temp: $-20^{\circ}C \sim + 80^{\circ}C$ Relative Humidity: 5% ~ 60% non condensing.		
Operating Voltage: 12 V / 3.3 V, Power: 11W				
MTBF (Mean Time Before Failure): 920,585 Hours				

Certification Approval:	FCC, CE
-------------------------	---------

## RocketRAID 4520/4522 Overview



Figure 2. RocketRAID 4522

RocketRAII	) 4522 Key
PORT1	mini-SAS (SFF-8088) Connection Corresponds to channel 1-4
PORT2	mini-SAS (SFF-8088) Connection Corresponds to channel 5-8
BEEP	Alarm/Beeper

J9	I <sup>2</sup> C Bus PIN 1 is denoted by a square. PIN 2 and PIN 3 are to the right of PIN 1. PIN 1 SCL PIN 2 GND PIN 3 SDA
J6	Battery Backup Unit (BBU) Connector
A1, A2 (RR4520)	Active LED pin
F1, F2 (RR4520)	Fail LED pin

#### What's in the Box

Make sure the following items are included in your purchase:

- RR4522 Host Bus Adapter (S/N sticker located on RocketRAID card)
- Driver CD
- Low profile bracket
- Quick Installation Guide

Note: Cables and Battery Backup Unit (BBU) are sold separately.

### **Getting Started**

Thank you for purchasing HighPoint Technologies RocketRAID 4522. You are only a few steps away from utilizing RAID storage using the industry's most affordable hardware RAID solution.

To start using your RocketRAID 4522 take the following steps:

- 1. Setting up the Hardware (pg. 8)
- 2. Install/Update drivers (pg. 9)
- 3. Install HighPoint RAID Management (WebGUI) (pg. 15)
- 4. Create RAID Arrays (pg. 20)
- 5. Initialize and format RAID Volumes (pg. 30)

### Step 1: Setting Up the Hardware

Ensure all items listed under Kit Contents are included in your package. For any discrepancy contact your reseller or submit a support ticket online at <u>www.highpoint-tech.com/websupport</u>.

### Preparing the RocketRAID HBA (Host Bus Adapter)

The following instructions describe how to prepare your RocketRAID4522 HBA for use.

#### To install your RocketRAID4522:

**Important**: Before installing the RocketRAID4522 Controller, ensure that your system is powered OFF.

- 1. Locate a PCI Express 2.0 x8 slot (or compatible slot) on your PC or Mac Pro (old version) motherboard.
  - Note 1: Refer to your PC or Mac Pro manual for instructions on how to access your motherboard.
  - Note 2: Refer to your motherboard manual for instructions on how to locate your PCI Express slot.
- 2. Align the RocketRAID4522 with the PCI Express slot and push straight down until the card is fully seated.
- 3. Tighten the connection by fastening the RocketRAID bracket and enclosure together with a screw.
- 4. Power on system and continue to Step 2: Install/Update Drivers

A PCI Express 2.0 x8 card is compatible with PCI Express 2.0 x16 and PCI Express 3.0 x16 slots. The following diagram shows how to install HBA to a PCIe slow on motherboards.



## Step 2: Install/Update Drivers

#### Installing drivers on a Bootable RAID Array

For instructions on how to install drivers during Windows OS installation refer to pg. 50.

#### Installing Drivers on an Existing Operating System

Drivers provide a way for your operating system to communicate with your new hardware. Updating to the latest drivers ensures your product has the latest performance, stability, and compatibility improvements. Drivers are updated regularly at <u>www.highpoint-tech.com</u>.

#### For Windows Users:

- 1. Download the latest driver files from our website <u>www.highpoint-tech.com</u>> Support > Documents and Downloads >RocketRAID 4500 Series.
- 2. Extract the downloaded files onto your PC and note the location of the files.



- 3. Open Windows **Device Manager** (Control Panel > Hardware and Sound > Devices and Printers > Device Manager).
- 4. Under Other devices, right-click **RAID Controller**.
- 5. Click Update Driver Software.

🚔 Device Manager – 🗆 🗙
File Action View Help
A A hptwin8
Audio inputs and outputs
⊳ 1 Computer
> 🌉 Display adapters
BDVD/CD-ROM drives
🔺 🦣 Human Interface Devices
🕼 Logitech USB First/Pilot Mouse+
a 😋 IDE ATA/ATAPI controllers
🕁 Intel(R) 9 Series Chipset Family SATA AHCI Controller
🕁 Standard SATA AHCI Controller
Keyboards
Mice and other pointing devices
Monitors
<ul> <li>Metwork adapters</li> <li>Other devices</li> </ul>
Other devices     RAID Controller
Ports (COM & LPT Update Driver Software
Print queues Disable
Processors Uninstall
> 27 Sensors
Goftware devices     Scan for hardware changes
Sound, video and Properties
Storage controllers
Figure System devices
Launches the Update Driver Software Wizard for the selected device.

6. Click Browse my computer for driver software.



7. Navigate to where you saved the driver files.

Browse For Folder	×
Select the folder that contains drivers for your hardware.	
Desktop	
🖻 🔀 hpt	
🖻 🖳 This PC	
Eibraries	
Network	
Hptiop_Windows_Miniport_v1.6.4.0.2_15_07_21	
<u>↓</u> x32	
📕 x64	
hptiop-win-1.4.74.22-20130222	
RAID_Manage_Win_v2.5.2.4_15_01_12	
RR64xL_Windows_Miniport_v1.3.14.0.1_15_07_22	
Folder: X64	
Eolder: x64	
OK Cancel	

- 8. Click OK.
- 9. Click **Next**, Windows security will prompt to ask if you are sure you want to install HighPoint Software.



10. After clicking **Install**, driver will be installed.



11. **Reboot** for changes to take effect.

#### For Mac Users:

- 1. Obtain latest driver online at www.highpoint-tech.com
- 2. Click the downloaded file.



- 3. A mounted volume will appear on the desktop. Click the icon to open the volume.
- 4. Click the driver package to start installation (.pkg file)



5. Follow the on-screen instructions of the installer.



- 6. Reboot computer for changes to take effect.
   7. Make sure Driver Installed is Yes

	RocketRAID 4522 SAS	Controllor
▼ Hardware	NUCKEINAID 4522 SAS	Controller.
ATA	News	Destal DAID (500.040.0551)
Audio	Name:	RocketRAID 4522 SAS Controller
Bluetooth	Type: Driver Installed:	RAID Controller Yes
Camera	Tunnel Compatible:	Yes
Card Reader	Pause Compatible:	Yes
Diagnostics	MSI:	Yes
Disc Burning	Bus:	
e e e e e e e e e e e e e e e e e e e	Slot:	Thunderbolt@193,0,0
Ethernet Cards	Vendor ID:	0x1103
Fibre Channel	Device ID:	0x4522
FireWire	Subsystem Vendor ID:	
Graphics/Displays	Subsystem ID:	0x9580
	Revision ID:	0x00b3
Hardware RAID	Link Width:	x4
Memory	Link Speed:	5.0 GT/s
NVMExpress		
PCI		
	lo Icon > About this Mac	Constant Descent DCI

Click Apple Icon > About this Mac> System Report > PCI

#### For Linux Users:

Users with Linux Kernel 3.9.4 or later have embedded RocketRAID 4500 series drivers in system, therefore do not need to install additional drivers. For users with older Linux kernel versions or driver compatibility issues, take the following steps:

- 1. Visit <u>www.highpoint-tech.com</u>> Support > Documents and Downloads >RocketRAID 4500 Series.
- 2. Click Download located next to Linux opensource driver
- 3. Start Terminal and navigate to the directory containing the drivers.
- 4. Extract the folder contents using the following commands, for example:
  - gunzip RR3xxx\_4xxx\_Linux\_Src\_v1.10.0\_15\_06\_04.tar.gz
  - tar -xvf RR3xxx\_4xxx\_Linux\_Src\_v1.10.0\_15\_06\_04.tar

```
[hpt@localhost
                  ]$ ls
RR3xxx 4xxx Linux Src v1.10.0 15 06 04.tar.gz
                  ]$ gunzip RR3xxx 4xxx Linux Src v1.10.0 15 06 04.tar.gz
hpt@localhost
                  ]$ ls
[hpt@localhost
R3xxx_4xxx_Linux_Src_v1.10.0_15_06_04.tar
                  ]$ tar -xvf RR3xxx_4xxx_Linux_Src v1.10.0 15 06 04.tar
[hpt@localhost
RR3xxx 4xxx Linux Src v1.10.0/
RR3xxx 4xxx Linux Src v1.10.0/Makefile
RR3xxx 4xxx Linux Src v1.10.0/hptiop.c
RR3xxx 4xxx Linux Src v1.10.0/install.sh
RR3xxx 4xxx Linux Src v1.10.0/hptiop.h
RR3xxx 4xxx Linux Src v1.10.0/README
[hpt@localhost
                  ]$
```

5. Read the README to verify the commands used to install the driver.

- 6. Enter super user mode. Type make to build driver, then type make install to install the driver.
- 7. Reboot.

#### For FreeBSD Users:

- 1. Visit <u>www.highpoint-tech.com</u>> Support > Documents and Downloads >RocketRAID 4500 Series.
- 2. Download the FreeBSD drivers and copy them onto a USB thumb drive.
- 3. Mount the USB and extract the drivers, then copy the driver to /boot/kernel/hptiop.ko.
- # tar-zxvf xxx.tgz
  # cp hptiop-xxx.ko /boot/kernel/hptiop.ko
- 4. To set the drivers to automatically load on startup, type the following command.
- # echo 'hptiop\_load="YES"' >> /boot/defaults/loader.conf

For more information, refer to the FreeBSD Manual at: <u>http://highpoint-</u> <u>tech.com/BIOS\_Driver/rr4520/FreeBSD/rr4522/Install\_FreeBSD\_RR3xxx\_4xxx.pdf</u>

#### Step 3A: Install HighPoint RAID Management (WebGUI)

The HighPoint RAID Management (WebGUI) software is a useful tool used to create, maintain, and view your RAID arrays.

#### For Windows Users:

- 1. Download the latest WebGUI from our website at <u>www.highpoint-tech.com</u>> Support > Documents and Downloads >RocketRAID 4500 Series
- 2. Extract and open the contents of the downloaded file.



3. Double-click HighPoint RAID Management.exe.



- 4. Follow the on-screen instructions to complete the WebGUI installation
- 5. Double-click the **HighPoint RAID Management** desktop icon to start the WebGUI. Alternatively, type <a href="http://localhost:7402">http://localhost:7402</a> in your browser address bar.



6. Your default web browser will open and prompt for a username and password (Default username: **RAID** / password: **hpt**). Username and password are case-sensitive.

### For Mac Users:

- 1. Download the latest WebGUI from our website <u>www.highpoint-tech.com</u>> Support > Documents and Downloads >RocketRAID 4500 Series
- 2. Double Click the downloaded Mac WebGUI file.



3. Double click the HighPointWebGUI.pkg to start the WebGUI installer.

	- HighP	ointWebGUI	
	- Internet	Territoria de la constancia de la consta	
HighPointWebGUI.pkg	Install_MacOSX_WebGUI.p df	readme.txt	

- 4. Follow the installer on-screen instructions to complete the WebGUI installation.
- 5. Double-click the HighPoint RAID Management desktop icon to start the WebGUI.



6. Your default web browser will open and prompt for username and password (Default username: **RAID** / password: **hpt**). Username and password are case-sensitive.

### For Linux Users:

- 1. Visit <u>www.highpoint-tech.com</u>> Support > Document and Downloads >RocketRAID 4500 Series.
- 2. Navigate to Linux WebGUI and click Download.
- 3. Start Terminal and navigate to the downloaded files.
- 4. Extract the contents by typing the following commands (filename varies):
  - gunzip RAID\_Manage\_Linux\_v2.3.1\_14\_10\_20.tgz
  - tar -xvf RAID\_Manage\_Linux\_v2.3.1\_14\_10\_20.tar

```
[hpt@win-hpmlfhibepv ~]$ cd Downloads/
[hpt@win-hpmlfhibepv Downloads]$ ls
RAID_Manage_Linux_v2.3.1_14_10_20.tgz
RR3xxx_4xxx_Linux_Src_v1.10.0
RR3xxx_4xxx_Linux_Src_v1.10.0
[hpt@win-hpmlfhibepv Downloads]$ gunzip RAID_Manage_Linux_v2.3.1_14_10_20.tgz
```

5. Read the README.txt file for specific instructions on how to install.

Σ	hpt@localhost:/home/hpt/Downloads     _		×
File E	dit View Search Terminal Help		
rnet	Explorer 6.0, Mozilla or FireFox.		2
3. Inst	alling the Software Package		
	To install the packge, you must log on as root.		
	Start your terminal and input the command: # ./RAID_Manage_Linux_2.3.1_14_10_20.bin		-
	The following files will be installed/configured: /usr/bin/hptsvr - service program /usr/bin/hptraidconf - command line program(CLI) /etc/hptcfg - service config file /etc/rc.d/init.d/hptdaemon - service control script /usr/share/hpt/webguiroot - data files		
er	If there is no /etc/hptcfg, you can add it manually by echo the contr driver name to /etc/hptcfg. For example for RR3220	roll	

Log in as root and type ./RAID\_Manage\_ Linux\_v2.3.1\_14\_10\_20.bin to install.
 Reboot.

