RocketStor 6314X
User Manual

Mar.31, 2020
Revision v1.04
HighPoint Technologies, Inc.

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Notice
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Contents

Kit Contents

- RS6314X Enclosure (with 4 disk trays pre-installed)
- Accessories Box
- Screw bag (including 2 sets of 18 screws for HDD/SSD)
- Thunderbolt™ Cable
- UL Power Cord
- Quick Installation Guide for RS6314X
- Thunderbolt™ 3 to Thunderbolt 2 adapter (only for RocketStor 6314X)

For any damaged or missing items contact your reseller or submit a support ticket online at www.highpoint-tech.com/websupport/

Product Information	RocketStor 6314X
Port Technology	Thunderbolt™ 2
Onboard Storage processor	RAID-On-Chip Onboard
Onboard Cache Memory	512MB DDR 3 Cache Memory with ECC Protection
Port Type	2x Thunderbolt™ Port
RAID Level	0, 1, 5, 6, 10 and JBOD
Max. Capacity	up to 32 TB
Number Of drives	Up to 4
Drive Interface	SAS, SATA
Drive Form Factor	3.5" & 2.5"
Material	Brushed aluminum housing
Dimension	8.66"(H)x5.31"(W)x8.67"(D)
Weight	9.46lb
Warranty	3 Years
Advanced RAID Feature	Configurable RAID Block Size up to 1MB
	Flash ROM for Upgradeable Firmware
	DV Mode Technology
	Storage Health Inspector
	Redundant RAID Configurations
	Multiple RAID Partitions supported
	Online Array Roaming
	Online RAID Level Migration (ORLM)
	Online Capacity Expansion (OCE)
	RAID Initialization Background/Foreground/Quick
	Global Hot Spare Disk support
	Automatic and configurable RAID Rebuilding Priority
	Disk Format compatible: 512, 512e, 4Kn
	Larger than 2 TB Drive and RAID Array support
	Spin down Massive Arrays of Idle Disks support
	Native Command Queuing
	Write Back and Write Through
Storage Monitoring and Management Suite	
RAID Management Suites:	Browser-Based management tool,
Drive Indicator	Power, Present, Active, Fail
SMTP	Email Alert Notification
Alarm Buzzer	Buzzer beeping when failed drive or array occurs
Operating System	Window 2008 and Window 7 and later
	Driver embedded into Mac OS X 10.9 and later
Power Supply	AC INPUT 100-240V ~ 5A 50/60Hz

Operating Environment	
Temperature	(operating) 5°C – 45°C (non-operating) -40°C – 65°C
Relative Humidity	(operating) 8% – 90% RH (Non-condensing) (non-operating) 5% – 95% RH (Non-condensing)

Figure 1. RS6314X Front Panel

Figure 2. RS6314X Back Panel

Figure 3. Isometric view of disk tray with physical drive installed (drive not included)

Figure 4. Bottom View of disk tray. SSD mount points are on the bottom.

Figure 4. Thunderbolt 3 to Thunderbolt 2 Adapter. It allows HighPoint Thunderbolt™ 2 RAID enclosures to be used with Thunderbolt™ 3 (USB-C) ports

Getting Started

Thank you for purchasing HighPoint Technologies RocketStor 6314X. You are only a few steps away from utilizing RAID storage using the industry's most affordable hardware RAID solution.

Main topics in this section include:

- Setting Up the Hardware
- How to Update and Install Drivers
- How to Install HighPoint WebGUI

Setting Up the Hardware

Important:

1. Ensure that you have all items listed under Kit Contents.
2. Verify and record the S/N of the enclosure unit.
   The technical support may ask for the S/N of the enclosure unit. Please record the S/N of the unit. The S/N is located on the sticker on the bottom of the enclosure unit as below.

The S/N has 13 characters and the S/N format for the RocketStor 6314X is "****M3M******"

Setup the hardware

Step 1. Plug in the power cord for your RS6314X. Note: To prevent physical drive damage, keep the RS6314X oriented upright when in use.

Figure 5. Power Cord plugged into back panel

Step 2. Plug one end of the Thunderbolt™ cable to either of the RS6314X ports and the other end to your computer's Thunderbolt™ port.

Figure 6. Connect to either the right or left Thunderbolt™ port.

Step 3. Press then pull the blue tab on each disk tray to unlock and slide out each tray.

Step 4. Mount your hard drives onto each tray using the provided screws. (Note: see HELP for a list of recommended hard drives)

Step 5. The disk trays have pre-drilled holes compatible with 3.5" and 2.5" hard drive form factors. SSD holes are drilled on the bottom of the disk tray.

Step 6. Switch the power button on.

Figure 9. Power Button located on Back Panel (figure shows enclosure switched ON)

Step 7. Make sure the power LED on the front of the enclosure is LIT.

Step 8. (For Windows) Install RS6314X drivers and the HighPoint WebGUI Management Utility to access and manage your arrays.
(For Mac) RS6314X drivers are pre-installed for Mac OSX 10.9 and later. Earlier versions of Mac OSX may require driver installation

LED Activity

A quick, convenient way for identifying a faulty drive or enclosure unit is to read the LED lights on the front panel.

Table 1. LED Activity Reference

LED Location	Icon	Normal	Faulty
Disk Tray Top LED		• When powered on, the LED will be a STABLE BLUE • When disk is busy, the LED will be BLINKING BLUE	

Disk Tray Bottom LED		• When array is normal status, LED will be UNLIT	When disk has a problem, LED will be SOLID RED When disk is under Rebuilding, LED will be Blinking RED
Power LED		• When enclosure is powered on LED will be SOLID BLUE • Power LED will be UNLIT if not connected to a running host system	

Table 2. LED Status Information

LED Status	Interpretation
STABLE BLUE	• Disk is detected and connection has been made • Enclosure is properly powered
BLINKING BLUE	Disk is in use and performing I/O activity such as: • Rebuilding an array • Verifying data integrity • Transferring data
RED	• Turned Identify LED ON Disk communication failure potential causes: • Disk is unplugged • Disk array is in critical condition • Disk array is in disabled condition • SMART detected disk failure

UNLIT	• Unit is powered OFF • Disk tray is empty

Shutting Down the RS6314X

The 6314X enclosure will automatically power down when your computer is turned off. For turning off the 6314X safely without shutting down your PC, take the following steps:

1. Eject the drive from OSX
   - Right Click the drive and click Eject
   - Double click the drive and click the Eject button for the drive under devices
2. Check the front panel LED lights to make sure there is no disk I/O activity
3. Switch the power switch on the back panel OFF (O is pushed down) or unplug the Thunderbolt™ cable.

Important: Do not move or tilt the enclosure until disk activity has completely stopped to prevent physical damage of hard drives.

Daisy Chaining the RS6314X

Daisy chaining means you are connecting multiple devices in a series in an effort to expand your storage without using more PC ports. Up to 6 Thunderbolt™ devices can be daisy chained together.

Figure 7. Sample daisy chain configuration.. RS6328L connected to RS6314X connected to another RS6314X (left to right)

1. Plug in one end of Thunderbolt™ cable to your Mac, and the other end to a RS6314X Thunderbolt™ port.
2. Plug in one end of *another* Thunderbolt™ cable into the unused port, and the other end of the cable into the next Thunderbolt™ device.

Note*:* Wait at least 20 seconds for the device to be detected by the system.

Important: Chaining SIX RS6314X enclosures DOES grant you *access* of up to 24 hard drives, but DOES NOT allow you to create a single RAID array using all 24 drives. Each RS6314X enclosure has its own RAID controller that detects only the 4 hard drives connected to it.

Install and Update Drivers

Drivers provide a way for your operating system to communicate with your new hardware. Update to the latest driver to ensure you have the latest performance and stability updates.

Check if drivers are currently installed

For Mac users:

1. Click on the Apple Icon ( )
2. Click About this Mac
3. Click More Info
4. Click System Report
5. Select PCI Cards

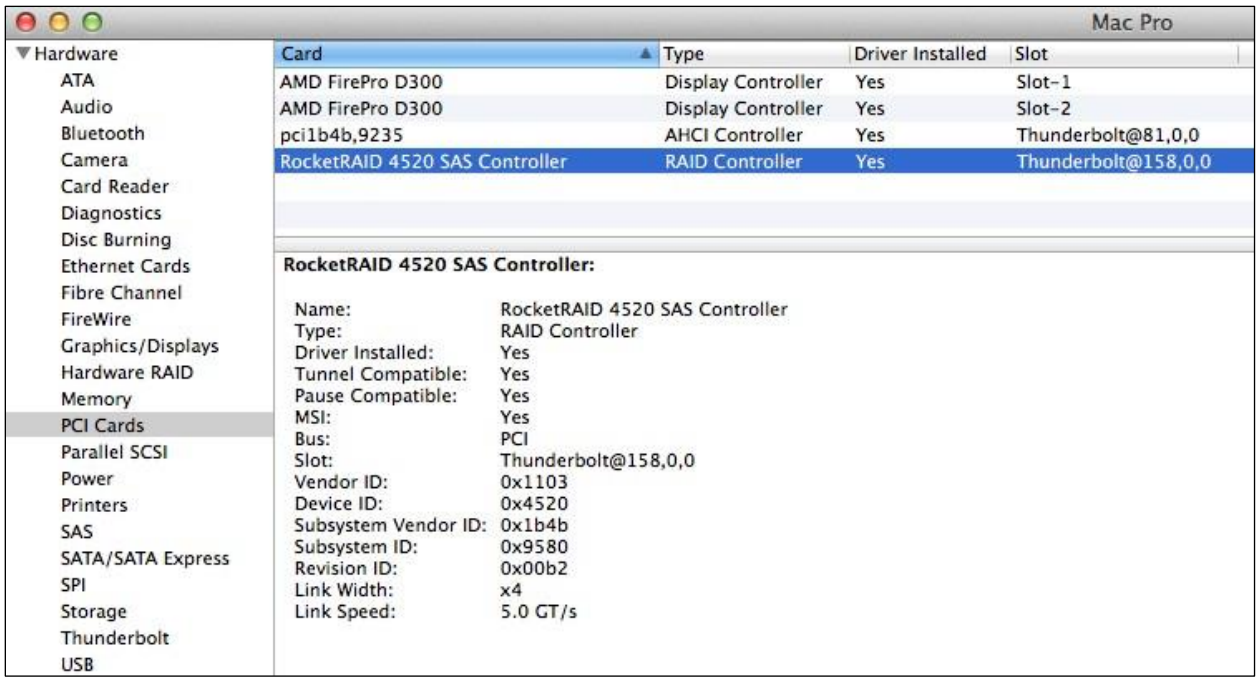


Figure 8. Navigate to Apple Icon > About this Mac > System Report > PCI

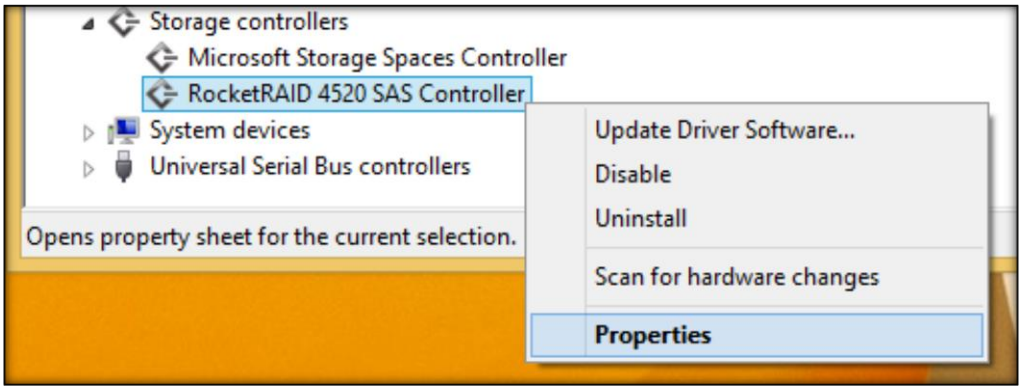
The RS6314X should be listed as RocketRAID 4520 SAS Controller, and Driver Installed should say Yes. (HighPoint Mac drivers are embedded for OSX 10.9 and later.)