#### Uninstalling HighPoint RAID Management (WebGUI)

#### For Windows Users:

- 1. Open Control Panel.
- 2. Click Uninstall a program.

3. Select HighPoint RAID Management to uninstall.

#### For Mac Users:

- 1. Navigate to /Applications/HPTWEBGUI/uninstall.
- 2. Click on the uninstall script.
- 3. Type in the Administrator password when prompted.

#### <u>Step 3B: Installing HighPoint Command Line Interface (CLI)</u> (Windows / Linux / FreeBSD)

The HighPoint CLI (Command Line Interface) is a command line utility that configures and manages HighPoint RAID controllers via command line. This is ideal for systems that cannot use the browser-based RAID management utility (WebGUI).

#### For Windows Users:

The HighPoint CLI software is bundled with the Windows platform WebGUI installation. Follow the steps outlined in step 3A to install the CLI.

To run CLI on Windows:

- 1. Run hptraidconf
- 2. Click **hptraidconf** to open a **cmd** terminal.
- 3. Input your username and password when prompted (default username: **RAID** / password: **hpt**.)

#### For Linux Users:

For Linux users, the CLI is an included package with WebGUI.

To run CLI on Linux:

- 1. Visit <u>www.highpoint-tech.com</u> for the latest CLI management update.
- 2. Download and save the file onto your computer.
- 3. Navigate to the file in terminal and then read the README for installation instructions.
- 4. Type ./RAID\_Manage\_Linux\_2.3.1\_14\_10\_20.bin (file name will vary) to install.
- 5. Once finished type hptraidconf to start CLI.
- 6. Input your username and password when prompted (default username: **RAID** / password: **hpt**).

## Step 4A: Create RAID Arrays using WebGUI

#### For both Mac and Windows users:

- 1. Login to WebGUI (Default username: **RAID** / password: **hpt**).
- 2. Once logged in, click the Logical tab.

		loc	alhost	C	۵	00
Controller	r(1): 4520 😳			High	rechnologies, Inc.	
Glob	bal View Physical	Logical Setting	Event SHI	Recover Logout	Help	
НВА Р	Properties		Storage Prope	erties		
Enci Phy: Legi	st Adapter model: RocketRAI closure count: 0 vsical Drive: 4 gacy Disk: 4 ID Count: 0	ID 4520 SAS Controller	Con	Configured Capacity: 2	0003 GB GB	

Click Logical to go to create array page.

3. Click Create Array:

Global View	Physical Log	ical Set	ting Ev	vent Sł	II Recov	ver Logout	Help
reate Array			Logical	Device In	formation	<u>1</u>	
pare Pool	Name	Туре	Capacity	BlockSize	SectorSize	OS Name	Status
ogical Device	Device_1_1	Hard Disk	5.00 TB			HPT DISK 0_0	Legacy
escan	Device_1_2	Hard Disk	5.00 TB			HPT DISK 0_1	Legacy
eeper Mute	Device_1_3	Hard Disk	5.00 TB			HPT DISK 0_2	Legacy
eeper wute	Device_1_4	Hard Disk	5.00 TB			HPT DISK 0_3	Legacy
		lodel	-		nformatio	Capacity	Max Free
		OSHIBA MG04 OSHIBA MG04				5.00 TB	0.00 GB
		OSHIBA MG04				5.00 TB	0.00 GB
	╘ 1/4 т	OSHIBA MG04	ACA500E-44	GDK022FJJA		5.00 TB	0.00 GB

- 4. The RAID creation page provides many features, options, and settings. Detailed descriptions are provided on pg. 57.
- 5. Select **RAID5** for Array Type. (RAID Quick Reference on pg. 84)
- 6. Set array name as "Tutorial\_Array".
- 7. Select **Quick Init** as the initialization method.
- 8. Select **Write Back** as the **Cache Policy** for better disk write performance.
- 9. Select **64K** as the **Block Size**.
- 10. Select all 4 available disks.
- 11. Leave the **Capacity**, **Sector Size**, **DV mode**, and **Disk Cache Policy** settings at their default values.
- 12. Click Create

Create Array			Create Array		
Spare Pool	Array Type:	RAID 5	0		
ogical Device	Array Name:	Tutorial_Array			
Rescan					
Beeper Mute	Initialization Method:	Quick Init	0		
	Cache Policy:	Write Back	٥		
	Block Size:	64K	٥		
	Number of RAID5 member disks:	-1	٥		
		Select All	Location Model	Capacity	Max Free
			Hitachi Hitachi 1/5 HUS724040ALE640- PK1331PAHBJB2S	4.00 TB	0.00 GB
	Available Disks:		Hitachi HItachi 1/6 HUS724040ALE640- PK133VPAG1LG6S	4.00 TB	0.00 GB
			Hitachi HItachi 1/7 HUS724040ALE640- PK133VPAG1LNBS	4.00 TB	0.00 GB
			Hitachi HIUS724030ALE640- PK1231P8G09WGP	3.00 TB	0.00 GB
	Capacity: (According to the max free space on the selected disks)	Maximum	(MB)		
	DV Mode:	Disable ᅌ	Margin:		5% 🗘
	(Enable special cache policy for DV/sequential write applications)		(Increasing the n in more stable pe decrease the ma performance.)	erformance, b	
	Disk Cache Policy:	Unchange	0		

Create Array page.

13. Once created, the WebGUI will acknowledge the array has been created and the system will prompt you to initialize the new volume.



(Mac OS X) Array successfully created.

The disk you inserted was not readable by this computer.
Initialize Ignore Eject

New volume needs to be initialized before use.



(Windows) Array successfully created.

	Disk Management		×
File Action Vie	ew Help		
	= b × 🖻 🛋 (a 🗟		
Volume	Initialize Disk	Free Spa	% F
•	You must initialize a disk before Logical Disk Manager can access it.	200 MB 620 MB	10C
(D:)	Select disks:	74.51 GB	100
BOOTCAMP (C:	Disk 1	21.09 GB	56
< The desired and the desired	Use the following partition style for the selected disks: MBR (Master Boot Record) GPT (GUID Partition Table) Note: The GPT partition style is not recognized by all previous versions of Windows.		>
GDisk 1 Unknown Unallocated ■	OK Cancel		•
			_

(Windows) For Windows platforms, user will be prompted to initialize disks in Disk Management.

14. Tutorial\_Array can now be seen under Logical Device Information. (Take note that the OS name is HPT DISK 0\_0; this will help identify which volume to initialize)

		Logi	cal Devi	ice Infor	mation		
Name <b>Tutorial_Array</b>		Capacity 9.00 TB	BlockSize 64k	SectorSize	OS Name HPT DISK 0 0	Status	Maintenance
	KAID 5	9.00 18	04K	5126		Normai	Maintenance

Tutorial\_Array is now created and can be seen in Logical tab.

#### Step 4B: Create RAID Array using RocketRAID BIOS (PC only)

RAID arrays can also be created using the RocketRAID BIOS. To enter the RocketRAID BIOS press **CTRL** + **H** during PC boot up.

Legacy disks, or disks that contain previous partitions, have to be initialized before they can be used for RAID.

	Disk Arr	ay Cont	roller	Hindow = Disk	Help	12527			
Channe 1	Status	Type	Capac		eSpace	WCache	Mode	el Number	
1	Nornal	Legacy	1000.		0.00G			HD 18EADX	
2	Normal	Legacy	1000.		0.00G			WD10EADX	
3	Normal	Legacy	1000.		0.00G			WD10EADX	
4	Normal	Legacy	1000.		0.00G			HD10EADX	
				Arrau					
		Type	Capacit	Array - y Status	s OSI	łane	Task		Progres
	ADX-00TDH		1000.2	y Status BG Norm	al U	Yame 18-1	Task		Progress
HDC HD10E		BOSingle	1000.2	y Status	al U		Task		Progres:
HDC HD10E HDC HD10E	ADX-00TDH	BOSingle BOSingle	1000.2	y Status BG Norm	al VI al VI	10-1	Task		Progres:
Name HDC HD10E HDC HD10E HDC HD10E HDC HD10E HDC HD10E	ADX-00TDH ADX-00TDH	BOSingle BOSingle BOSingle	1000.20 1000.20 1000.20	y Status B <mark>G Norn</mark> a BG Norna	al Ul al Ul al VI	10-1 10-0	Task		Progres:

4 Legacy disks are shown here.

#### Initializing Disks

Before initializing, you must make sure you have the disk panel selected. The gold frame represents your current selection. By default, you start on the disk panel.

- 1. Press **ALT** + **W** to access Window tab.
- 2. Select disk(s).
- 3. Use keyboard arrow keys to navigate and press Enter to select desired disk(s).
- 4. Once disks are selected, press **ALT** + **D** to activate disk tab.
- 5. Select Initialize.

System I	<mark>)isk</mark> Array Controller	r Window
Channel (1) 1	Information	
(2) 2	Initialize	
(3) 3 •(4) 4	Toggle Spare Unplug	
	Turn <mark>o</mark> n write cache Turn off write cache	
	Rescan	[Alt+R]
	Identify disk	[Alt+F]

Four disks are selected and about to be initialized.

#### 6. Press Enter.

7. A prompt will warn you that data will be erased.

System	Disk Arr	ay Conti	coller W	indow He Disk —	elp			
Channe l	Status	Type	Capacit		ace WC	ache Mod	el Number	
•(1) 1	Norma l	Legacy	1000.20		886 On		HD10EADX-	00TDHB0
(2) 2	Normal	Legacy	1000.20	)G Ø.	00G On	HDC	HD10EADX-	OOTDHBO
(3) 3	Normal	Legacy	1000.20	IG Ø.	00G On	HDC	HD10EADX-	OOTDHBO
(4) 4	Norma l	Legacy	1000.20	IG Ø.	00G On	HDC	HD10EADX-	-22TDHB0
			Yes	No Irray —				
Nane	-	Type	Capacity		OSNam		P	rogress
HDC HD19E			1000.200		VD0-			
WDC WD10E			1000.200					
WDC WD10E			1000.200		VD0-			
WDC HD10E	10X-2210H	bosingle	1000.200	Normal	VD0-3	3		
[F10] Menu	[TAB] S	witch win	dow [Ent	erl Sele	ct			

- 8. Select Yes.
- 9. Once initialized, you can proceed to create an array.

System I	lisk Arr	ay Con	troller	lindow = Disk =	Help			States of	Constant of
Channel	Status	Type	Capac		Snace	WCache	Mode	el Number	
•(1) 1	Norma l	Empty	1000.1	LZG 100	0.12G	On		HD10EADX	
(2) 2	Normal	Enpty	1000.1		0.12G				
(3) 3	Normal	Enpty	1000.1		Ø.12G			HD10EADX	
(4) 4	Normal	Empty	1000.1		0.12G			HD10EADX	
-		140		Array —		-			
Name		Type	Capacity	Status	OSN	ame T	ask	I	rogress
[F10] Menu	[TAB] Sw	uitch ui	ndou IP-	tanl Sal					
ti ioi nenu	111101 20	itten ut	naou l'En	ter] Sel	ect			1	

## Create Arrays

- 1. Navigate to the disk panel (ALT + W, then press 1)
- 2. Select each disk you wish to include in your array

Channe l	Status	Type	Camar	= Disk		1101-	N-1		
(1) 1	Normal	Legacy	1000	286	a and	On		el Nunber HD18EADX-	0070000
(2) 2	Norma 1	Legacy	1000.		0.00G			HD10EADX	
(3) 3	Normal	Legacy		20G		On		WD10EADX	
(4) 4	Normal	Legacy	1000.		0.00G			HD10EADX	
				Array					
		Type	Capacit	- Array y Statu	s OSM	lane	lask		Progress
HDC HD10EA	IX-88TDH1	BOSingle	1000.2			lane 1	lask		Progress
HDC HD10EA HDC HD10EA	DX-00TDHI	BOSingle BOSingle	1000.2	y Statu OG Norm	al VI		lask	I	Progress
Name HDC HD19EA HDC HD19EA HDC HD19EA	DX-00TDHI DX-00TDHI	BOSingle BOSingle BOSingle	1000.2 1000.2 1000.2	y Statu OG Norm	al VI al VI	19-1	ľask	1	progress
HDC HD10EA HDC HD10EA	DX-00TDHI DX-00TDHI	BOSingle BOSingle BOSingle	1000.2 1000.2 1000.2	y Statu OG Norn OG Norn	al VI al VI al VI	18-1 10-0	lask	I	Progress

Each selected disk has (#) symbol on the left.