For Windows users:

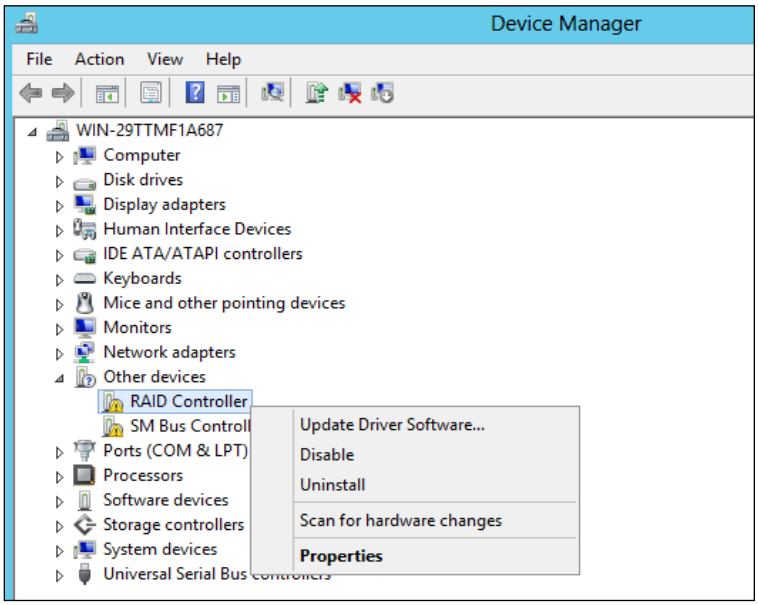
1. Install and verify motherboard Thunderbolt™ drivers are functional
2. Click Start
3. Click Control Panel
4. Click Hardware and Sound
5. Under Devices and Printer, Click Device Manager

Note: Alternatively, you can search Device Manager in your start menu search bar.

6. Click the Storage controllers tab
   - If driver is installed it will show RocketRAID 4520 SAS Controller,



   - If driver is *not* installed it will be located in Other devices as RAID Controller



- Click Properties, then click the Driver Tab to find out the version installed.

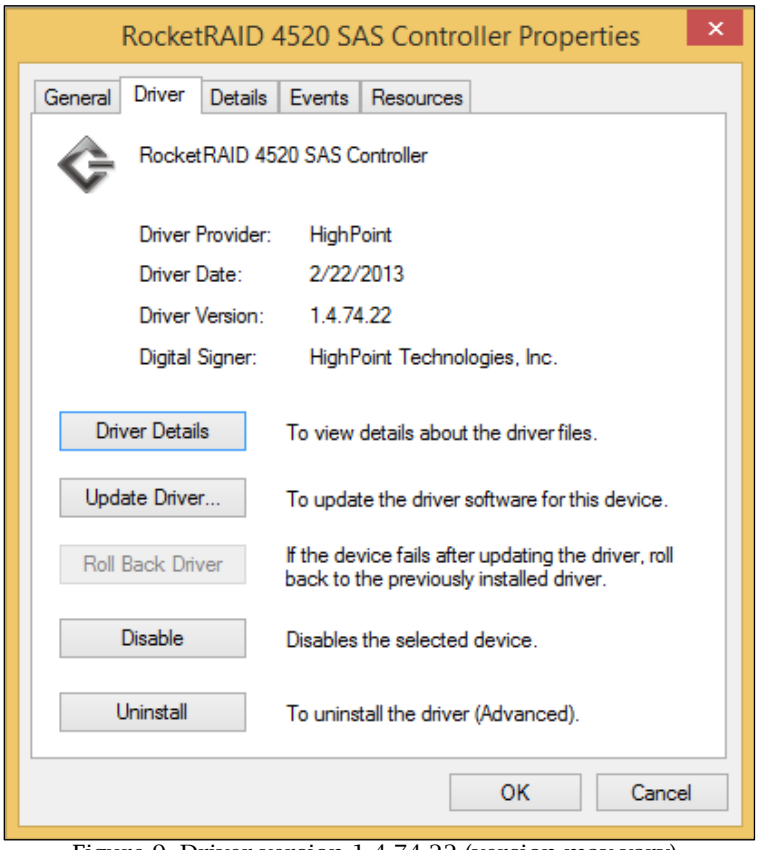


Figure 9. Driver version 1.4.74.22 (version may vary)

Install/Update Drivers on existing operating systems

- For users that already have an operating system installed, and want to use the RS6314X as a data array (data storage) device, follow the instructions below.

For Mac Platforms:

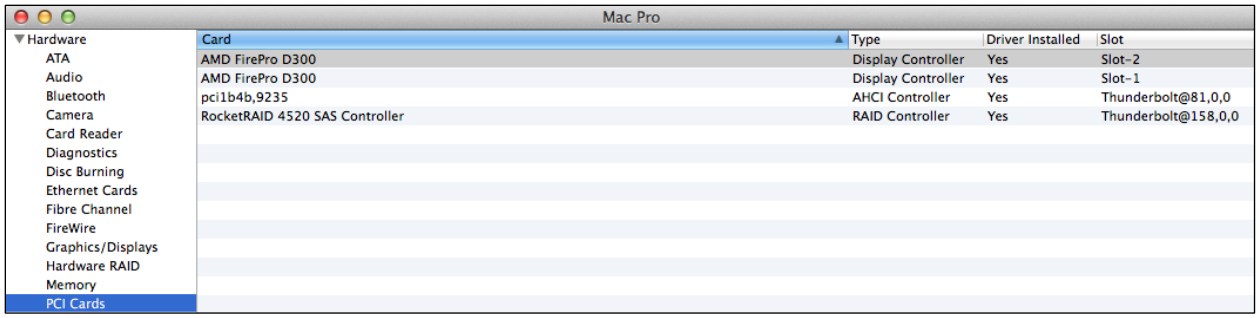
Drivers for RS6314X are already embedded in the latest Mac OSX (10.9 and later), and installing drivers is unnecessary. If you previously uninstalled the drivers, or wish to update your current drivers, follow the instructions below.

HighPoint Mac Drivers have file extension .dmg; make sure the file extension for the files you downloaded are the same.

1. Obtain latest driver online at http://www.hptmac.com/series-rs6314a-resources.php

- Navigate to your specific HBA controller page (Refer to How to View HBA Properties to find model name)

2. Once downloaded, locate the folder you downloaded the driver to and double click on the file named "HighPointIOP_Mac_###.dmg" ***Note:*** File name varies, but extension is .dmg.
3. The file will be mounted onto the operating system, click on HighPointIOP.pkg located on your desktop
4. Follow the on-screen instructions.
5. Reboot computer
6. Make sure Driver Installed is Yes

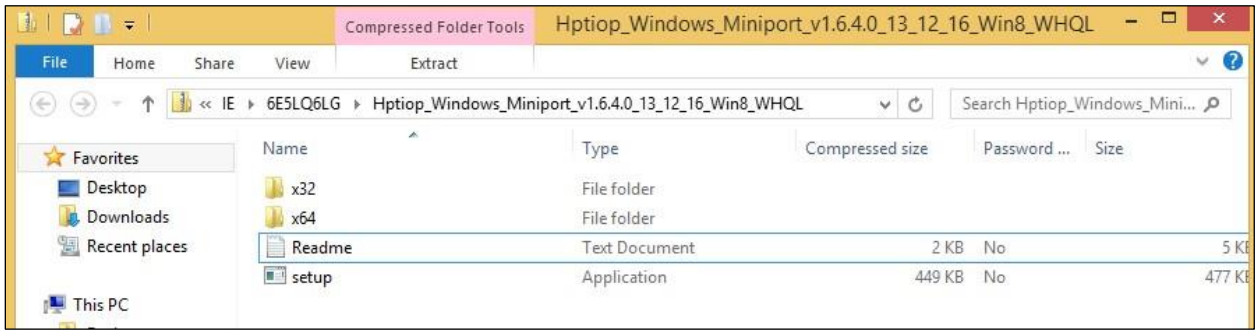


After reboot, check system report again to confirm you have *RocketRAID 4520 SAS Controller* installed.

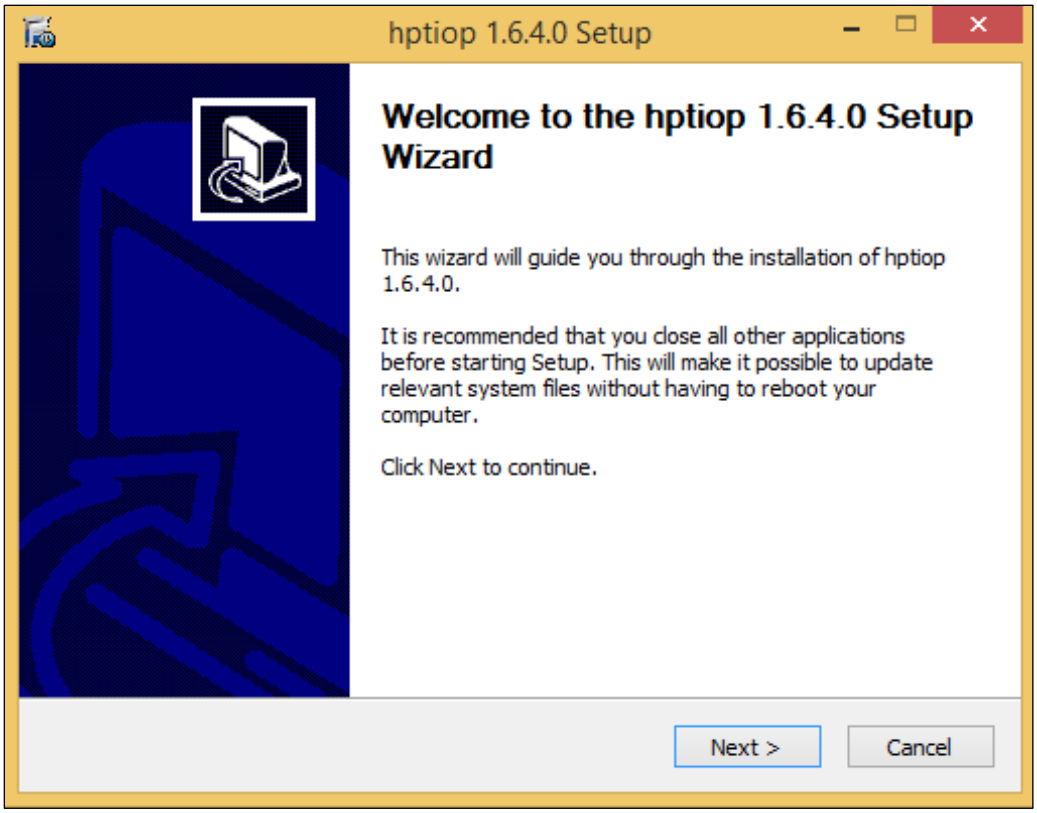
For Windows Platforms:

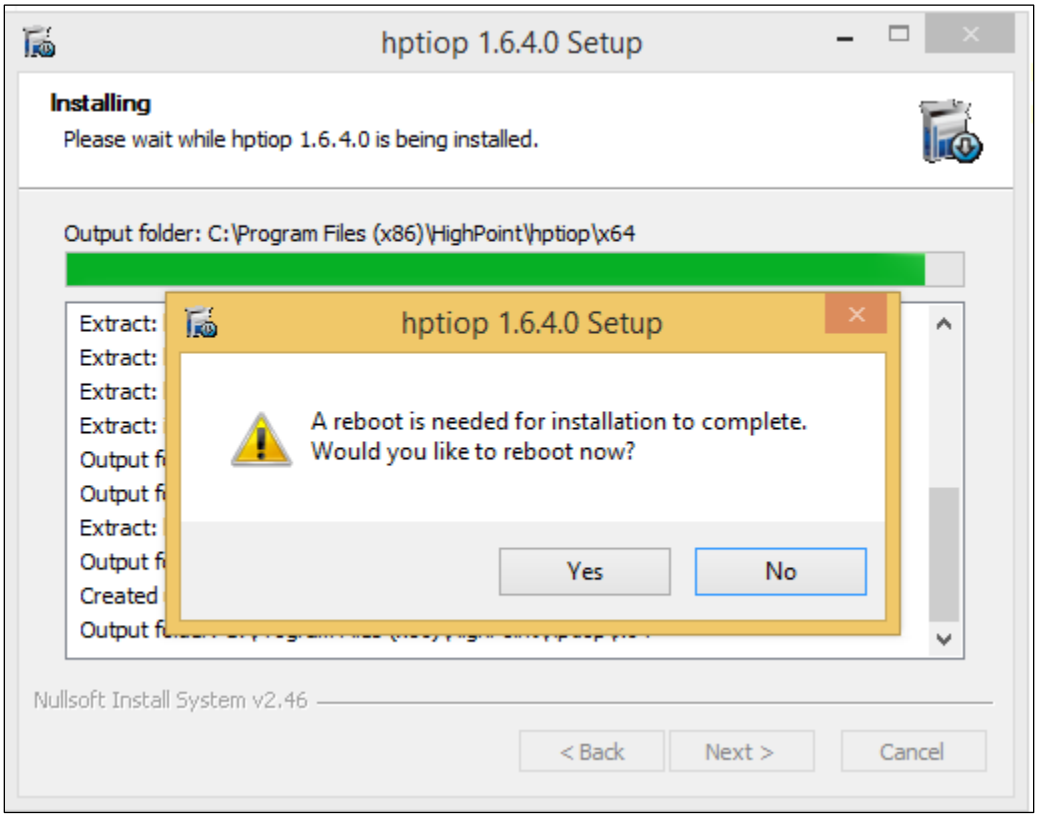
1. Download the latest drivers from http://www.hptmac.com/series-rs6314a-resources.php
- For PC motherboards with Thunderbolt™, download the WHQL driver files

2. Once downloaded, click setup.exe

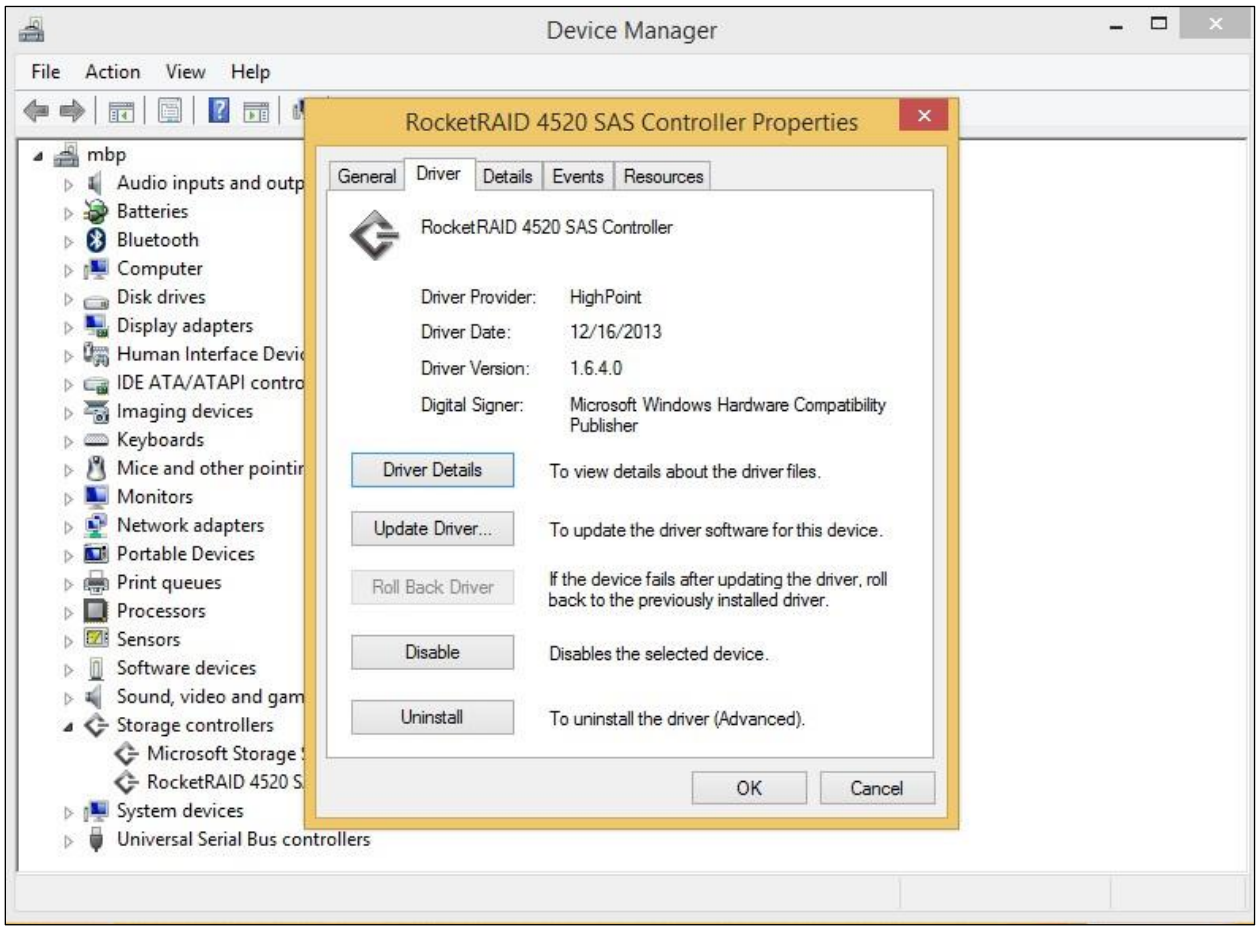


3. Follow the on-screen instructions until prompted to reboot


hptiop 1.6.4.0 Setup
Welcome to the hptiop 1.6.4.0 Setup Wizard
This wizard will guide you through the installation of hptiop 1.6.4.0.
It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
Click Next to continue.
Next >
Cancel


hptiop 1.6.4.0 Setup
Installing
Please wait while hptiop 1.6.4.0 is being installed.
Output folder: C:\Program Files (x86)\HighPoint\hptiop\x64
Extract:
Extract:
Extract:
Extract:
Output f
Output f
Extract:
Output f
Created
Output f
hptiop 1.6.4.0 Setup
A reboot is needed for installation to complete.
Would you like to reboot now?
Yes
No
Nullsoft Install System v2.46
< Back
Next >
Cancel

4. After reboot, check drivers are installed properly using device manager

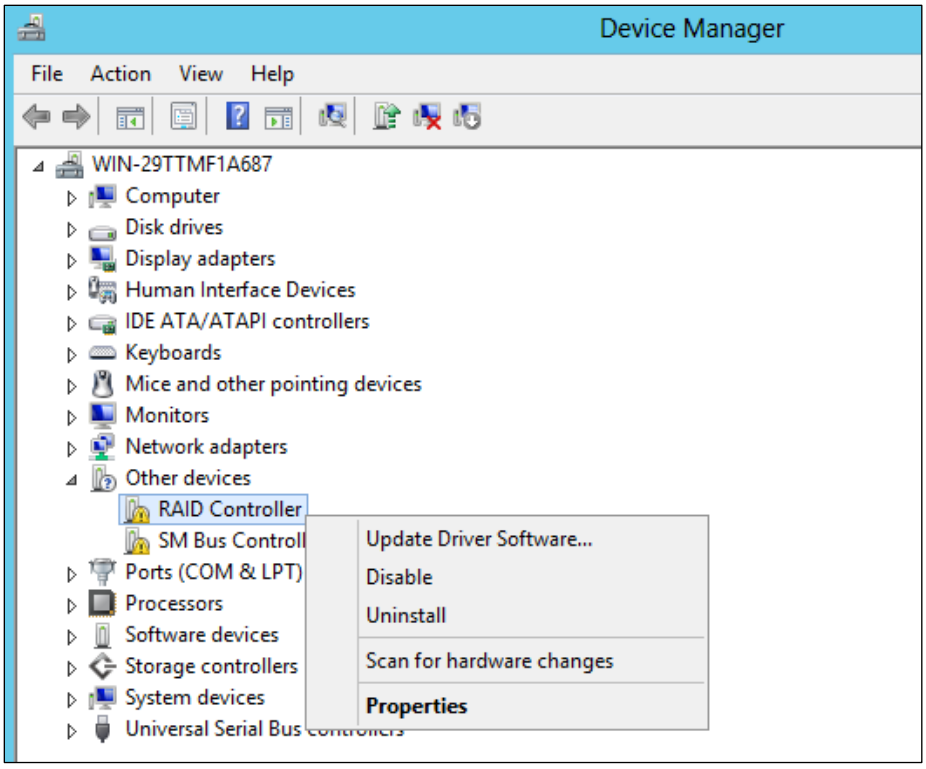


Alternate Install Method:

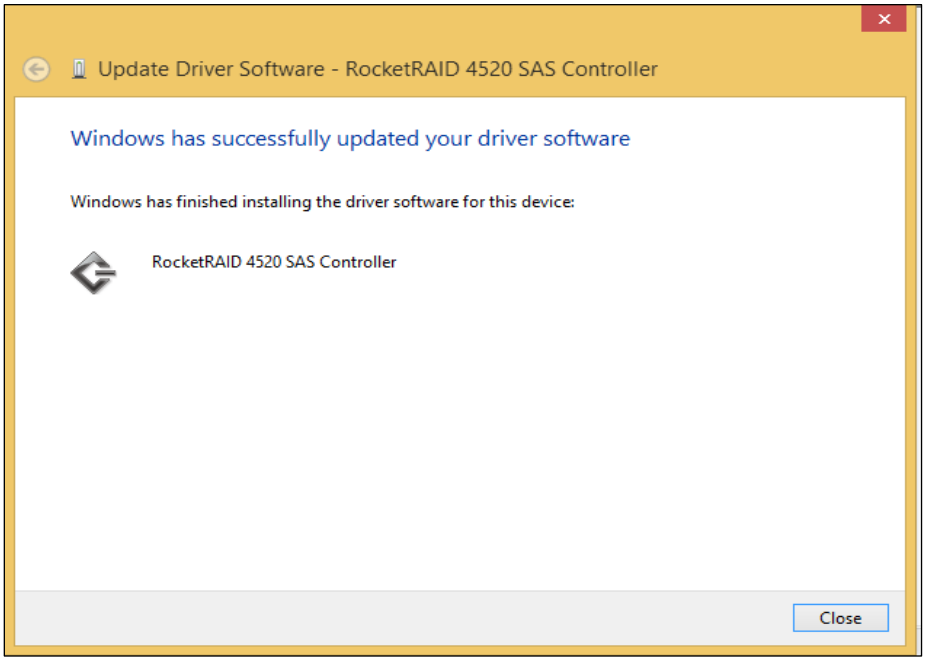
1. Obtain latest driver software for RocketRAID 4520 SAS Controller from our website http://www.hptmac.com/series-rs6314a-resources.php
2. Take note the location you downloaded the driver file to, then open Windows Device Manager.