- 3. Press **ALT** + **A** to open array panel
- 4. Press Create:

		Array Controller	- Disk
Channel	Stat	Information	ty FreeSpace WCache Model Number
(1) 1	Norm		ZG 1988.12G On HDC HD19EADX-09TDHD6
(2) 2	Norm	Create	ZG 1000.12G On NDC ND10EADX-00TDHB
(3) 3	Norm	Delete	ZG 1000.12G On NDC ND10EADX-00TDHB
(4) 4	Norm	Unplug	2G 1888.12G On HDC HD18EADX-22TDHB8
		Verify	
		Start task	
		Stop task	
		Set Boot	
		Set DUDI	
		Contraction of the second second	
	111		— Array ————
Nane		Type Capaci	ity Status OSName Task Progress

Press ALT+A to open menu, then select create.

5. Press **Spacebar** to navigate and make selections (**TAB** also navigates between windows)

System I	lisk Array Controller	Hindow Help Disk	
Channel (2) 2 (3) 3 (4) 4	Status         Type         Capz           Array         Type         ()           Array         Type         ()           ()         1:RAID         0           ()         2:RAID         1           ()         3:JBOD         ()         4:RAID           ()         3:JBOD         ()         4:RAID           ()         3:JBOD         ()         5:RAID           ()         5:RAID         3           ()         6:RAID         5           ()         7:RAID         6           ()         8:RAID         5/0	Disk         acity FreeSpace WCache Model Number         Create Array         Init Method         (.) Quick init         (.) Quick init         (.) Poreground         (.) Background         (.) Xeep old data         Name         RAIDS_00         Block Size	3
Name [F18] Menu	( ) Write-through Crea	64KB Progress	

RocketRAID BIOS create array option menu.

- 6. Press Create (ALT + E)
- 7. A prompt about sector size will pop up, select a sector size (irrelevant for Windows XP 64-bit and later.)

Disk —	
Channel Status Type Capacity FreeSpace WCache Model Number	
•(1) 1 DX-88	
	TDHB0
(3) 3 () 1:RAID 0 (+) Quick init X-00	TDHB0
(4) 4 () 2:RAID 1 () Foreground X-22	TDHBØ
() 3:JB_= Sector size	
() 4:RA	
() S:RA 512B	
2X () 7:RA 2X	
() 8:RA <mark>4K</mark>	
rCache Po OK	
() None	
(.) Writ	
	gress
	a construction
Create Cancel	
[F10] Menu [TAB] Switch window [Enter] Select	

8. Your created array will show up in the Array Window.

		-		6.000 C		sk =		2000	i mean	S M M	
Channe l	Status	Type		Capac	ity I	Free	Space	HCache		el Number	
1	Normal			1000.			0.12G			WD18EADX	
2	Normal			1000.			0.12G	On	HDC	HD10EADX	-00TDHB
3	Normal			1000.			0.12G	On	HDC	HD10EADX	-00TDHB
4	Normal	RAID	disk	1000.	126	l	0.12G	On	HDC	HD10EADX	-22TDHBB
					Arra						
ne		Type	Ca	pacit	Arra y Sta		OSN	ane	Task		Progress
ne 1 15_88		Type RA105		pacit 99.99	y Sta	itus	OSN		Task		Progress
					y Sta	itus			Task		Progress

Array RAID5\_00 has been created.

9. Exit the BIOS (ALT+X). Alternatively, ALT + S to open System Tab, then select Exit.

### Step 4C: Create RAID Arrays using CLI (Windows / Linux / FreeBSD)

Start your operating systems console such as command prompt (Windows). On the command line, type hptraidconf to start HighPoint CLI. Enter your login credentials when prompted (default username: **RAID** / password: **hpt**).



In order to see the devices connected to the controller, type **query devices**.

2 <b>4</b>		Co	mmand Pro	ompt - hpt	raidconf	-	×
PT C D	LI > query de Capacity	vices MaxFree	Flag	Status	Mode 1Number		·
/1 /2 /3 /4	4000.69 3000.50 4000.69 4000.69	4000.69 3000.50 4000.69 4000.69	SINGLE SINGLE SINGLE SINGLE SINGLE	NORMAL NORMAL NORMAL NORMAL	Hitachi HUS724040AI Hitachi HUS724030AI Hitachi HUS724030AI Hitachi HUS724040AI Hitachi HUS724040AI	⊿E640 ⊿E640	
 рт с	:LI >						

The device ID gives the position of each drive and is needed to select which drive will be included in the array.

To create a 4 disk RAID 5 array named Tutorial\_Array input the following command:

HPT CLI > create RAID5 name=Tutorial\_Array disks=1/1,1/2,1/3,1/4

C:4.			C	ommand Pro	ompt - hptra	aidconf		-	□ ×
HPT I D		query dev apacity	ices MaxFree	Flag	Status	Mode 1Nu	mber		· · · · · ·
1/1 1/2 1/3 1/4	34	1000.69 1000.50 1000.69 1000.69	4000.69 3000.50 4000.69 4000.69	SINGLE SINGLE SINGLE SINGLE SINGLE	NORMAL NORMAL NORMAL NORMAL	Hitachi Hitachi	HUS7240 HUS7240	140ALE640 130ALE640 140ALE640 140ALE640	
	CLI >	<pre>&gt; create RA &gt; query arr &gt;acity(GB)</pre>	ays	utorial_Ar Statu	2	1/1,1/2, Sector	1/3,1/4 Cache		Name
 1		9001.51	RAID5	INIT(F	> 64k	512B	 WB	Tutoria]	 L_Array
HPT	CLI >	•							

To view the created array, type **query arrays**.

For more HighPoint CLI information type help in the command line or refer to the documentation included in the software package.

### Step 5: Initialize and format the RAID Array

Before using the newly created RAID array, you must initialize and format the new volume.

#### For Windows Users:

- 1. After creating the RAID array, open Windows Disk Management.
- 2. Disk Management will ask to initialize unknown disks either in MBR format or GPT.

3	Disk Management	_ □	×
File Action Vi	ew Help		
-	📰 🖻 🗙 🖻 🚘 询 🔜		
Volume	Initialize Disk ×	Free Spa	% F
(D:)	You must initialize a disk before Logical Disk Manager can access it. Select disks: Disk 1	200 MB 620 MB 74.51 GB	100 100 100
BOOTCAMP (C:		21.09 GB	56
<	Use the following partition style for the selected disks:		>
Disk 0 Basic	MBR (Master Boot Record) GPT (GUID Partition Table)		Â
113.00 GB Online	Note: The GPT partition style is not recognized by all previous versions of Windows.		
	OK Cancel		
Generation Generation Generation Content of	Primary partition		-

(Windows) Disk Management asks to initialize the disks before use. As a general rule, select MBR for disks less than 2TB and GPT for disks greater than 2TB.

3. Right click the new disk, and click properties.



4. In properties, check and make sure it is a HPT VD (HighPoint Virtual Disk).

	HPT VD0-0 S	SCSI Disk Device Properties
General	Policies Volumes	Driver Details Events
Ŷ	HPT VD0-0 SCSI	Disk Device
	Device type:	Disk drives
	Manufacturer:	(Standard disk drives)
	Location:	Bus Number 0, Target ID 0, LUN 0
	e status device is working pr	operly.
		~
		OK Cancel

Disk properties show HPT VD 0-0.

5. Once the disk has been confirmed, right click the unallocated space and click New Simple Volume.

Disk 0 Basic 13972.19 GB Online	13972.19 GB Unallocated	New Simple Volume New Spanned Volume
<b>⊡Disk 1</b> Basic	System Reserved	New Striped Volume New Mirrored Volume New RAID-5 Volume
1863.02 GB Online	350 MB NTFS Healthy (System, A	Properties
		Help

Right Click unallocated space, then click New Simple Volume.

- 6. Follow the on-screen instructions to configure and format the drive.
- 7. Once finished, the new volume will receive a drive letter and be available for use.



**RAID** array is now formatted as NTFS and drive letter E:

#### For Mac Users:

1. After creating a RAID array, click Initialize when prompted. (**Note:** If you ignored the prompt, simply open Disk Utility).

	HPT VD0-0 Media	
🎍 🕢 🚷 🌔 😑		WARNIN 97.7:86
Verify Info Burn Mount Eject E	nable Journaling New Image Convert Resize Image	Log
🔲 121.33 GB APPLE SSD S	First Aid Erase Partition RAID Restore	
Macintosh HD	If Repair Disk is unavailable, click Verify Disk. If the disk needs repairs, you'll be	niven
	instructions for repairing the disk from the Recovery HD.	,
	If you have a permissions problem with a file installed by the OS X installer, click Disk Permissions.	Repair
WebGUI_Mac_v2.6.8_15		
	Show details	r History
•		
	Verify Disk Permissions	rify Disk
	Repair Disk Permissions Rep	bair Disk
Disk Description : HPT VD0-0		248 Bytes)
Connection Bus : SAS Connection Type : External	Write Status : Read/Write S.M.A.R.T. Status : Not Supported	
Connection ID : 50:01:93:0	20:58:65:AE:57, Logical Unit 0 Partition Map Scheme : Unformatted	

Disk Utility for Mac.

2. In Disk Utility, select the Volume you created on the right, then click the Erase tab.

	HPT VD0-0 Media	
		WARNIN
Verify Info Burn Mount E	ject Enable Journaling New Image Convert Resize Image	Log
Burn CD/DVD	from disk image	
<ul> <li>121.33 GB APPLE SSD S</li> <li>Macintosh HD</li> <li>BOOTCAMP</li> <li>15 TB HPT VD0-0 Media</li> <li>WebGUI_Mac_v2.6.8_15</li> <li>HighPointWebGUI</li> </ul>	First Aid       Erase       Partition       RAID       Restore         To erase all data on a disk or volume:       1       Select the disk or volume in the list on the left.       2         Specify a format and name.       3       If you want to prevent the recovery of the disk's erased data, click Security Options         4       Click Erase.         To prevent the recovery of previously deleted files without erasing the volume, select a volume in the list on the left, and click Erase Free Space.	5.
	Format:       Mac OS Extended (Journaled)         Name:       Tutorial_Array	9
	Erase Free Space Security Options Erase	
Disk Description : HPT Connection Bus : SAS Connection Type : Extr Connection ID : 50:0	Write Status : Read/Write	es)

3. Select the desired disk format and disk name then click **Erase**. (**Note**: All previous data on disks will be erased.)



4. When finished, your new RAID volume will be available for use.



(Mac) Tutorial\_Array volume created and mounted on desktop.

#### For Linux Users:

1. After creating a RAID array, open your disk utility program to view the logical volume.

ē	9.0 TB Hard Disk	(HPT VD0-0) [/dev/sda] — Disk U	tility	_ = ×
File Help				
Storage Devices	Drive			
Local Storage hpt@localhost	Model: Firmware Version: Location:	HPT VD0-0 4.00	Serial Number: World Wide Name: Device:	00193ce98b3f8c00 - /dev/sda
SATA Host Adapter 885E9120 SATA 6Gb/s Controller SATA Host Adapter 7 Series/C210 Serieroller [AHCI mode]	Write Cache: Capacity: Partitioning:	- 9.0 TB (9,001,513,254,912 bytes) Not Partitioned	Rotation Rate: Connection: SMART Status:	- SCSI Not Supported
I.O TB Hard Disk     ATA Hitachi HUA722010CLA330     Peripheral Devices     USB, FireWire and other peripherals     54 GB Hard Disk	Format Driv Erase or parti		Benchmark Measure drive	performance
<ul> <li>3.8 GB Hard Disk</li> <li>942 GB Hard Disk</li> <li>9.0 TB Hard Disk</li> </ul>			nown ) TB	
HPT VD0-0	Usage: - Partition Type: - Erase or form	<b>me</b> at the volume	Device: /dev/sda Capacity: 9.0 TB (	1 9,001,513,254,912 bytes)

- Click Format drive to create an MBR or GPT partition table on the drive.
   Click Format Volume to format the drive.

<u>i</u>	Cre	eate partition on HPT VD0-0 ×
	Size:	9.0 TB 9001.513 GB
	Туре:	Ext4 2
	Namo	This file system is compatible with Linux systems only and provides classic UNIX file permissions support.
	Name:	New Volume
	🗹 Take	ownership of filesystem 🛛 🖒
	Encry	vpt underlying device
		Cancel Create

4. Once formatted, the volume will be available for use.

#### Manage your RAID array

The following features allow you to monitor and maintain your arrays to prevent any critical failures from occurring:

- Spare Pool (pg.36)
- Email Notifications (pg.37)
- SMART Monitoring (pg.40)
- Health Inspector Scheduling (pg.41)

#### RAID Spare Pool

Physical drives marked as a spare will automatically be added to a redundant RAID array (RAID levels 1, 1/0, 5, and 6) whenever there is a disk failure. Enabling this feature minimizes the chances of data loss since it reduces the time an array is in critical status.