- Click Start
- Click Control Panel
- Click Hardware and Sound
- Under Devices and Printer, Click Device Manager
- ***Note:*** Alternatively, you can search Device Manager in your start menu search bar.

3. Under Other Devices, right click on RAID controller
4. On the dropdown menu, click Update Driver Software…



5. When prompted, select Browse my computer for driver software
6. Locate the driver files you downloaded and select them.
7. Press next and follow the on–screen instructions



8. Reboot

Uninstall Drivers

To uninstall the drivers, take the following steps

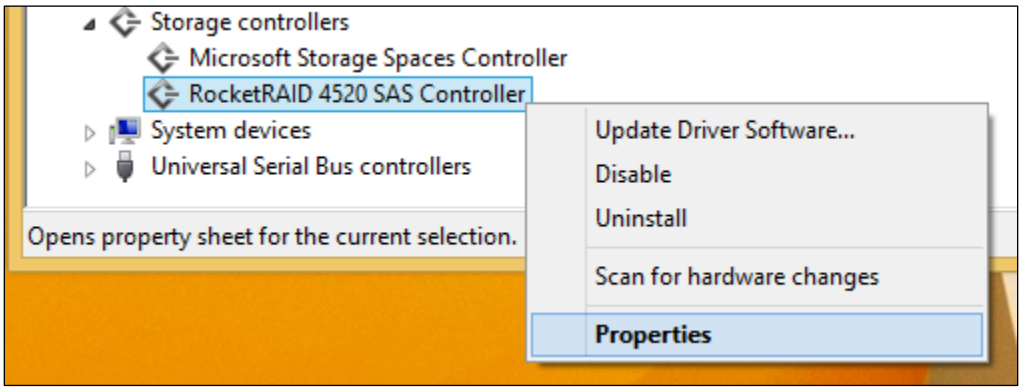
For Mac Platform:

1. Double click on “HighPointIOP_Mac_106_####.dmg” Note: File name subject to change, make sure extension is .dmg.
2. Double click on uninstall.command
3. A terminal window will pop up prompting you to type in your administrator password. Type in your administrator password to allow uninstall.
4. Reboot

Note: The file is flagged as an unidentified developer file on OSX. In order to open, hold the Control key + click the file, then click open. A system prompt will appear; read the prompt, then click open.

For Windows Platform:

1. Open Windows Device Manager
   - Click Start
   - Click Control Panel
   - Click Hardware and Sound
   - Under Devices and Printer, Click Device Manager
   - ***Note***: Alternatively, you can search Device Manager in your start menu search bar.
2. Click the Storage controllers tab
3. Right click RocketRAID 4520 SAS Controller



4. Click Uninstall
5. Reboot your PC for changes to take effect

Installing HighPoint WebGUI

HighPoint Web RAID Management Software (WebGUI) is used to monitor and configure your hard disks and RAID arrays attached to HighPoint RocketRAID controllers.

The software package must be installed on system with supported HighPoint RocketRAID controllers installed, and the device driver must be loaded to run the service. A web browser with XML support is required on the client side, e.g. Internet Explorer, Mozilla, FireFox or Google's Chrome.

New features are continually added to the interface; update to the latest version at http://www.hptmac.com/series-rs6314a-resources.php

1. Locate the HighPoint WebGUI Setup on our website http://www.hptmac.com/series-rs6314a-resources.php and download the file
2. Extract the files from the archive
3. Double click on "HighPoint RAID Management.exe"
4. Follow the on–screen steps to install our software.

5. Log in the WebGUI by double clicking the desktop icon created or by typing http://localhost:7402 in your preferred browsers address line (it is recommended to use the latest version of your browser.)

Navigating the WebGUI

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

- Create and remove arrays
- Monitor disk health
- Update firmware and BIOS
- Change enclosure settings
- Troubleshoot faulty drives
- View general system overview

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

Logging In HighPoint WebGUI

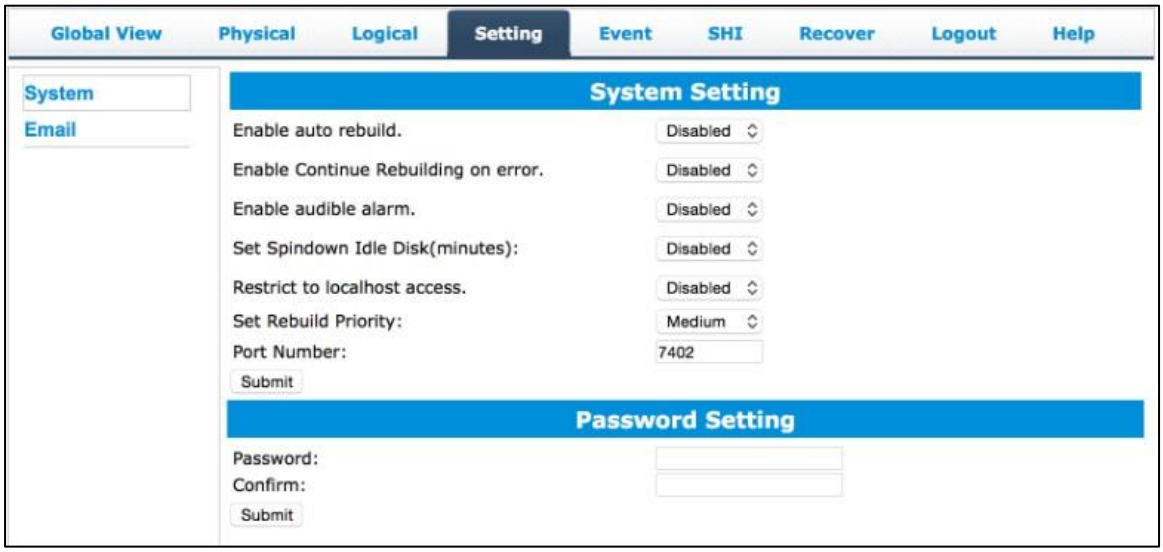
You can reach the HighPoint WebGUI log in page either by:

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

For the Windows WebGUI, please use the default user name: RAID and password: hpt for log-in.

For the Mac WebGUI, it will log-in without password needed

You can set up the Password from the WebGUI > Setting page.

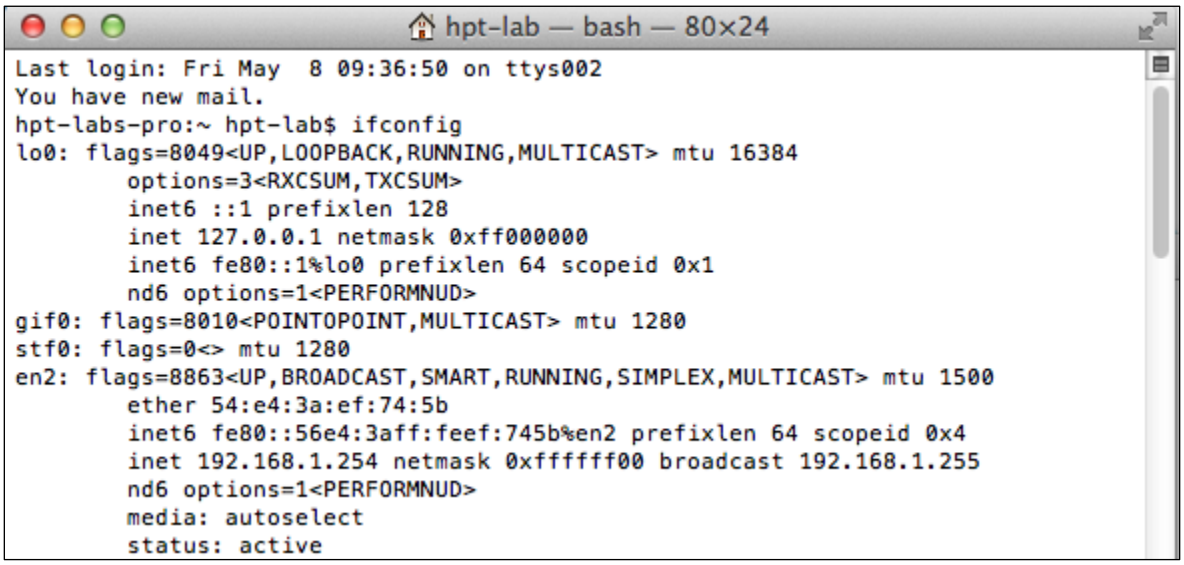


Remote Login

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

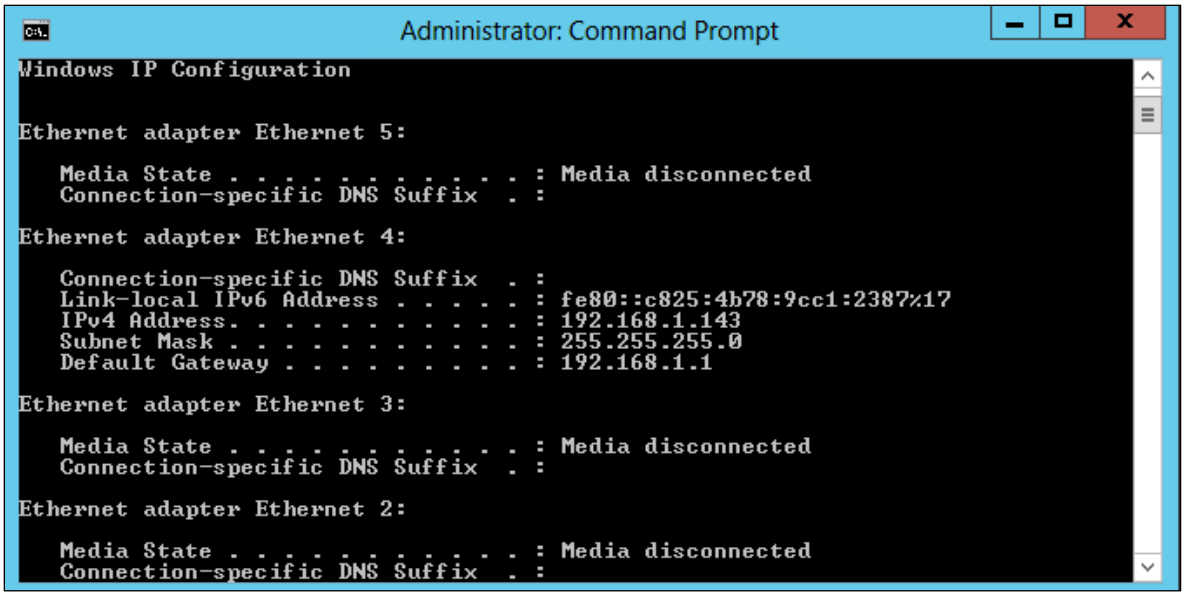
To obtain your IP address
For Mac users:

1. Open a terminal window on the host computer (computer that is connected to the RS6314X enclosure)
2. Type `ifconfig`
3. Look for the connection that has status: active
4. Write the IP address located after inet:



For Windows users:

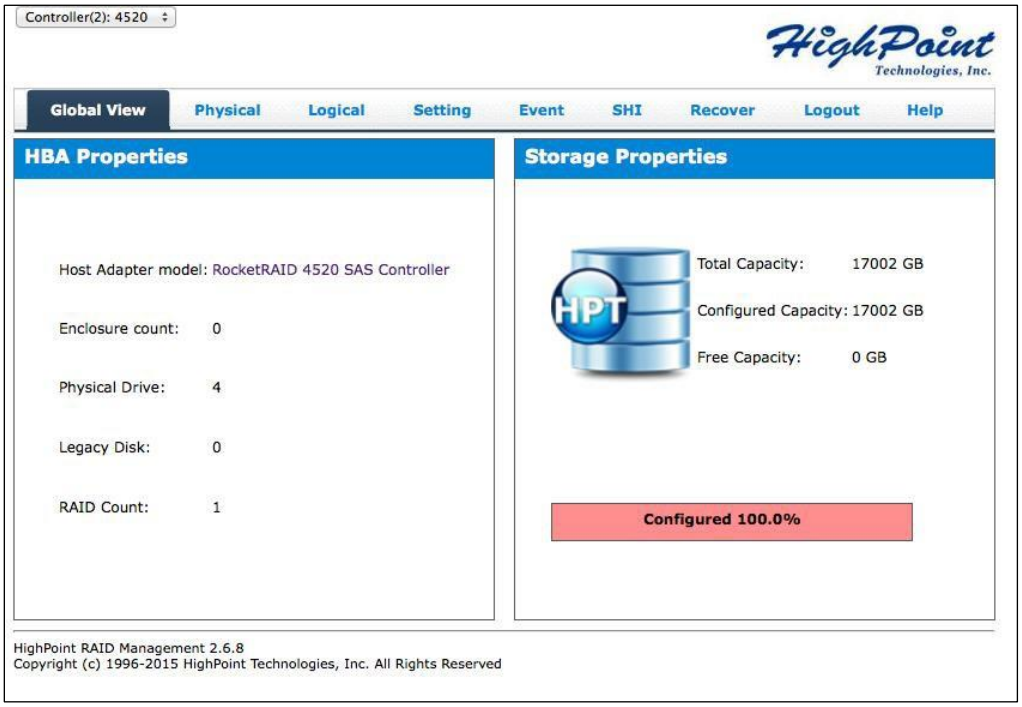
1. Open a command prompt window on the host computer.
2. Type `ipconfig`
3. Look for the section that contains your network adapter information
4. Take *Note* the IP address



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)

Global Tab



The GUI 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).

Viewing HBA Properties

1. Log in to WebGUI
2. Select the proper controller from drop down on the top left
3. Click Global View

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.

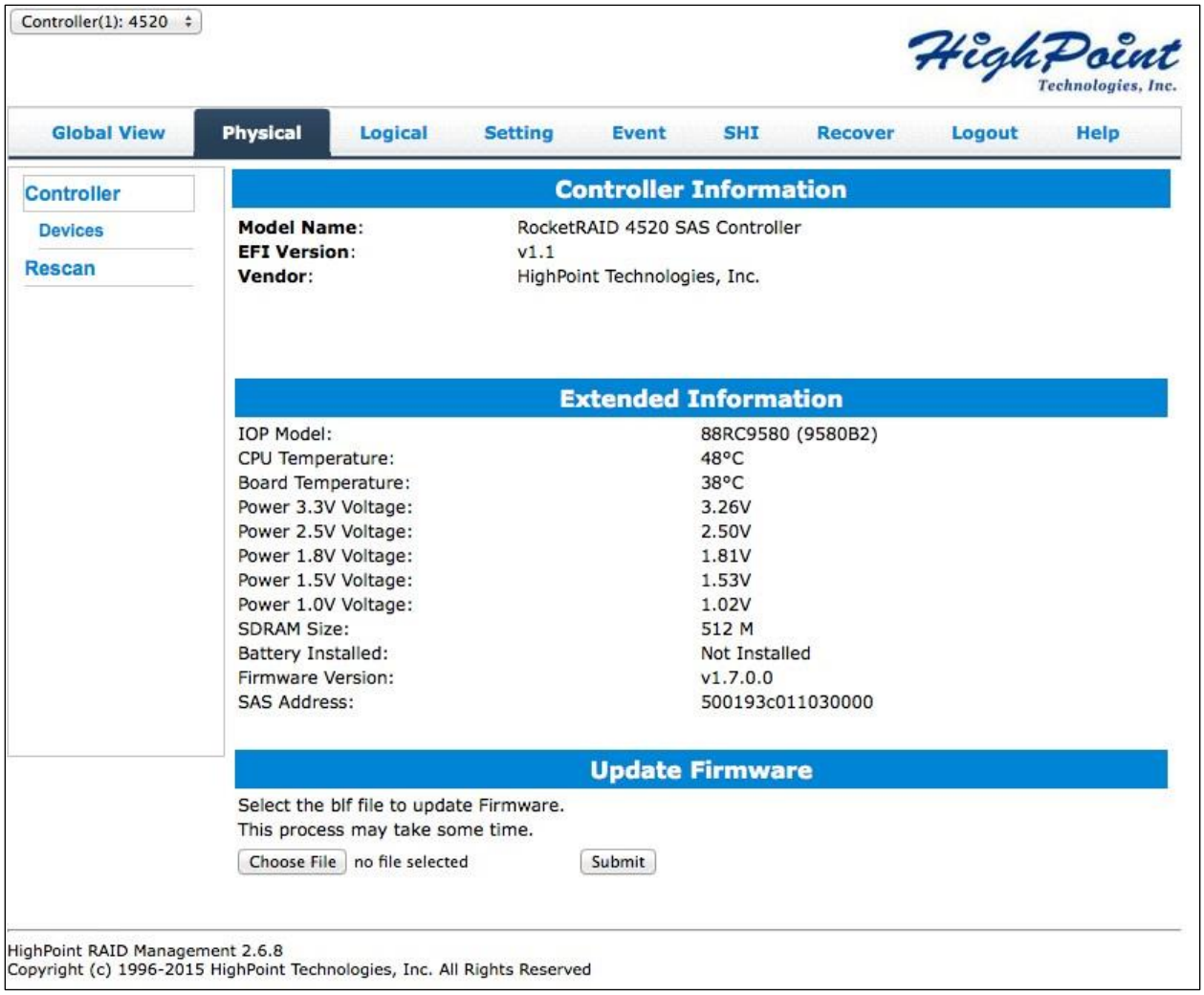
Viewing Storage Properties

1. Log in to WebGUI
2. Select the controller from drop down menu on top left
3. Click Global View

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

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: RocketRAID 4520 SAS Controller (for RS6314X)
- EFI Version: v1.1 (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 Celsius (℃).
- Board Temperature: Displays the board temperature in Celsius (℃).
- SDRAM Size: SDRAM size of the HighPoint controller card
- Battery Installed: Battery Backup Unit (Not Applicable for RS6314X)
- Firmware Version: Firmware version of the HBA
- SAS address: the SAS address

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

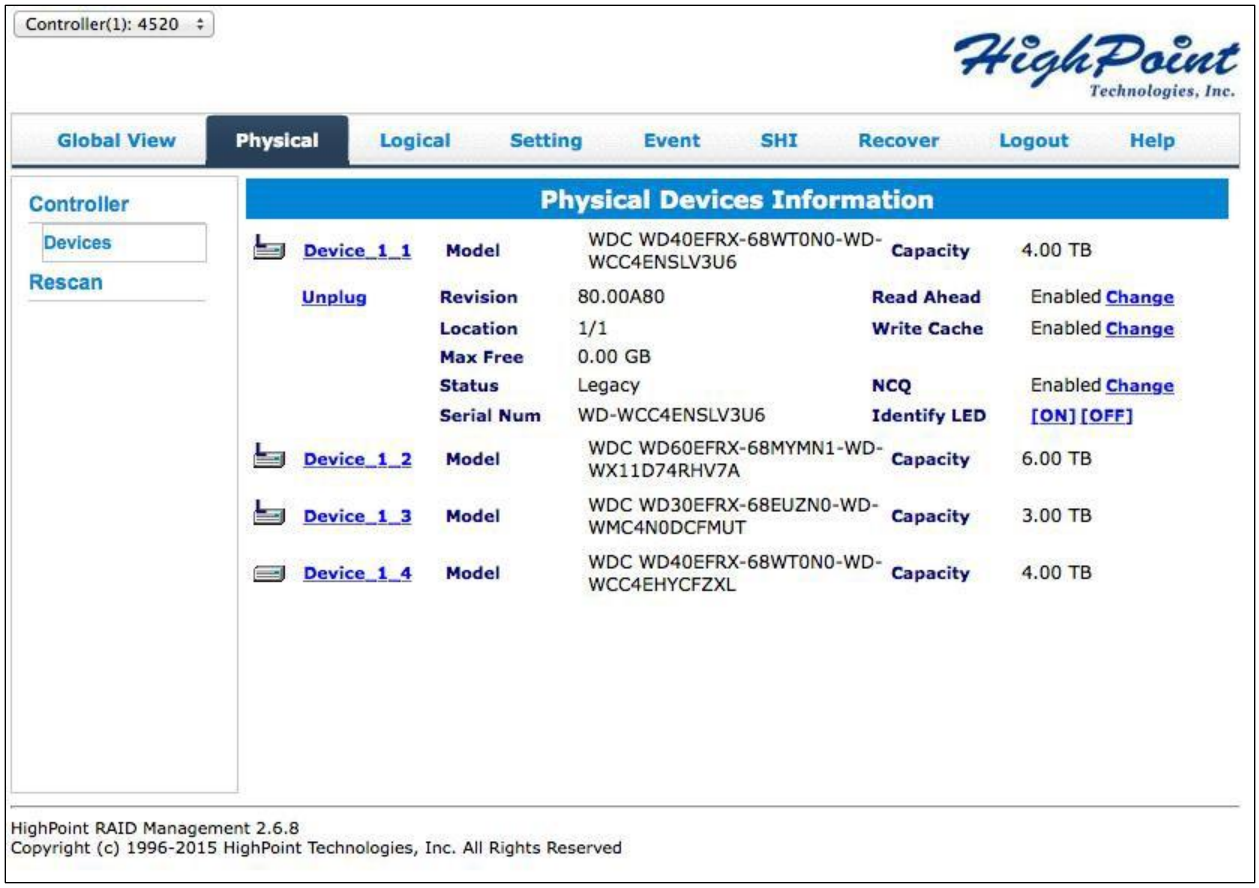
Updating BIOS/Firmware

Keeping the firmware up to date ensures that your RAID controller the latest compatibility and performance updates. Firmware files have extension .blf.

1. Locate the latest firmware on our webpage at www.highpoint-tech.com
2. Example firmware file will be in a zipped package with a naming convention such as RR4520_v1.6.3.0_xxxx.zip
3. Extract the contents of the file
4. Read 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.
5. Locate the proper firmware file (e.g. 4520fw.blf, refer to the readme)
6. Click Choose File and browse to your firmware file
7. Click Submit
8. Reboot

Obtaining Physical Device Information

1. Log in to WebGUI
2. Click Physical
3. Click Devices located on the left panel



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
- **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.