#### Add/Remove Spare

#### Using WebGUI:

- 1. Log in WebGUI.
- 2. Click Logical.
- 3. Click Spare Pool.
- 4. Check the box for the disk you want as a spare from Available Disks.
- 5. Click Add Spare.

Disks added to the spare pool will show under **Spare Pool** and can be removed by checking the disk checkbox from **Spare Pool**> Click **Remove Spare**.

#### Using RocketRAID BIOS:

- 1. Navigate to the disk panel (Press **ALT** + **W**, then press **1**).
- 2. Use keyboard arrow keys to select desired disk.
- 3. Press **enter** to confirm each selection.
- 4. Press **ALT** + **D** to open disk tab.
- 5. Select Toggle Spare.

Disks added to the spare pool will show under **Spare Pool** and can be removed by checking the disk checkbox from **Spare Pool**> Click **Remove Spare**.
# **Email Notifications**

When enabled, all added recipients will receive an email notification for any event log entries. (More information about events refer to pg.80)

To set up email alerts:

- 1. Check the Enable Event Notification box.
- 2. Enter the ISP server address name or SMTP name.
- 3. Type in the email address of the **sender** (email account that is going to **send** the alert).
- 4. Type in the account name and password of the sender.
- 5. Type in the SMTP port (default: **25**).
- 6. Check support SSL box if SSL is supported by your ISP (port value will change to **465**, refer to your ISP if you have a specific SMTP port.

*Note*: After you click 'Change Setting' the password box will become blank.

## Adding Email Recipients

Recipients						
E-mail	Name	Event Level				
	Add I	Recipient				
E-mail:						
Name:						
Event Level:		Information Warning Error				
Add Test						

You can add multiple email addresses as receivers of a notice.

- 1. Type the email of the recipient in the **E-mail** text box.
- 2. Type the name of the recipient in the **Name** text box.
- 3. Check which type(s) of events will trigger an email in the respective **Event Level** check boxes.
- 4. (**Optional**) Click **test** to confirm settings are correct by sending out a test email.
- 5. Click **add** to add the recipient to recipient list.
- 6. The added recipient will display in under **Recipients.**

The email will send to your recipients the output recorded in the event log.

#### HighPoint RAID Management Software Mail Notification

```
Sent: Mon 5/4/2015 4:36 PM
To: test0
Mon, 04 May 2015 23:35:40 GMT:
[HPTMV9580IOPController]: Plugging device detected.('WDC
WD40EFRX-68WT0N0-WD-WCC4EHYCFZXL' at Controller2-Channel8)
```

#### Example event log email message.

### WebGUI Remote Login

A user connected to a local network can remotely access the WebGUI using the IP address of the host device.

To obtain your IP address

#### For Windows Users:

- 1. Open a command prompt window on the host computer.
- 2. Type ipconfig.
- 3. Look for the section that contains your network adapter information.
- 4. Note the IP address.



Example: The IPv4 address is under Ethernet adapter Ethernet 4 and is 192.168.1.143

**Note:** Make sure **Restrict to localhost access** is **disabled** in WebGUI **Setting** (Refer to setting)

You can then remotely access the WebGUI using any other computer that is in your local network by opening any web browser and typing http://{IP address of host computer}:7402 (default port is 7402).

### For Mac Users:

- 1. Open a **terminal** window on the host computer (computer that is connected to the RR4522.)
- 2. Type ifconfig.
- 3. Look for the connection that has **status**: **active**
- 4. Write the IP address located after **inet**:

```
000
                            A hpt-lab — bash — 80×24
                                                                                  Last login: Fri May 8 09:36:50 on ttys002
You have new mail.
hpt-labs-pro:~ hpt-lab$ ifconfig
lo0: flags=8049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 16384
        options=3<RXCSUM,TXCSUM>
        inet6 ::1 prefixlen 128
        inet 127.0.0.1 netmask 0xff000000
        inet6 fe80::1%lo0 prefixlen 64 scopeid 0x1
        nd6 options=1<PERFORMNUD>
gif0: flags=8010<POINTOPOINT,MULTICAST> mtu 1280
stf0: flags=0<> mtu 1280
en2: flags=8863<UP, BROADCAST, SMART, RUNNING, SIMPLEX, MULTICAST> mtu 1500
        ether 54:e4:3a:ef:74:5b
        inet6 fe80::56e4:3aff:feef:745b%en2 prefixlen 64 scopeid 0x4
        inet 192.168.1.254 netmask 0xffffff00 broadcast 192.168.1.255
        nd6 options=1<PERFORMNUD>
        media: autoselect
        status: active
```

Example: en2 has active status, the IP is 192.168.1.254

# For Linux Users:

- 1. Open a **terminal** window on the host computer (computer that is connected to the RR4522.)
- Type if config | grep 'inet'

3. Write the IP address located after **inet**:

# Storage Health Inspection (SHI)

The Storage Health Inspector (SHI) monitors each individual disk's health. Monitoring disk SMART attributes can prevent critical RAID failures from occurring.

This section covers the following:

- Enabling SMART Monitoring
- Disabling SMART Monitoring
- Changing HDD Temperature Threshold

## Enabling SMART Monitoring

Global Viev	w Phy	sical Logical Sett	ing Even	t SF	II Recover	Logout H	elp
							Schedule
		Storage H	ealth Inspe	ector(S	HI)		
Controller ID	Port#	Device Serial Number	RAID	٩F	Bad Sectors Found & Repaired	Device Statu	S
1	1	WD-WCC4ENSLV3U6	None	96	None	ок	SMART
1	2	WD-WX11D74RHV7A	None	96	None	OK	SMART
1	3	WD-WMC4N0DCFMUT	None	95	None	OK	SMART
L	4	WD-WCC4EHYCFZXL	None	100	None	ОК	SMAR1
		HDD Tem	perature T	hresho	old		
Set harddisk tem	perature th	reshold (F): 140	Set				

To access the SMART attributes of an individual disk:

- 1. Log in to WebGUI (default user: RAID password: hpt).
- 2. Select the proper controller using the drop down menu on the top left.
- 3. Click the SHI tab.
- 4. Click **SMART** on the desired disk.
- 5. Click **Enable** to enable SMART monitoring.

### **Disabling SMART monitoring**

You have the option to disable SMART monitoring on each individual disk:

- 1. Select the proper controller using the drop down menu on the top left.
- 2. Click the **SHI** tab.

- 3. Click **SMART** on desired disk.
- 4. Click Disable.

*Note*: Disabling SMART will prompt the Storage Health Inspector to change the disk status to 'Failed'. The RocketRAID alarm will **not** alert you when this setting is disabled. Any potential warnings related to S.M.A.R.T attribute technology will not trigger.

#### **Changing HDD Temperature Threshold**

To ensure hard disk temperatures remain cool, enable SMART to monitor disk temperatures. In **SHI**, you can set a threshold so that the WebGUI or controller alarm (if enabled) can warn you when physical disks get too hot.

- 1. Log in to WebGUI.
- 2. Select the controller from the drop down on the top left.
- 3. Click SHI.
- 4. Type the desired hard disk temperature threshold (*°F*).
- 5. Click Set.

## **Utilizing the Health Inspector Scheduler**

The **Health Inspector Scheduler** (**HIS**) enables you to periodically check your disk/arrays to ensure they are functioning optimally.

Controller(1): 4520 + High Point Technologies, Inc.
Global View Physical Logical Setting Event SHI Recover Logout Help
Tasks List
Name         Description           test0         Check all disks every week on Tuesday at 16:20:0           Delete
New Verify Task
RAID_5_1 Task Name:
• Occurs one time on 2015-5-5 at 0:0:0
Occurs every 4 Month(s) ≠ on Tuesday ≠ 12 at 0 : 0 : 0
Start date: 2015-5-5 End date: 2015-5-5 • No end date
Submit
Health Inspector Scheduler
Task Name: Select a Schedule: Obaily  Weekly Bi-Weekly Monthly
Select a time: Sunday   Submit
HighPoint RAID Management 2.6.8 Copyright (c) 1996-2015 HighPoint Technologies, Inc. All Rights Reserved

## Creating a New Verify Task

All arrays will appear under New Verify Task

- 1. Log in to WebGUI.
- 2. Select the proper controller from the top left drop down.
- 3. Click SHI.
- 4. Click Schedule.
- 5. Select the array you want to schedule the verify task.
- 6. Type the name in **Task Name** entry box.
- 7. Choose whether you want to schedule.
  - One time verify task on specific date (YYYY-MM-DD) at (HH:MM:SS, 24-hr clock).
  - Or a specific schedule you can adjust based on Daily, Weekly, or Monthly options.
- 8. Click Submit.
- 9. Your entry will appear under Tasks List.

*Note*: New Verify Task box only appears if you have normal status arrays. If you have a critical array, New Rebuild Task will replace New Verify Task.

## **RAID Expansion (OCE/ORLM)**

**Important:** It is recommended to **Verify/Rebuild** your array before **Expanding** or **Migrating**. Once you start an **OCE/ORLM** procedure, you *can* stop the process but it **must** be resumed until completion.

To add more capacity to your current configuration, follow these steps:

- 1. Log in WebGUI
- 2. Select desired controller from drop down menu on top left
- 3. Click **Logical**
- 4. Click **Maintenance** for the array you want to change
  - Select a **different** RAID level to **Migrate**
  - Select the **same** RAID level to **Expand**

Ar	ray Inf	ormat	ion	
RAID_5_0	Delete Unplug Verify			
- Device_1_2	Write Bac	k ‡	Chang	e Cache Policy
Device_1_3		Rename		
Device_1_3	JBOD(Volu	ume) 🗧	ORLM	)
				Close

- 5. **Important**: Record all the physical drives currently in array.
- 6. Click ORLM
- 7. Select the physical drives you recorded earlier and the drives you want to add

#### 8. Click Submit

Upon submission, you will receive a prompt stating ORLM created successfully.



The **Logical Device Information** for the migrating/expanding array will change status to **migrating/expanding**.

Controller(1): 4520 ÷	)						High	Point Technologies, In
Global View	Physical	Logical	Setting	Eve	nt S	HI Recov	er Logout	Help
Create Array			Lo	gical D	evice I	nformation		
Spare Pool	Name	Туре	Capacity	BlockSize	SectorSiz	e OS Name	Status	
Logical Device	W RAID_5_0	RAID 5	4.00 TB	64k	512B	HPT DISK 1_3	Migrating 0%	 Maintenance
Rescan	*							
Beeper Mute	W RAID_5_1	RAID 5	6.00 ТВ	64k	512B		Migrating 0%	Maintenance
	Device_1_	_6 Hard Dis	k 6.00 TB			HPT DISK 1_0	Legacy	
	Device_1	_7 Hard Dis	k 6.00 TB			HPT DISK 1_1	Legacy	
	Device_1	_8 Hard Dis	k 6.00 TB			HPT DISK 1_2	Legacy	

# Updating RocketRAID HBA BIOS/Firmware

Having the latest BIOS ensures you have the latest firmware stability and performance improvements. Updating the BIOS may fix boot up or system resource issues; make sure to read the README before making any changes.

A few reasons as to why update BIOS/Firmware:

BIOS resource issue	Inefficient BIOS code may cause your boot-up to hang during POST.
Compatibility fixes	Updating firmware may fix issues that occur when using new hardware
Bug fixes	Bugs that are discovered post release are fixed in subsequent updates.

# Updating BIOS/Firmware using WebGUI

Keeping the firmware up to date ensures that your RAID controller the latest compatibility and performance updates.

- 1. Locate the latest firmware on our webpage at <u>www.highpoint-tech.com</u>.
- 2. Extract the contents of the file.
- 3. Refer to the readme (if included) to make sure you have the correct firmware for your HBA *Note*: Your HBA name and properties can be found in the **WebGUI** > **Physical Tab**.
- 4. Locate the proper firmware file
- 5. Login to WebGUI, then click the Physical tab.
- 6. Under Update Firmware, click Browse and browse to your firmware file.
- 7. Click **Submit.**
- 8. **Reboot** for changes to take effect.

### <u>Updating BIOS/Firmware using a bootable USB</u>

Create a bootable USB using a utility such as Rufus. **Caution**: Creating a bootable USB will erase all previous data stored on it.

- 1. Download the latest BIOS/Firmware file found at www.highpoint-tech.com
- 2. Extract the file contents onto the bootable USB
- 3. Read the README for instructions on how to flash the BIOS onto your hardware.

- 4. Reboot your computer into DOS mode by:
  - Setting boot priority to the bootable USB
  - Removing all bootable drives (OS, CD Drives) from motherboard and leaving only the bootable USB and RocketRAID card plugged in
- 5. Once in DOS mode, you should see a command line interface



Bootable USB formatted with Rufus Utility, FreeDOS CLI (Command Line Interface)

- 6. Type in the command with the file you found in the README (ex. run go.bat on command line)
- 7. Reboot

## **Troubleshooting - Hardware**

If you face any hardware related issues involving the RocketRAID 4522 or disk drives, refer to the following sections for troubleshooting tips. For all other problems, submit a support ticket at <u>www.highpoint-tech.com/websupport</u>.

#### PC hangs during Boot Up

The most commons symptom for this problem is the lack of resources.

There are two methods to fix this problem:

- 1. Update your motherboard BIOS
- 2. Update your RAID Controller BIOS

# Update Motherboard BIOS

To update your motherboard BIOS, refer to your motherboard manufacturer's user manual or website.

## Update RocketRAID BIOS

To update RocketRAID BIOS refer to either of these sections:

- Using a Bootable USB to update BIOS.
- Updating the BIOS through WebGUI

**Note:** Press END to bypass the RocketRAID BIOS splash screen so you can boot up windows and access WebGUI.

# **Troubleshooting - Software**

If you face any software related issues involving the HighPoint RAID Management (WebGUI), refer to the following sections for troubleshooting tips. For all other problems, submit a support ticket at <u>www.highpoint-tech.com/websupport</u>.

## WebGUI - Connection cannot be established

- 1. Check the connection of the card with its PCI Express slot. (PCIe 2.0 x8 for RR4522)
- 2. Check and make sure the cables are not faulty.
- 3. Check Device Manager (Windows) or System Report (Mac) to verify the device and drivers are installed and detected by the OS
  - a. For Windows Users:
    - i. Open **Device Manager**.
    - ii. Click on the **Storage Controller** tab.
    - iii. Check to see if **RocketRAID 4522 SAS Controller** is listed.
    - iv. If **RocketRAID 4522 SAS Controller** is not listed, check to see if **RAID Controller** is under **Unknown devices**.
    - v. If **RAID Controller** is under **Unknown Devices**, re-install RocketRAID drivers.
    - vi. If RAID Controller is **not** present, recheck your hardware and cables.
  - **b.** For Mac Users:
    - i. Click the Apple Icon on the menu bar.
    - ii. Click About this Mac > System Report.
    - iii. Click PCI.
    - iv. Check to see the Type: RAID Controller and Driver Installed: Yes.
    - v. If Driver Installed is **No**, re-install the drivers.
    - vi. If **RAID Controller** is not present, recheck your hardware and cables.

#### c. For Linux User:

- i. Open **Terminal.**
- ii. Type command **lsmod** | **grep** 'hptiop' to check is driver is running.
- iii. Type command modinfo hptiop to check driver information.

# **Troubleshooting - RAID**

If you face any RAID related issues involving your RAID array, refer to the following sections for troubleshooting tips. For all other problems, submit a support ticket at <u>www.highpoint-tech.com/websupport</u>.

## Critical Arrays

When your disk is critical, that means your array as a whole is still accessible, but a disk or two is faulty (depending on your RAID level) is in danger of failing.

Common scenarios for critical	<ul> <li>Unplugging disk that is part of an array</li> <li>Bad sector detected on a disk part of the array</li> </ul>
array status	• Unrecoverable data during rebuilding
	<ul> <li>Defective port or cable interrupts</li> </ul>
	rebuilding process

To recover from this situation,

- 1. Backup your existing data.
- 2. Identify which disk is faulty.
  - You can refer to the LED lights on the enclosure.
  - Refer to the WebGUI Logical tab and Event tab.
- 3. Re-insert the faulty disk or replace with a new disk.
  - Array will rebuild automatically if you enable auto-rebuild setting and you simply reseated the faulty disk. *Note*: Click **Rescan** if array still does not rebuild automatically.
- 4. Once a new disk is added, add the new disk into the critical array.
  - Log in to WebGUI.
  - Click Logical Tab.
  - Click Maintenance>Add disk> select the appropriate disk.
- 5. Rebuild should start automatically.
  - If rebuild does not start, click 'Rescan' on the left hand panel.

*Note*: Rebuilding an array takes on average 2 hours per 1 Terabyte of disk capacity. The process will scan through the entire disk, even if you have very little *used* disk space.

## Rebuild failed

If rebuilding fails to complete due to bad disk sector errors (check in the Event Log), there is an option to continue rebuilding on error in HighPoint WebGUI.

- 1. Log in to WebGUI.
- 2. Click **Setting** tab.
- 3. Under System Setting, change Enable Continue Rebuilding on Error to Enabled.

This option will enable rebuilding to ignore bad sectors and attempt to make your data accessible. It is important to backup immediately after backup is complete and replace or repair any disk(s) with bad sectors.

## Critical array becomes disabled when faulty disk was removed

If this is the case, check to make sure you removed the correct disk. When you remove the wrong disk from a critical array, the array status may become disabled. Data is inaccessible for disabled arrays. Follow these steps to restore the previous state:

- 1. Shut down your PC.
- 2. Place all disks, including the removed disks, back to original array configuration.
- 3. Boot up PC.
- 4. Once array is back to critical status, identify the correct disk (using the event log) and replace it.

## **Disabled** Arrays

If two or more disks in your array go offline due to an error or physical disconnection your array will become **disabled**.

To recover a disabled array, using the 'Recover Tab' will yield the best results. To utilize the **Recover** tab, you will need to insert the **exact** physical drives that are listed on the recover list. The goal of using recover is to get the RAID status back to critical/normal, allowing you to access and back up your data.

## Recover with RAID Maintenance

**Note:** The recover function will only attempt to recover RAID information stored on your disks. Data integrity of the array will not be fixed, if previously corrupted. All disks in the original (disabled) array must be detected before performing a recover operation.

1. Log in to WebGUI.

- 2. Click **Maintenance** for the array that is disabled.
- 3. Click Recover.

## Recover RAID with Recover Tab

Before using the Recover tab to recover your array, check to see if the RAID array is listed in your **Recover List**. Once you have confirmed the RAID array is listed under the Recover List, proceed to delete the disabled array.

- 1. Log in to WebGUI.
- 2. Click **Maintenance** for the array that is disabled.
- 3. Click **delete**, to delete the disabled array.
- 4. Click **Recover** Tab.
- 5. Select the RAID configuration you just deleted.
- 6. Click Recover Array.

## Setting up a Bootable RAID

#### For Windows Users:

Creating an array and then installing Windows OS onto the RAID configuration is a bootable array. Since you cannot use the conventional method of installing drivers, the drive must be loaded during installation.

#### Prepare the following items for installation:

- Operating System Install CD
- Driver files for RocketRAID 4522
- USB thumb drive

#### Set Array as Boot Device

It is recommended to set the RAID array as a boot device prior to installing Windows.

- 1. Enter RocketRAID BIOS during boot up (CTRL+H).
- 2. Navigate to **settings** using arrow keys.
- 3. Press Enter.
- 4. Press Enter again.
- 5. Select the desired RAID array.
- 6. You will return to the main screen once the flag is set.

## Installing Windows on Bootable Array:

- 1. On first boot-up, press **CTRL** + **H** during the HighPoint RocketRAID splash screen to enter the BIOS RAID creation utility.
- 2. Create the array you want to install your Windows Operating System onto
- 3. With the array created, download the RR4522 drivers from <u>www.highpoint-</u> <u>tech.com</u> and load them onto a **USB**. You will need to locate the files when prompted to load drivers during Windows Installation
- 4. Start Windows Installation.
- 5. When prompted **Where do you want to install Windows**? Click **Load Driver**
- 6. When prompted, click **Browse**
- 7. Browse to your connected USB and driver files you downloaded
- 8. Click **OK**, and once loaded, you will see a list of drivers detected.
- 9. Select the HighPoint driver file
- 10. Click Next, and you should see the RAID arrays you created
- 11. Select the RAID array and click Next
- 12. Follow the Windows installation instructions to complete your installation

## For Linux Users:

RocketRAID 4522 drivers are already embedded in Linux and a bootable Linux can be directly installed on the RAID array.

## **Battery Backup Unit (BBU, sold separately)**

When you set your RAID array or HDD to utilize write back cache, you sacrifice reliability for performance. Utilizing Write Through cache allows you to safe guard your data from power related failures, but it will be much slower.

A BBU is primarily used to safe guard arrays utilizing write back cache. When a power failure occurs, the battery will provide enough power to maintain the data in the cache for however long the battery capacity is.

## Attaching the BBU

The connection will be made directly on the RAID controller J6 pins.

### Checking the Battery Status

- 1. Log into WebGUI
- 2. Select the Controller the BBU is connected to

- 3. Select the Physical Tab
- 4. Charge status should be listed under Extended Information
- 5. For CLI, type query controllers

## **Online Array Roaming**

One of the features of all HighPoint RAID controllers is online array roaming. Information about the RAID configuration is stored on the physical drives. If the RR4522 fails or you wish to use another RAID controller, the RAID configuration data can still be read by another HighPoint RocketRAID card.

# Port Multiplier (PM) Compatibility

HighPoint RocketRAID 4522 support port multipliers (PM) which enables connectivity of up to 40 hard drives.

## Example:

Global View	Physical	Logical	Setting	Event	SHI	Recover	Logout	Help
Create Array			Logi	cal Devi	e Infor	nation		
Spare Pool Logical Device	Name	Type rray RAID	Capacity 5 9.00 TB	BlockSize 64k	SectorSize 512B	OS Name HPT DISK 1_0	Status Normal	<u>Maintenance</u>
Beeper Mute			Phys	ical Devi	ce Infor	mation		
	Location 1/E1/2 1/E1/3 1/E1/4 1/E1/5	Hitachi HUS Hitachi HUS	724040ALE6 724040ALE6	:40-PK133VF :40-PK133VF :40-PK1331F :40-PK1231F	AG1LG6S		Capacity 4.00 TB 4.00 TB 4.00 TB 3.00 TB	Max Free 1.00 TB 1.00 TB 1.00 TB 0.00 GB

Connected to 1 port on the RocketRAID 4522, the port multiplier split the signal to 4 other targets. Under Physical Device Information (Location), the 1 represents the RR4522 port, E1 represents the port multiplier, and 2...5 represents the additional channels connected to the PM.

## Appendix A: Navigating RocketRAID 4522 BIOS Utility (PC only)

HighPoint RocketRAID BIOS utility allows you to create, manage, and maintain your RAID arrays without the need to install HighPoint WebGUI application.

During boot up, you will see a RocketRAID splash screen prompting you to press **CTRL** + **H** to enter the BIOS. The following keys will help you navigate through the menus, find information, and make adjustments to your RAID arrays.

RocketRAID 4522 BIOS Setting Utility v1.8 Copyright (c) 2014 HighPoint Technologies, Inc. All rights reserved.	
▶ Press CIRL-H to enter setup ◀	
Waiting adapter <1:0:0> to be ready	

RocketRAID Splash Screen. Press CTRL + H to enter BIOS

System	Disk Arr	ay Cont	roller	Windo = Dis	a ball the ball of the ball of the			
Channe	l Status	Туре	Capac		FreeSpace	WCache	Model N	umber
• 1	Normal	Legacy	5000.		0.00G	On		MG04ACA500E
2	Normal	Legacy	5000.	98G		On	TOSHIBA	MG04ACA500E
3	Norma l	Legacy	5000.	98G	0.00G	On		MG04ACA500E
4	Norma l	Legacy	5000.	98G	0.00G	On		MG04ACA500E
Name			<u> </u>	Arra				
	1G04ACA5001	Туре	Capacit				ľask	Progress
TOSHIBA	1G04ACA5001	Single	5000.980 5000.980		Non-the sector of the sector			
TOSHIBA	1G04ACA5001	Single	5000.980					
TOSHIBA M	1G04ACA5001	Single	5000.980					
				nor		-3		
[F10] Menu	I [TAB] SI	vitch win	ndou [Er	iter]	Select			

Default Screen upon entering BIOS.

Table	1.	Navis	gating	the	BIOS

Keyboard Arrow Keys	Navigate the menu bar
F10	Accesses the menu bar
ТАВ	Switches between windows
Enter	Make a selection
ALT + <highlighted key&gt;</highlighted 	Selects Menu Item (Ex. System can be accessed with ALT + S
Spacebar	Make certain selections (eg. creating arrays)
ESC	Exits a selection menu

# System Disk Array Controller Window Help

#### Snapshot of RocketRAID BIOS menu bar

# Table 2. Menu Bar Key

System	Exits the BIOS (ALT + X)
Disk	Displays disk Information
	Initialize disks
	Add disks to spare pool
	Unplugs disks
Array	Displays array information
-	Create/delete/unplug arrays
	Verify array integrity
	Set boot flag
Controller	Displays RAID controller information
	Adjust controller settings
Window	View BIOS window panels
Help	www.highpoint-tech.com

# Appendix A-1: System Tab



Press **ALT** + **X** to exit the BIOS.