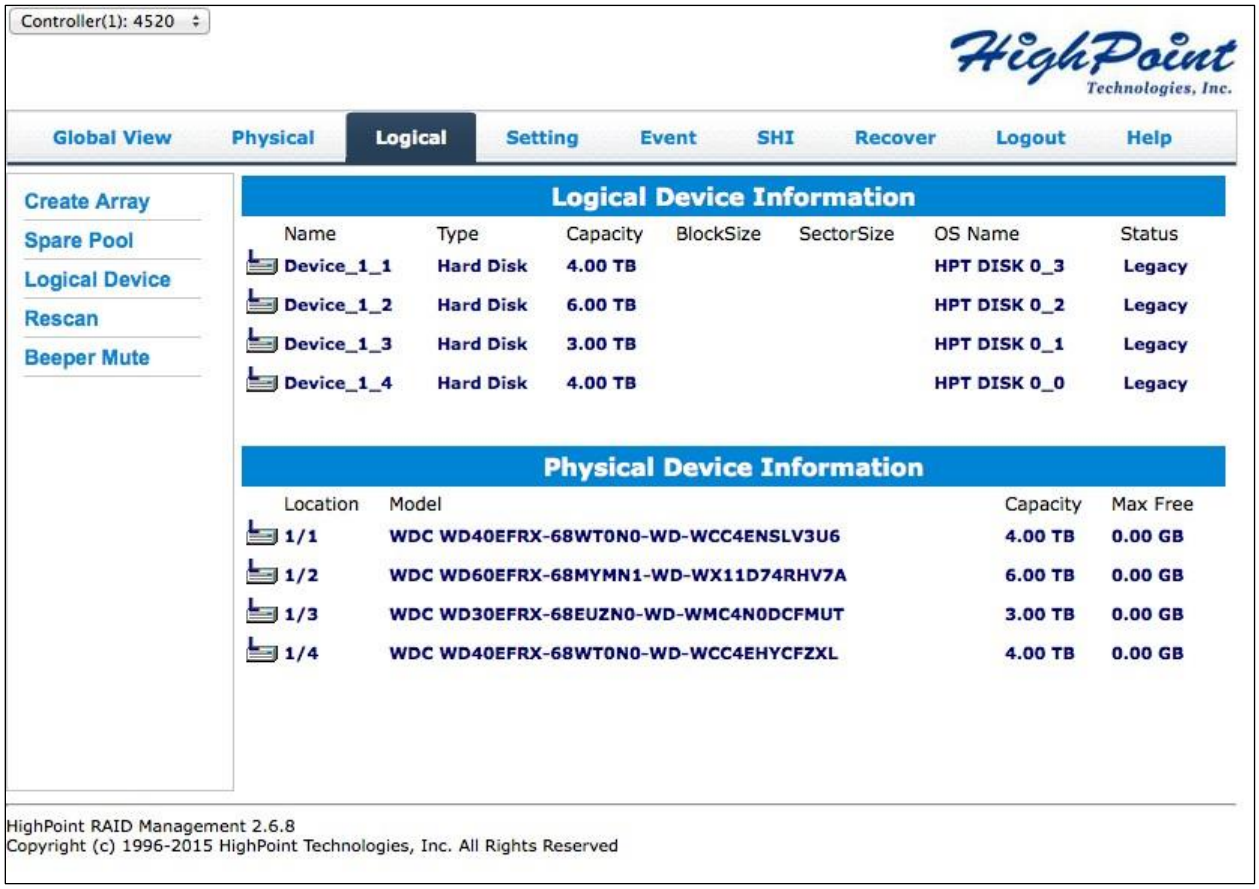
Write Cache
Enabling write cache will speed up write operations.

NCQ (Native Command Queuing)
A setting that allows 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.

Logical Tab



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:

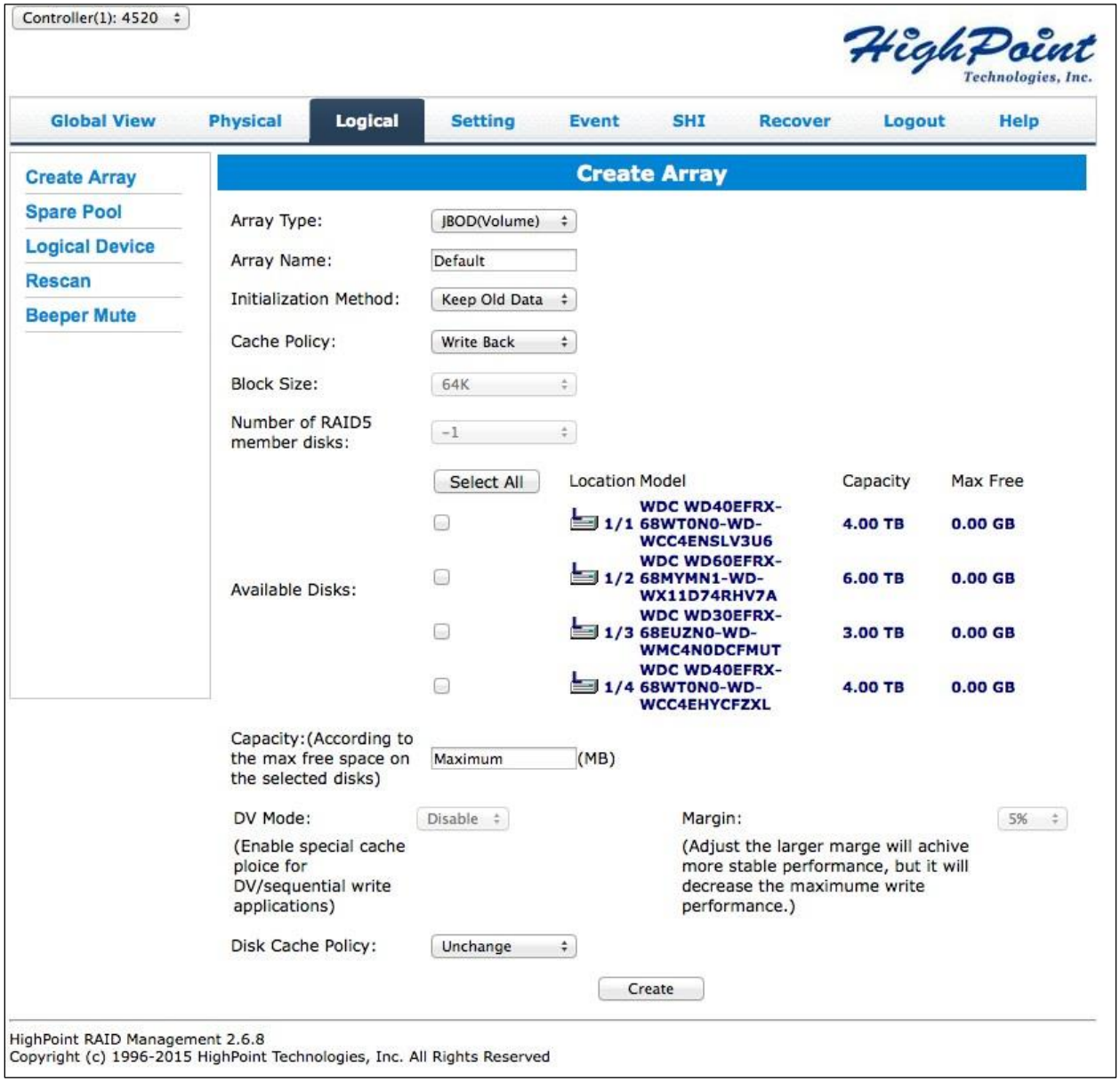
- Create Array
- Spare Pool
- Logical Device
- Rescan
- Beeper Mute

Creating an Array

To create an array:

1. Log into the WebGUI
2. Select the proper controller from the drop down on the top left
3. Click Logical
4. Click Create Array

An array is a collection of physical disks that will be seen as one virtual drive by your Operating System (OS). The RS6314X has a RocketRAID 4520 SATA/SAS controller capable of creating the following array types



Array Type:

- JBOD – Just a Bunch of Disks
- RAID 0 - Striping
- RAID 1 - Mirroring
- RAID 5 – Rotating Parity bit
- RAID 1/0 – Striping of Mirrored Drives
- RAID 6 – Double Parity Bit

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

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

Initialization Method: Initialization of a disk sets all data bits to 0, essentially clearing all the data on the drive. It is important to initialize disks since previous data physically stored on the drive may interfere with new data.

- Keep Old Data: This option skips the initialization process and all data on each physical disk of the array will be untouched.
- 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.
- 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**: Initializing takes a significant amount of time (approximately 2 hours per 1 TB).

Background and Foreground Initialization

Fully initializing the array will completely zero out the data on the disks, meaning the disk will be completely wiped and every bit on the disk will be set to 0. Foregoing initialization means the array will still be created, and you can still write new data onto the array. But when your array requires rebuilding, residual data left behind may interfere with the process.

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]

Adjusting the block size towards your disk usage can give some performance gain.

In a typical RAID configuration, data of the virtual drive is striped (or spread across) the physical drives. Having a smaller array block size will increase the likelihood of accessing all physical drives when processing large I/O requests. Multiple physical drives working in parallel increases the throughput, meaning better performance.

For smaller I/O requests (512 bytes to 4 kilobytes), it is better to have each individual disks handle their own I/O request, improving the IOPS (I/O per second), rather than having one tiny I/O request being handled by multiple disks.

A block size of 64k is recommended because it strikes a balance between the two I/O usage scenarios.

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.

An example of how disk capacities are limited by smallest disk.

- You have 3 drives connected to the enclosure.
- First drive is 6 TB, second is 4 TB, and third drive is 2 TB.
- After creating a RAID level 5 using all three drives and maximum capacity
- The first drive will have 4 TB, the second 2 TB, and the third drive 0 TB free capacity
- The free capacity on the first and second drive can be used to create a separate array.

You may also choose how much space each array will take. You can use the remaining space to create another array (up to 4 arrays are supported)

Sector Size (Default: 512B)

Note: For current operating systems, this option is already implemented so changing it in the WebGUI is not necessary.

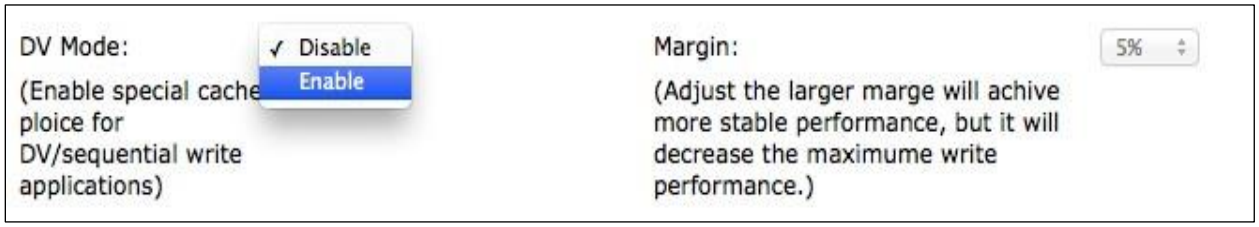
This option will set the sector size of your virtual drive, and physical sector sizes on your physical disks will remain the same. A sector is the smallest physical storage unit on a disk. The default sector size is 512 B since it is the most common sector size in disks today.

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.