# Appendix A-2: Disk Tab

ľ	sk Array Controller Window	Di
S	Information	
9	Initialize Toggle <mark>S</mark> pare Unplug	
	Turn on write cache Turn off write cache	
	Rescan [Alt+R]	
	Identify disk [Alt+F]	
	Toggle Spare Unplug Turn on write cache Turn off write cache Rescan [Alt+R]	

Access disk tab by **navigating** to disk and pressing **enter**, or press **ALT** + **D**.

	<ul> <li>Device Type: SATA or SAS</li> </ul>
Information	Model Number
	Serial Number
	Firmware Revision
	Capacity (in sectors)
Information	Read Ahead (on/off)
	Write Cache (on/off)
	• TCQ
	• NCQ (on/off)
	Spin up mode

Initialize	Initializes selected disks
Toggle Spare	Adds selected disks to spare pool
Unplug	Ejects selected disks
Turn on/off write cache	Toggles disk write cache ability
Rescan	Triggers HBA to rescan
Identify Disk	If applicable, will light up identify LED.

## Initializing Disks

First you must navigate to the disk panel. By default, you start on the disk panel.

- 1. Press **ALT** + **W** to access Window tab.
- 2. Select disk(s).
- 3. Use keyboard arrow keys to navigate and press enter to select desired disk(s).
- 4. Press **ALT** + **D** to activate disk tab.
- 5. Select Initialize.



Four disks are selected and about to be initialized.

- 6. Press Enter.
- 7. A prompt will warn you that data will be erased.
- 8. Select Yes.
- 9. Once initialized, you can proceed to create an array.

## Adding Disks to Spare Pool

- 1. Navigate to the disk panel (Press ALT + W, then press 1).
- 2. Use keyboard arrow keys to select desired disk.
- 3. Press enter to confirm each selection.

- 4. Press **ALT** + **D** to open disk tab.
- 5. Select Toggle Spare.

### **Unplugging Disks**

- 1. Navigate to the disk panel (Press ALT + W, then press 1).
- 2. Use the keyboard arrow keys and Enter to select desired disks.
- 3. Press **ALT** + **D** to open disk tab.
- 4. Select Unplug.

### Turn On/Off Disk Write Cache

- 1. Navigate to the disk panel (Press ALT + W, then press 1).
- 2. Select desired disks.
- 3. Press **ALT** + **D** to open disk tab.
- 4. Select Turn on/off write cache.

#### Rescan

Triggers motherboard to rescan the connection

## Appendix A-3: Array Tab

Array Information	<ul> <li>Will disk the following information on selected array:</li> <li>Array name</li> <li>RAID type</li> <li>Cache Policy</li> </ul>
	<ul><li>Block Size</li><li>Sector Size</li><li>Disk Members</li></ul>
Create/Delete/Unplug	Selected action will be performed on array
Verify	Initiates verifying array integrity
Start/Stop Task	Starts or stops the verifying/rebuilding process
Set boot	Sets boot flag on array

# Creating an Array



- 1. Navigate to the disk panel (ALT + W, then press 1.)
- 2. Select each disk you wish to include in your array.
- 3. Press **ALT** + **A** to open array panel.
- 4. Press Create:
- 5. Press **Spacebar** to navigate and make selections (**TAB** also navigates.)

	-
Array Type	Refer to RAID Level Reference Guide for information about different levels.
	RAID 0, 1, 5, 6, 1/0, 5/0, and JBOD
	Write-back -Any data written to the array will be stored as cache, resulting in better I/O performance at the risk of data failures due to power outages. Data will be stored as cache before it is physically written to the disk; when a power outage occurs, any data in the cache will be lost.
Cache Policy	<b>Write-through</b> -Data written to an array is directly written onto the disk, meaning lower write performance for higher data availability. Without cache acting as a buffer, write performance will be noticeably slower but data loss due to power outages or other failures is significantly minimized.

Init Method	<ul> <li>Quick Init- This option grants immediate access to the RAID array by skipping the initialization process, but it will delete all data. Note: Skipping initialization is generally not recommended since residual data on disks may interfere with new data in the future.</li> <li>Foreground-The array initialization process will be set at high priority. During this time array will be non- accessible, but initialization completion time will be shorter.</li> <li>Background-The array initialization process will have a lower priority. During this time array will be accessible, but initialization completion time will be longer.</li> <li>Keep Old Data - This option skips the initialization process and all data on each physical disk of the array will be untouched.</li> </ul>
Name	Create array name
Capacity	Designate array capacity

- 6. Press Create (ALT + E)
- 7. A prompt about sector size will pop up, **select** a sector size
- 8. Array will show up in the Array Window



### Verifying your array

- 1. Navigate to the array panel (Press ALT + W, then press 2)
- 2. Select desired array to verify (only if you have more than 1 array. If you only have 1 array, verify will automatically start)
- 3. Press **ALT** + **A** to open array tab

- 4. Select **Verify**
- 5. You can Start/Stop the process by selecting **start/stop task** <u>Setting Boot Array</u>
- 1. Navigate to the array panel (Press ALT + W, then press 2)
- 2. Select desired array
- 3. Press **ALT** + **A** to open array tab
- 4. Press Set Boot
- 5. Window will close, **reboot** to confirm

## Appendix A-4: Controller Tab

	Provides certain controller information:
	Product ID
	PCI Location
	IOP Model
	SDRAM Size
Information	Firmware Version
miormation	
	Battery Installed
	Battery MB Installed
	Serial Number
	CPU Temperatures (Celcius)
	<b>A</b>
	Controller voltage levels
	Configures certain settings:
	Enable audible alarm
	i linubie bruggereu opin up
Setting	• Spin down idle disk (minutes)
occung	Enable automatic rebuild
	Continue Rebuilding on error
	<ul> <li>INT13 support</li> </ul>
	• Use single BCV entry
	Stop on error

## <u>Controller > Setting Information</u>

Enable Audible Alarm	Enables/Disables the RocketRAID controller alarm
Enable Staggered Spin up	<b>(Default: Disabled)</b> Enabling this setting will force the card to power on each hard disk sequentially (2 seconds between disks). Check with your disk

	<ul> <li>manufacturer if your drive supports this feature.</li> <li>Number of drives per spin up: Select the number of disks per spin up (eg. 2 drives powered on every 2 seconds.)</li> <li>Delay between spin up (seconds): Time interval between spin ups.</li> </ul>
Spin down idle disk (minutes)	Hard drives can be instructed to spin down when there is no disk activity for set period of time.
Enable automatic rebuild	When enabled, any new disk attached to the controller will automatically be used to rebuild a critical RAID array
Continue Rebuilding on error	Disk bad sectors can interrupt the RAID rebuild process. Enabling this option will allow rebuilding to continue, ignoring bad sectors. Rebuild Priority: This setting determines how HBA resources should be directed towards repairing broken RAID arrays.
Provide INT13 support	INT13 is the HBA's boot function
Use single BCV entry	When enabled (and if HBA hosts several logical disks) only the first disk will be reported to the motherboard BIOS. This setting could be useful when bottom from a disk or array attached to your RocketRAID HBA.
Stop on error	<b>(Default: Enabled)</b> If disabled, the host adapter BIOS menu will bypass array or device errors when booting the system

# Appendix A-5: Window Tab

The Window is the default screen you see upon entering the BIOS. The Top panel shows all the physical drives detected, and the bottom panel shows all arrays created.

Maximize	Makes Selected Panel (Disk or Array) full screen. You can press TAB to toggle between disks and array panels.
Restore	Restores default panel configuration
1. Disk 2. Array	Selects the panel you want to work with
Refresh	Refreshes panels

## Appendix B: Navigating the HighPoint WebGUI

The HighPoint WebGUI management utility allows you to do several key things:

- View general system overview (see pg. 64)
- Update firmware and BIOS (see pg. 65)
- Create and remove arrays (see pg. 68)
- Change enclosure settings (see pg. 77)
- Troubleshoot faulty drives (see pg. 80)
- Monitor disk health (see pg. 81)

Tab Name	Function
Global View	View HBA (Host Bus Adapter) and Storage Properties
Physical	View Additional Controller properties Update BIOS/Firmware View disk properties Adjust selected disk behaviors
Logical	Manage and create RAID arrays

Setting	Adjust WebGUI controls settings
Event	Show WebGUI Event Log
SHI (Storage Health Inspector)	View and schedule S.M.A.R.T monitoring
Recover	Revert to previously created arrays
Logout	Logout of WebGUI
Help	Additional WebGUI documentation Online Web Support

## How to Login HighPoint WebGUI

You can reach the HighPoint WebGUI log in page either by:

- Double clicking on the HighPoint RAID Management icon created on your desktop
- Opening your preferred web browser and typing <u>http://localhost:7402</u>in the address bar.

The default username and password to login is

## Username: RAID Password: hpt

Username and Password are Case-Sensitive (Username is not changeable)

# Appendix B-1: Global Tab

Blobal View	Physical Logical Setting	Event SHI	Recover Lo	ogout Help
A Properties		Storage Prop	erties	
Host Adapter mode	el: RocketRAID 4520 SAS Controller		Total Capacity:	17002 GB
Enclosure count:	0		Free Capacity:	0 GB
Physical Drive:	4			
Legacy Disk:	0			
RAID Count:	1	Co	nfigured 100.0%	

The WebGUI Global view provides an overview of what each HighPoint controller card connected to your computer detects. It is also the first page you see when logging in.

- Host Bus Adapter Properties
- Storage Properties

On the top left of the page is a drop down menu that allows you to select which controller you want to manage (if you have multiple HighPoint controllers connected). HBA Properties

- Host Adapter model: the model name of the controller.
- Enclosure Count: number of external enclosures detected.
- **Physical drives**: number of drives seen by the controller.
- **Legacy Disks**: number of Legacy disks connected. Legacy disks are physical drives that have previous partitions stored on them.

## **Storage Properties**

• **Total capacity**: the combined capacity of each physical disk connected to controller.

- Configured capacity: the amount of space used for creating arrays.
- Free Capacity: total amount of space unused.

		localhost Č		Ê
Controller(1)	: 4522 ᅌ		010 10 0 1	
			HighPoint	
			Technologies, Inc.	
Global	View Physical Logical	Setting Event SHI Recover	Logout Help	
Controlle		Controller Information		
	Model Name:	RocketRAID 4522 SAS Controller		
Devices	BIOS Version:	v1.8		
Rescan	Vendor:	HighPoint Technologies, Inc.		
		Extended Information		
	IOP Model:	88RC9580 (9580B3)		
	CPU Temperature:	37°C		
	Board Temperature:	32°C		
	Power 3.3V Voltage:	3.27V		
	Power 2.5V Voltage:	2.52V		
	Power 1.8V Voltage:	1.80V		
	Power 1.5V Voltage:	1.48V		
	Power 1.0V Voltage:	1.02V		
	SDRAM Size:	512 M		
	Battery Installed:	Not Installed		
	Firmware Version:	v1.8.1.0		
	Serial Number:	1350M48000597		
	SAS Address:	500193c030025501		
	SAS Address.	500195050025501		
		Update Firmware		
	Select the blf file to up	date Firmware.		
	This process may take			
	Choose File no file sele	scted Submit		
	ID Management 2.6.8 1996-2015 HighPoint Technologies, Inc.	All Rights Reserved		
		-		

# Appendix B-2: Physical Tab

The physical tab shows general and extended information about the controller you are using. Information about the firmware, BIOS, and operating temperatures are all located here. This information is useful for identifying what RAID controller model you have and to make sure you have the most updated version available.

The physical tab contains the following information:

- Controller Information
- Extended Information
- Update Firmware
- Physical Devices Information

**Controller Information**: Lists the controller model name, BIOS version, and vendor.

- Model Name: RocketRAID4522 SAS Controller
- BIOS Version: v1.12 (as of 5/5/2015)
- Vendor: HighPoint Technologies, Inc.

**Extended Information**: Gives you additional information concerning the HBA (Host Bus Adapter) in the enclosure

- **IOP Model**: IOP chip model number
- **CPU Temperature**: Displays computer temperature in Celcius (°C).
- **Board Temperature**: Displays the board temperature in Celcius (°C).
- **SDRAM Size**: SDRAM size of the HighPoint controller card
- Battery Installed: Battery Backup Unit information
- Firmware Version: Firmware version of the HBA
- SAS address: the SAS address

**Update Firmware**: Allows you to update the controller BIOS and firmware through the WebGUI.

	Update Firmware
Select the blf file to update Firmware. This process may take some time. Choose File no file selected	Submit

Global View	Physic	al Logi	cal Setti	ng Event SHI	Recover	Logout Help
Controller			P	hysical Devices Inform	nation	
Devices	5	Device_1_1	Model	WDC WD40EFRX-68WT0N0-W WCC4ENSLV3U6	D- Capacity	4.00 TB
Rescan		Unplug	Revision	80.00A80	Read Ahead	Enabled Change
			Location	1/1	Write Cache	Enabled Change
			Max Free	0.00 GB		
			Status	Legacy	NCQ	Enabled Change
			Serial Num	WD-WCC4ENSLV3U6	Identify LED	[ON] [OFF]
	Ŀ	Device_1_2	Model	WDC WD60EFRX-68MYMN1-W WX11D74RHV7A	<sup>/D-</sup> Capacity	6.00 TB
	ы	Device_1_3	Model	WDC WD30EFRX-68EUZN0-W WMC4N0DCFMUT	D- Capacity	3.00 TB
		Device_1_4	Model	WDC WD40EFRX-68WT0N0-W WCC4EHYCFZXL	D- Capacity	4.00 TB

The following properties are part of the **Physical Devices Information** box under the physical tab.

- Model Model number of the physical drive
- Capacity Total capacity of the physical drive
- **Revision** HDD device firmware revision number
- Read Ahead\* (Enable/Disable) Disk read ahead
- Location Device location (example: 1/2 states controller 1, slot 2)
- Write Cache\* (Enable/Disable) the disk write cache
- Max Free space on disk that is not configured in an array
- **Status** (Normal, disabled, critical) status of the disk
- NCQ\* (Enable/Disable) Native Command Queuing (SATA disks only)
- Serial Number serial number of the physical disk
- **Identify LED\*** On/Off toggle the IDENTIFY (RED) on the front panel
- **Unplug** Safely ejects selected disk. Other methods of disk removal will trigger alarm if enabled
- \* Disk properties that can be adjusted.

#### Read Ahead

Enabling disk read ahead will speed up read operations by pre-fetching data and loading it into RAM.

Write Cache

Enabling write cache will speed up write operations.

NCQ (Native Command Queuing)

A setting that allows SATA disks to queue up and reorder I/O commands for maximum efficiency.

**Identify LED** 

The Disk tray LED lights on the front panel can be toggled ON or OFF.

Rescan

Clicking rescan will immediately signal the controller to scan for any changes in the connection. Clicking this button will also stop any alarm if currently ringing.

Appendix B-3: Logical Tab

Global View	Physical Lo	gical <mark>Set</mark>	ting Ev	vent SH	II Recov	er Logout	Help
Create Array			Logical	Device In	formation		
Spare Pool	Name	Туре	Capacity	BlockSize	SectorSize	OS Name	Status
Logical Device	Device_1_1	Hard Disk	4.00 TB			HPT DISK 0_3	Legacy
Rescan	Device_1_2	Hard Disk	6.00 TB			HPT DISK 0_2	Legacy
Beeper Mute	Device_1_3	Hard Disk	3.00 TB			HPT DISK 0_1	Legacy
	Device_1_4	Hard Disk	4.00 TB			HPT DISK 0_0	Legacy
			Physical	Device I	nformatio	n	
		lodel				Capacity	Max Free
	1/1 W	DC WD40EFRX	-68WT0N0-V	VD-WCC4ENS	LV3U6	4.00 TB	0.00 GB
	i 1/2 ₩	DC WD60EFRX	-68MYMN1-\	VD-WX11D74	RHV7A	6.00 TB	0.00 GB
	늘 1/3 🛛 W	DC WD30EFRX	-68EUZNO-W	D-WMC4N0D	CFMUT	3.00 TB	0.00 GB
	🔄 1/4 🛛 W	DC WD40EFRX	-68WT0N0-V	VD-WCC4EHY	CFZXL	4.00 TB	0.00 GB

The Logical tab is where you are edit, delete, and maintain your RAID configurations, as well as, adding drives to your spare pool. The logical tab has the following settings:

- Create Array
- Spare Pool
- Logical Device
- Rescan
- Beeper Mute

An array is a collection of physical disks that will be seen as one virtual drive by your Operating System (OS). The RocketRAID4522 controller is capable of creating the following array types:

Global View	Physical Logical	Setting	Event	SHI Reco	ver Logou	ıt Help
Create Array			Create /	Array		
Spare Pool	Array Type:	JBOD(Volume)	\$			
ogical Device	Array Name:	Default				
lescan						
eeper Mute	Initialization Method:	Keep Old Data	Ŧ			
	Cache Policy:	Write Back	\$			
	Block Size:	64K	\$			
	Number of RAID5 member disks:	-1	Å.			
		Select All	Location Mod	lel	Capacity	Max Free
			1/1 68W WC	C4ENSLV3U6	4.00 TB	0.00 GB
	Available Disks:		1/2 68M WX	11D74RHV7A	6.00 ТВ	0.00 GB
			1/3 68E WM	C WD30EFRX- UZN0-WD- C4N0DCFMUT C WD40EFRX-	3.00 ТВ	0.00 GB
			<b>1/4 68W</b>		4.00 TB	0.00 GB
	Capacity: (According to the max free space on the selected disks)	Maximum	(MB)			
	DV Mode:	Disable ‡		Margin:		5% ‡
	(Enable special cache ploice for DV/sequential write applications)			more stable pe	ger marge will ac rformance, but i aximume write	
	Disk Cache Policy:	Unchange	\$			
			Create			

Array Type:

- JBOD Just a Bunch of Disks •
- **RAID0** Striping
- **RAID 1** Mirroring
- RAID 1 Milloring
  RAID 5 Rotating Parity bit
  RAID 1/0 Striping of Mirrored Drives
  RAID 5/0 Striping of Distributed Parity
  RAID6 Double Parity Bit

Each RAID level has its pros and cons based on the application you use it for (Note: Refer to RAID level Quick Reference)

**Array Name:** the name that will be displayed in Logical Device Information (Default: RAID\_<level>\_<array number>)

#### Initialization Method:

- **Keep Old Data:** Opts to keep all the data on each drive untouched. Best for users that already have HighPoint RAID data on the selected drives.
- **Quick Init:** Grants immediate access to the array volume. This option will delete previous user data, but will not build parity. Recommended for testing purposes only or when new disks are used. Not recommended for RAID 5, RAID 5/0, and RAID 6.
- **Foreground:** The array initialization process will be set at high priority. During this time array will be non-accessible, but initialization completion time will be shorter.
- **Background:** The array initialization process will have a lower priority. During this time array will be accessible, but initialization completion time will be longer.

*Note* 1: Initialization takes a significant amount of time (approximately 2 hours per 1 TB).

### Cache Policy (Default: Write Back)

**Write Back** – Any data written to the array will be stored as cache, resulting in better I/O performance at the risk of data failures due to power outages. Data will be stored as cache before it is physically written to the disk; when a power outage occurs, any data in the cache will be lost.

**Write Through** – Data written to an array is directly written onto the disk, meaning lower write performance for higher data availability. Without cache acting as a buffer, write performance will be noticeably slower but data loss due to power outages or other failures is significantly minimized.

#### Block Size (default: 64K) [16K, 32K, 64K, 128K, 256K, 512K, 1024K are the supported block sizes]

This option allows you to specify the block size (also known as "stripe size") for specific array types (RAID 0, 1, 5, 6, 1/0, and 5/0). Adjusting the block size allows you to tailor the array performance towards specific application. Consider the sizes of disk I/O data you are dealing with; as a general rule larger disk I/O may benefit from smaller block sizes, and smaller disk I/O may benefit from larger block sizes. A block size of 64 KB is recommended since it gives balanced performance for most applications.

#### **Capacity (Default: Maximum)**

The total amount of space you want the RAID array to take up. When creating RAID levels, disk capacities are limited by the smallest disk.

Example Capacity calculation:

A RAID 5 organizes data in the manner shown below. All parity data will become unusable for the user and not included in the total disk capacity.

Disk 1	Disk 2	Disk 3	Disk 4
Data 1	Data 2	Data 3	Parity
Data 4	Data 5	Parity	Data 6
Data 7	Parity	Data 8	Data 9
Parity	Data 10	Data 11	Data 12

Therefore, RAID 5 capacity will be [SMALLEST DISK CAPACITY] \* (number of disks - 1).

#### Sector Size (Default: 512B)

This option is irrelevant for Windows XP 64 and later. Current OS already support larger volumes, and introduce a partitioning method known as GPT (GUID partition table). This option, also known as VSS (Variable Sector Size) allows you to specify the sector size of the array, for use with older Windows Operating Systems.

#### DV Mode

This mode is specifically designed for video applications. The default firmware cache policy provides balanced performance for standard applications such as workstations, file servers, and web servers. But for DV mode, a special cache firmware is implemented specifically for large sequential writing (large I/O requests such as video files). Enabling DV mode will maintain the performance and consistency of transferring and processing video files.

There are several factors concerning DV mode to take note:

- DV mode only available for RAID 0, 5, and 6
- Only 1 RAID array you created can enable DV mode
- DV mode only works when array status is normal
| DV Mode:  | ✓ Disable | Margin:  | 5% | $\hat{}$ |
|---|-----------|--|----|----------|
| (Enable special cache<br>policy for<br>DV/sequential write<br>applications) | Enable    | (Increasing the margin % will result<br>in more stable performance, but<br>decrease the maximum write<br>performance.) |    |          |

#### Margin

[5% - 25%]

When DV mode is enabled, you have the option to set the margin. This percentage represents the amount of space the designated cache will hold before flushing the data onto the drive. Increasing the margin % will result in more stable performance, but decrease the maximum write performance.

Alternatively, you can change the margin anytime in Logical > Maintenance for DV enabled array.

DV Mode:	Enable ᅌ	Margin:	~	5%
(Enable special cache policy for		(Increasing the margin % will result in more stable performance, but		10% 15%
DV/sequential write applications)		decrease the maximum write performance.)		20% 25%

### Logical Device Information

Logical device tab is the default page upon clicking the Logical tab of the WebGUI. This page contains information about your RAID arrays and individual disks your system detects.

#### **Logical Device Information**

Arrays you create and the properties associated with them will appear here.

#### Maintenance

Once an array has been created, click maintenance for options to manage your array.

#### **Array Information**

Clicking on the maintenance button will show you the Array information box. Different array statuses (Normal, critical, disabled) will have different maintenance options.

### Normal Status

Name	Туре	Capacity	BlockSize	SectorSize	OS Name	Status	
RAID_5_0	RAID 5	9.00 ТВ	64k Ari	512B	HPT DISK 0_0	Normal	<u>Maintenance</u>
Location 1/1 1/2 1/3 1/4	Model WDC WD4 WDC WD6 WDC WD3 WDC WD4				<ul> <li>Change Cad</li> <li>Change Margin</li> <li>name</li> <li>ORLM</li> </ul>	che Policy	city Max Free TB 1.00 TB TB 3.00 TB TB 0.00 GB TB 1.00 TB
						Close	

A Normal Status Array has the following options:

Delete - deletes the selected RAID array Unplug - powers off the selected RAID array Verify - verifies the integrity of the RAID array Change Cache Policy - Toggles between Write through and Write back cache Change Margin - Adjust margin when DV mode is enabled Rename - renames the RAID array OCE/ORLM - Online Capacity Expansion / Online RAID Level Migration

### Critical Status

		Lo	ogical De	evice Info	ormation			
Name	Type RAID 5	Capacity 9.00 TB	BlockSize	SectorSize 512B	OS Name HPT DISK 0_0	Status Critical	Mai	ntenance
W				ray Inform	_			
		🐕 RAID		Delete				
Location	Model			Unplug Add Disk			city	Max Free
<b>1/1</b>	WDC WD4	┥┝═▫	evice_1_2		¢ Change Cac	he Policy	тв	1.00 TB
<b>1/2</b>	WDC WD6	┥ ┝═▫	evice_1_3	Disable ‡	Change Margin		тв	3.00 ТВ
<b>1/3</b>	WDC WD3	<mark>₀ Lפ₀</mark>	evice_1_4	JBOD(Volume)	) ‡ ORLM	•	тв	0.00 GB
<b>2</b> 1/4	WDC WD4	¢.					тв	1.00 TB
						Close		

A critical status array has all the normal status options except the following:

- The Array can no longer be renamed
- Add disk replaces the verify disk option

Once array status changes to critical, the faulty disk will be taken offline and you can either:

- Reinsert the same disk
- Insert new disk

Reinserting the same disk should trigger rebuilding status, since data on the disk would be recognized.

If you insert a new disk, clicking **add disk** will give you the option to select that disk and add it to the array.

#### **Disabled Status**

Name       Type       Capacity       BlockSize       SectorSize       OS Name       Status         RAID_5_0       RAID 5       9.00 TB       64k       512B       Disabled       Maintenance         Array Information       RAID_5_0       RAID_5_0       Capacity       Maintenance         Location       Model       Pevice_1_1       Delete       Capacity       Max Free         1/1       WDC WD40       Pevice_1_2       Unplug)       4.00 TB       1.00 TB
Array Information  Array Information  RAID_5_0  Location Model  Capacity Max Free
Location Model Capacity Max Free
Location ModelDevice_1_1 Capacity Max Free
Delete
E 1/2 WDC WD60 - B Device_1_3 6.00 TB 3.00 TB
L/3 WDC WD30 Device_1_4 3.00 TB 0.00 GB
Loo TB 1.00 TB 1.00 TB 1.00 TB

A disabled status array means that your RAID level does not have enough disks to function.

- Your data will be inaccessible.
- Rebuilding will not trigger, since RAID does not have enough parity data to rebuild upon.

Your options in Maintenance are:

**Delete** – will delete the array **Unplug** – will take array offline, making it safe to remove **Recover** – will attempt to recover the array using the list from the recover tab

## **Physical Device Information**

Global View	Physical	Logical	Setting Event	SHI Rec	over Logout	Help
Create Array			Logical Dev	vice Informatio	on	
Spare Pool	Name	Type Capacit	ty BlockSize	SectorSize	OS Name	Status
Logical Device Rescan			Physical Dev	vice Informati	on	
Beeper Mute	Location		EFRX-68WT0N0-WD-W	/CC4ENSLV3U6	Capacity 4.00 TB	Max Free 4.00 TB
	2/6 2/7		EFRX-68MYMN1-WD-W EFRX-68EUZN0-WD-W		6.00 TB 3.00 TB	6.00 ТВ 3.00 ТВ
	2/8		EFRX-68WT0N0-WD-W		4.00 TB	4.00 TB

- Location which controller and port the drive is located in
- Model model number of the drive connected
- Capacity total capacity of the drive
- Max Free total capacity that is not configured

#### Rescan

Clicking rescan will force drivers to report array status. For any disk(s) you hot plug into the device, do not click rescan until all physical drives are detected and appear under Logical Device Information.

#### Beeper Mute

The controller emits a beeping sound whenever an

- Array falls into **critical** status
- Array falls into **disabled** status
- You unplug a disk
- Your disk fails due to bad sectors
- SMART sensors anticipate drive failure

If device is currently beeping, clicking Beeper Mute will mute the sound immediately. *Note*: This button does not permanently mute the alarm. To permanently mute the alarm go to **Setting>Enable audible alarm>Disabled**.

Global View	Physical Logical Setting	Event SHI Recover Logout	Help
system		System Setting	
Email	Enable auto rebuild.	Disabled \$	
	Enable Continue Rebuilding on error.	Disabled \$	
	Enable audible alarm.	Disabled +	
	Set Spindown Idle Disk(minutes):	Disabled ÷	
	Restrict to localhost access.	Disabled ÷	
	Set Rebuild Priority:	Medium ÷	
	Port Number:	7402	
	Submit		
	Pa	assword Setting	
	Password:		
	Confirm:		
	Submit		

## Appendix B-4: Setting Tab

### System Settings

#### Enable auto rebuild (default: Enabled)

When a physical drive fails, the controller will take the drive offline. Once you reinsert or replace the disk, the controller will not automatically rebuild the array unless this option is enabled.

### Enable continue rebuilding on error (default: Enabled)

When enabled, the rebuilding process will ignore bad disk sectors and continue rebuilding until completion. When rebuild is finished, the data may be accessible but data inconsistency due to ignored bad sectors may cause problems in the future. If this option is enabled, HighPoint recommends user to check the event log for bad sectors.

#### Enable audible alarm (default: Enabled)

When a physical disk fails, the controller will emit an audible sound signaling failure. This option mutes the alarm.

#### Set Spin down Idle Disk (minutes) (default: Disabled)

When set, physical drives will spin down a certain amount of time after disk activity ceases. Only 10, 20, 30, 60, 120, 180, 240 minutes setting are available.

#### Restrict to localhost access (default: Enabled)

Remote access to the controller will be restricted when **enabled**, other users in your network will be unable to remotely log in to the WebGUI.

#### Rebuild Priority (default: Medium)

You can specify the amount of system resources you want to dedicate to rebuilding the array. There are 5 levels of priority [Lowest, Low, Medium, High, Highest]

#### Port Number (default: 7402)

The default port that the HighPoint WebGUI listens on is 7402. You may change it to any open port.

#### Password Setting

#### Changing your WebGUI password

Under Password Setting type your new password and confirm it, then click submit.

#### Email Setting

You can set the controller to send an email out to recipients of your choosing when certain events (refer to Event Tab) trigger.

## Appendix B-5: Recover Tab

Controller(1): 4520 \$		High Point Technologies, Inc.
Global View Physical Logical Setting Event SH	Recover	Logout Help
Recover List		
Total items:(0), valid items:(0), only valid items are displayed.		
Backup To File Clear All		
Recover Array		
Update Recover List		
Select the rec file to update Recover List.		
This process may take some time.		
Choose File no file selected Submit		
HighPoint RAID Management 2.6.8 Copyright (c) 1996-2015 HighPoint Technologies, Inc. All Rights Reserved		

Previously created arrays will be stored under this tab. Recovering an array from here will attempt to recover a '**disabled**' array and make it '**normal**'.

The Recover List will list all your previous and current created arrays. Each entry will list the following properties:

- Array name
- RAID level
- Array Capacity
- Time created ( YYYY/MM/DD, HH/MM/SS, 24 hr clock format)
- Location of physical drives
- Model of physical drives

**Important:** When recovering an array it is important to note the **location** and **model** of each physical drive because you can **only** recover using those **exact** positions and drive model.

#### How to Backup your Recover List

The recover list is a record of your previously created arrays containing the model and location information of your physical drives. Recovering from the list could help bring a **disabled** array back to **normal** status for emergency data retrieval.

To backup your recover list:

- 1. Log in to WebGUI
- 2. Click **Recover** Tab
- 3. Click Backup to File

Note: The file will be saved as hptrec.rec

#### How to Reload your Backup Recover List

In the case that you cleared the recover list or it does not appear for any reason, you can recover it if you saved the list beforehand.

To reload your recover list

- 1. Log in to WebGUI
- 2. Click Recover Tab
- 3. Under Update Recover List click Browse.
- 4. Locate your previously saved **hptrec.rec** file and select it **Note**: loading a back up recover list will completely replace the current recover list.
- 5. Click Submit

### Appendix B-6: Event Tab

In the event tab, you can see log entries associated with the HighPoint device. The event log provides useful information when troubleshooting your set up.

In the event tab, there are four options available:

- Download Save the log file on your computer
- Clear Clears all log entries
- Prev View previous log page
- Next View next log page

#### Table 3. Event Log Icon Guide

Icon	Name	Definition
R	Information	<ul> <li>Includes general administrative tasks:</li> <li>Create/delete arrays</li> <li>Configuring spares</li> <li>Rebuilding arrays</li> <li>Configuring event notifications</li> <li>Configuring maintenance</li> </ul>
<u>^</u>	Warning	<ul><li>Alerts issued by the Host</li><li>Adapter:</li><li>High temperatures</li><li>Sector errors</li></ul>

		<ul> <li>Communication errors</li> <li>Verification errors</li> </ul>
8	Error	Hardware related problems • Hard disk failure • Broken errors • Memory failure

The event view is a basic error logging tool built into the HighPoint WebGUI.

### Appendix B-7: SHI (Storage Health Inspector)

- S.M.A.R.T Attributes
- HDD Temperature Threshold
- Storage Health Inspector Scheduling

The SHI outputs information collected using SMART (Self-Monitoring Analysis and Reporting Technology) Hard Drive Technology. The data provided on this tab helps you to anticipate any disk failures based on a variety of monitored hard disk properties.

# Appendix C:WebGUI Icon Guide

9	<b>Critical</b> – missing disk A disk is missing from the array bringing it to 'critical' status. The array is still accessible but another disk failure could result in data loss.
ofo	Verifying The array is currently running a disk integrity check.
8	<b>Rebuilding</b> The array is currently rebuilding meaning you replaced a failed disk or added a new disk to a 'critical' state array.
0	Critical – rebuild required The array has all disks, but one disk requires rebuilding.
8	Disabled The icon represents a disabled array, meaning more than one disk failed and the array is no longer accessible
å.	<b>Initializing</b> The array is initializing. The two types of initialization is Foreground and Background. (See Initialization)
U	Uninitialized The array initialization process has been interrupted, and the process is incomplete.
2	Not Initialized Disk is not initialized yet, and needs to be initialized before use
<b>,</b> U	OCE/ORLM Array is performing a OCE/ORLM operation
÷	OCE/ORLM has stopped The array expansion process has been stopped.
L	Legacy An existing file system has been detected on the disk. These disk are classified as legacy drives.
Q	Spare The device is a spare drive, it will automatically replace any failed drive part of an array.
Ŵ	Normal The array status is normal

Ŵ	Initializing The array is initializing, either foreground or background initialization
*	Initialization Stopped The initialization has been stopped. Current status is uninitialized.
Ŷ	Critical – Inconsistency Data in the array is inconsistent and needs to be rebuilt.
	Critical – missing disk A disk has been removed or experienced failure, and user needs to reinsert disk or add a new disk.
Ŵ	Rebuilding The array is currently rebuilding.
Ŵ	Verifying The array is performing a data consistency check. Array status will show 'verifying'.
	Disabled The array does not have enough disks to maintain the RAID level. A disabled array is not accessible.
Ŵ	OCE/ORLM Array is expanding its capacity or migrating to a different raid level. Status will display 'Expanding/Migrating'
<b>1</b>	OCE/ORLM stopped The 'Expansion/Migrating' process has been stopped. The status will display 'Need Expanding/Migrating'
1	Critical – OCE/ORLM A disk member is lost during the OCE/ORLM process.
1	Critical – OCE/ORLM - rebuild The expanding/migrating array requires a rebuild.

Туре	Description	Min. disks	Usable space	Advantage	Disadvantage	Application
JBOD	Just a bunch of disk	1	100%	Each drive can be accessed as a single volume	No fault tolerance - failure of one drive results in complete data loss	Backup
RAID 0	Disk Striping	2	100%	Offers the highest performance	No fault tolerance – failure of one drive in the array results in complete data lose	Temporary file, performance driven application.
RAID 1	Disk Mirroring	2	50%	Provides convenient low- cost data redundancy for smaller systems and servers	Useable storage space is 50% of total available capacity. Can handle 1 disk failure.	Operating system, backup, and transaction database.
RAID 1/0	Disk Mirroring followed by stripe	4	50%	High read performance and medium write performance with data protection for up to 2- drive failures	Useable storage capacity equals total capacity of all drives in the array minus two	Fast database and application servers which need performance and data protection
RAID 5	Disk Striping with Rotating parity	3	67-94%	High read performance, and medium write performance with data protection with a single drive failure	Not recommended for database applications that require frequent/heavy write sessions. Can handle 1 disk failure.	Data archives, and ideal for application that require data protection
RAID 6	Disk Striping with dual rotating parity	4	50-88%	High read performance, and medium write performance with data protection in case of up to two drives failure	Not recommended for applications that require frequent/heavy write sessions.	Data archives and ideal for application that requires data protection

# Appendix D: RAID Level Reference Guide<sup>1</sup>

<sup>&</sup>lt;sup>1</sup> Refer to the RAID controller product specifications for supported RAID levels.

## <u>Help</u>

**Online Help** redirects you to additional documentation concerning the HighPoint WebGUI.

**Register Product** takes you to HighPoint's web support. On this page you can create a new customer profile where you can register your product or post an online support ticket.

#### HighPoint List of Recommended Hard Drives

HighPoint maintains a list of tested hard drives suitable for RAID applications. Since not every hard drive in the market can be tested, this list is meant to be a general guideline for selecting hard drives operating in a RAID environment. Regular, desktop grade drives are highly not recommended for RAID use.

<u>http://highpoint-</u> <u>tech.com/PDF/Compatibility\_List/RocketRAID\_600\_2700\_3600\_and\_4500\_Series\_RAID\_HBA\_Hard\_Drive\_Compatibility\_List.pdf</u>

Contacting Technical Support

For any help and support, submit a support ticket online at <u>http://www.highpoint-tech.com/websupport/</u>.

You may also call us during our regular business hours: Monday – Friday (Excluding Holidays), 9 AM to 6 PM (PST) **Phone:** (408) 240-6108