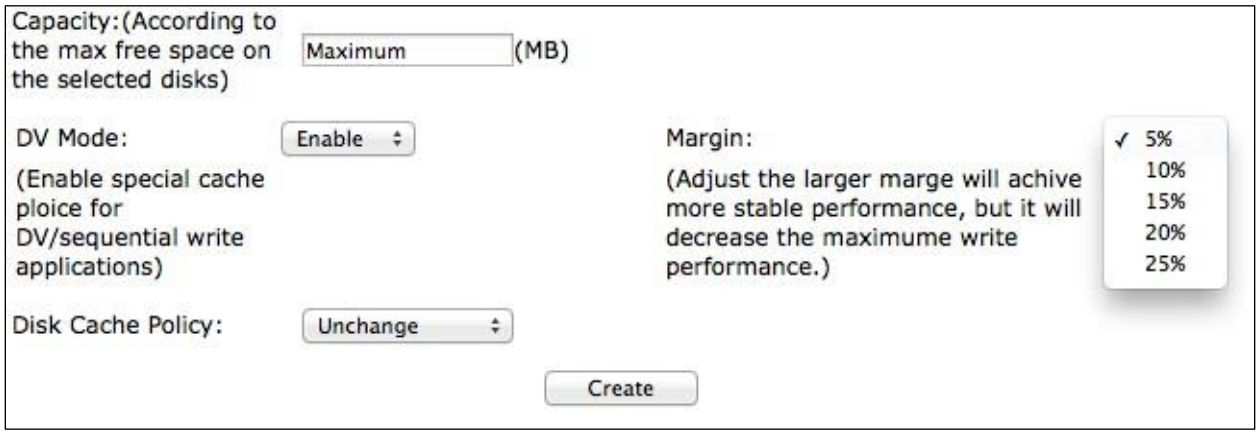
There are several factors concerning DV mode to take note:

- 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



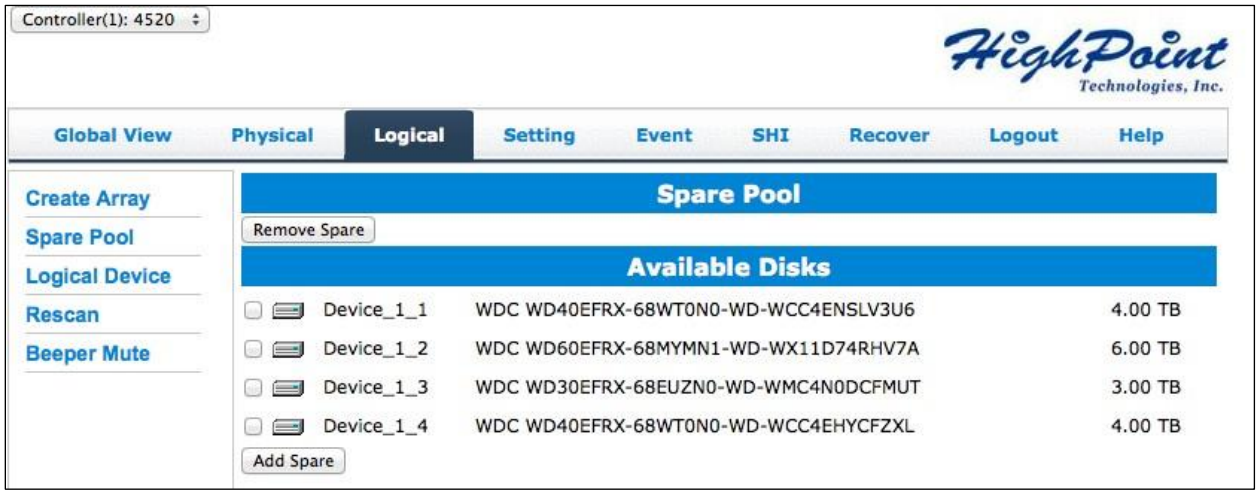
Margin
[5% - 25%]
When DV mode is enabled, you have the option to set the margin.
This percentage represents the amount of space the designated cache will hold before flushing the data onto the drive. Increasing the margin % will result in more stable performance, but decrease the maximum write performance.

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



Adding Spare Disks

Spare disks are physical disks that will immediately replace critical disks in an array.



To add spare disks:

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

Physical drives marked as a spare will automatically be added to an array whenever there is a disk failure. Having this feature minimizes the chances of a data loss since it reduces the time an array is in critical status.

Obtaining 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

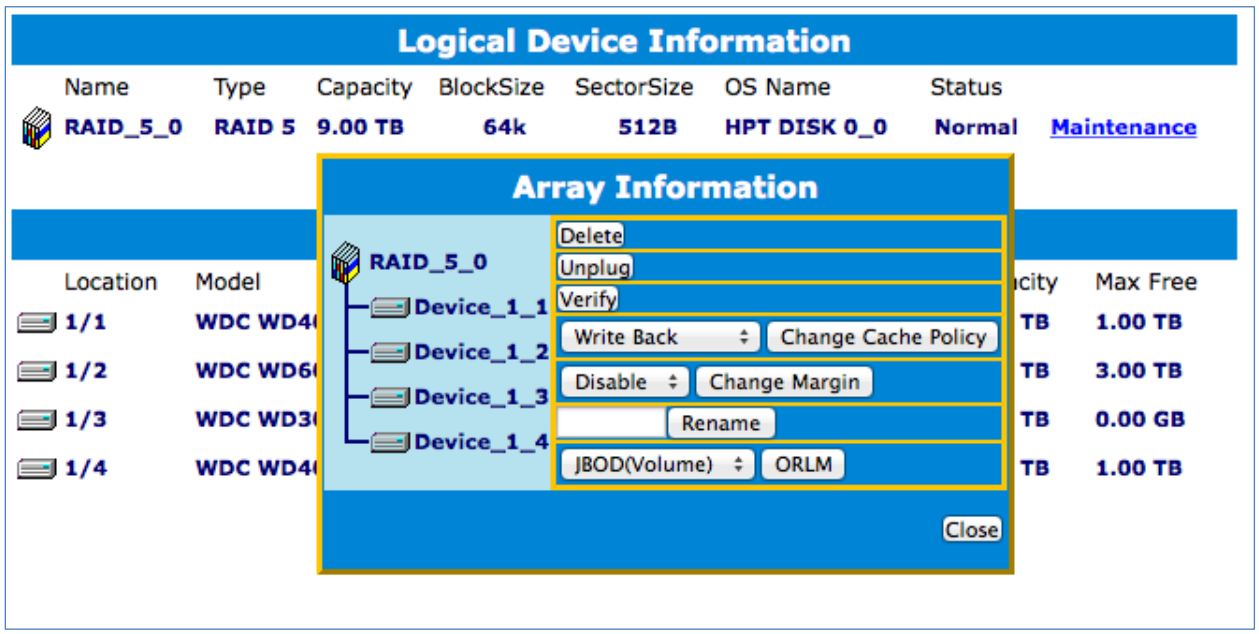
Arrays you create and the properties associated with them will appear here.

Maintenance

Once an array has been created, you have the option maintain it.

Array Information

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

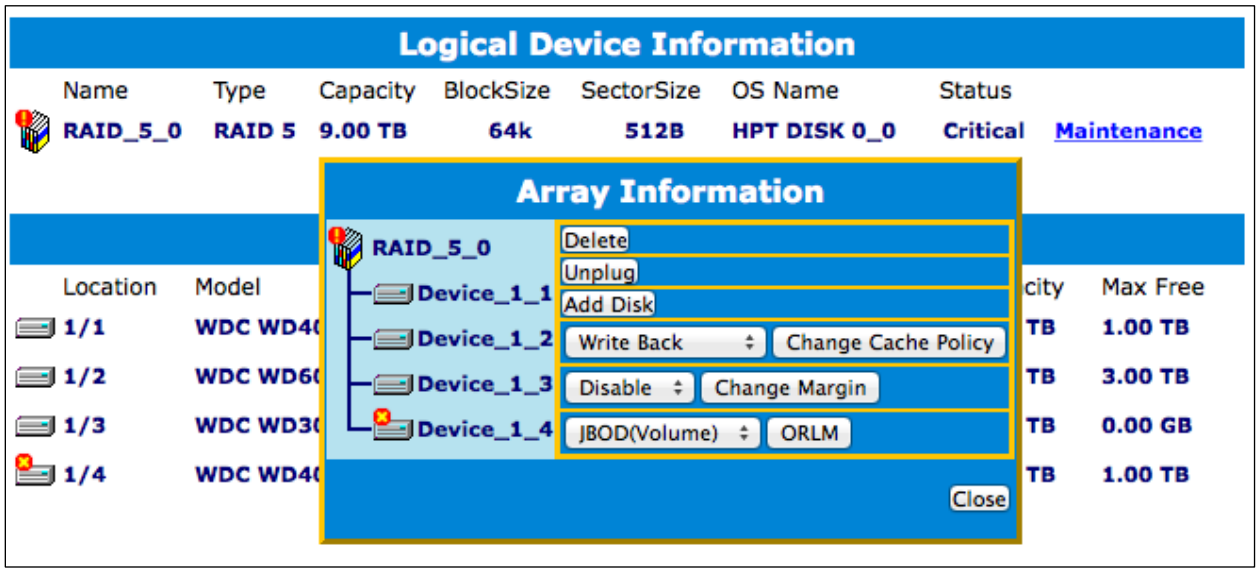


A Normal Status Array has the following options

- Delete
- Unplug
- Verify
- Change Cache Policy
- Change Margin
- Rename
- ORLM

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



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

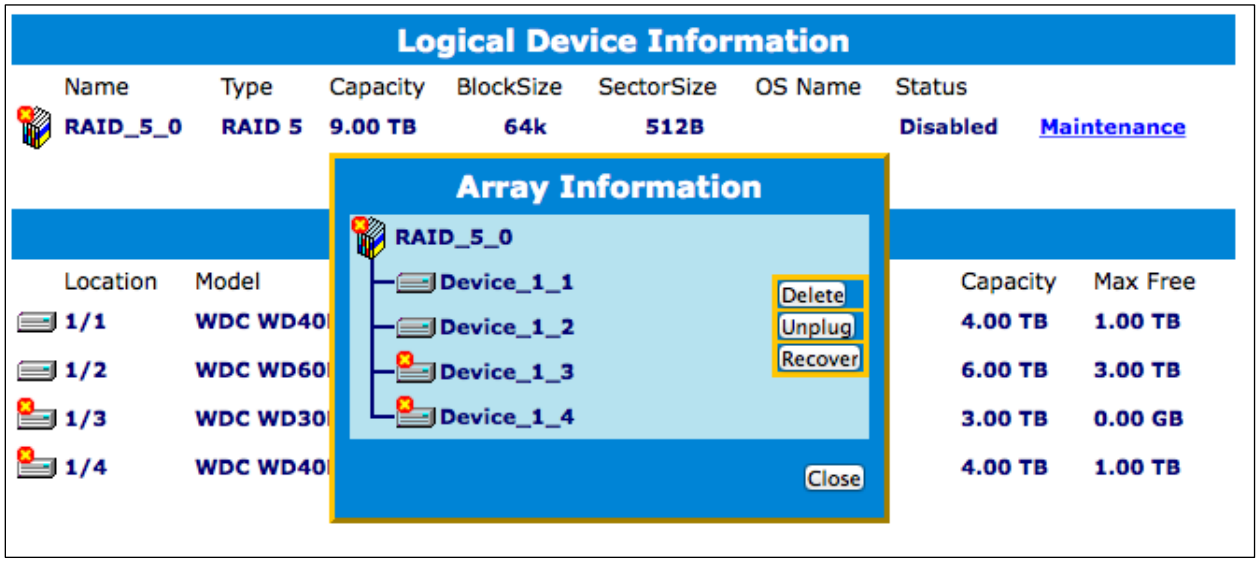
Once array status changes to critical, the faulty disk will be taken offline and you can either:

- 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



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
- Unplug
- Recover

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

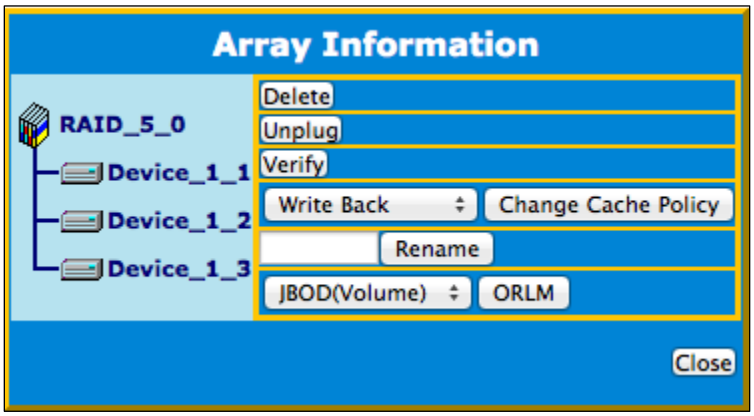
Expanding an Existing Array

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:

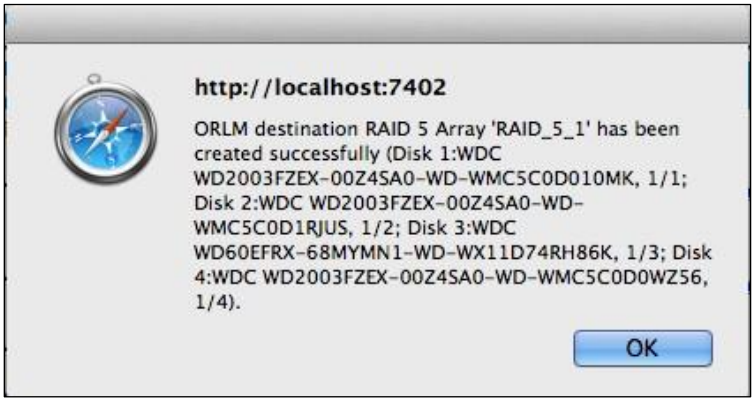
1. Log in WebGUI

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



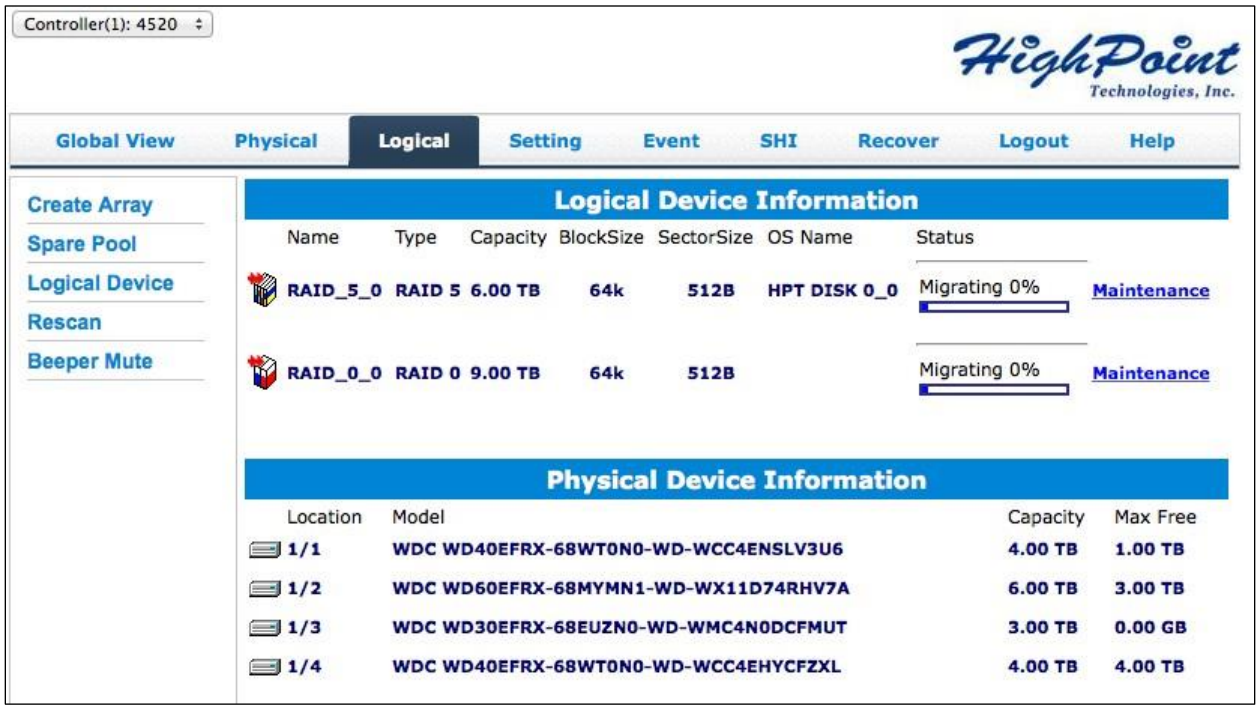
5. Important: Record all the physical drives currently in array.
6. Click ORLM
7. Select the physical drives you recorded earlier and the drives you want to add
8. Click Submit

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



The Logical Device Information will change status to migrating.

Physical Device Information



- 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.

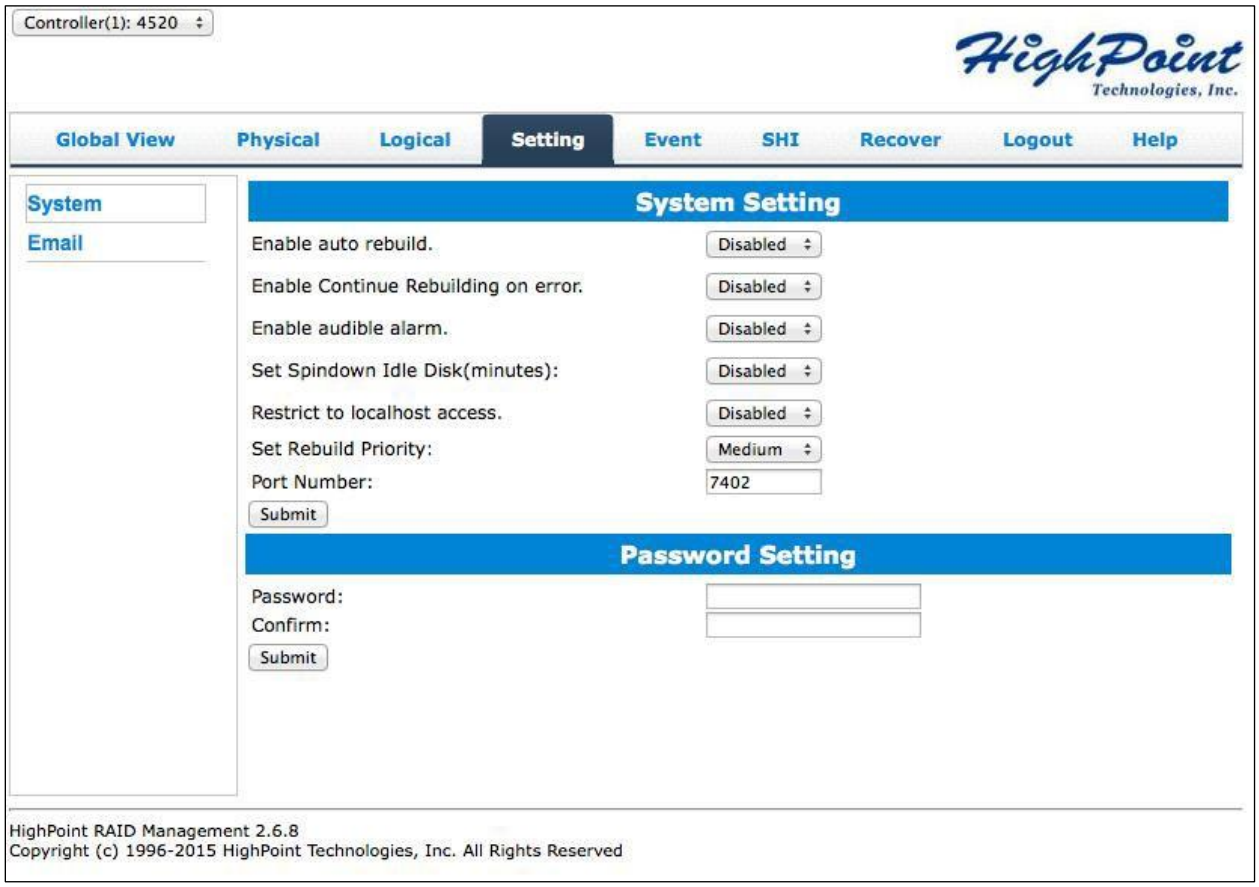
Beeper Mute

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. In order to permanently mute the alarm, go to Setting > Enable audible alarm > Disabled.

Setting Tab



Under this tab, user can

Enable auto-rebuilding
Enable rebuilding on error
Turn audible alarm on/off
Set spin down time for idle disks
Restrict to localhost
Set rebuild priority
Change port number
Change WebGUI password

System Settings

Enable auto rebuild (default: Enabled)
When a physical drive fails, the controller will take the drive offline. Once you re-insert 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.

Recovering your WebGUI password

If you wish to revert to the default password: hpt, delete the file hptuser.dat.

For Mac Users:

1. Open Terminal
2. Type or navigate to cd /usr/share/hpt
3. Type rm hptuser.dat, to remove the file
4. Reboot

For Windows Users:

1. Open file explorer
2. Navigate to C:/Windows/
3. Delete hptuser.dat
4. Reboot

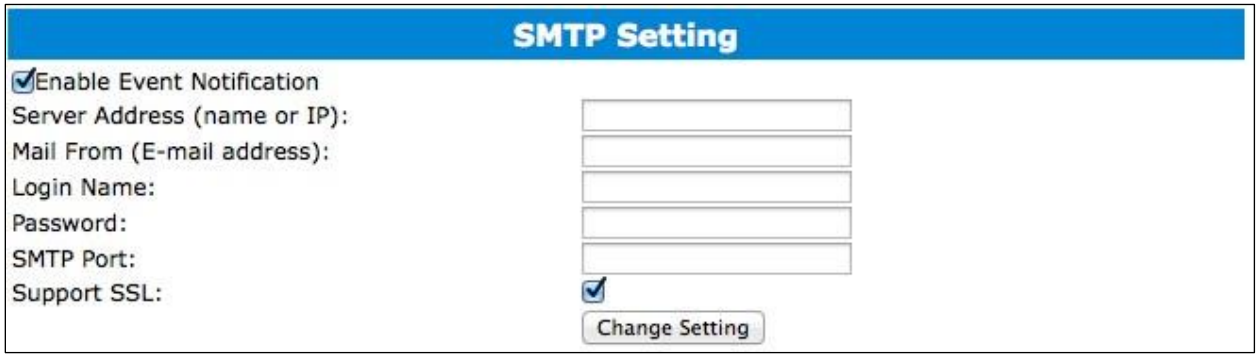
Email Setting

The following topics are covered under email:

- SMTP Setting
- Adding Recipients

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

SMTP settings



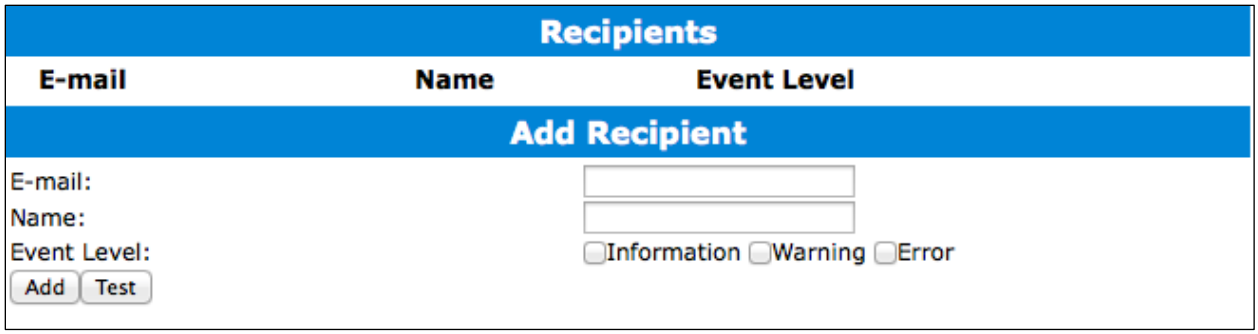
To set up email alerts:

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



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.
Example email message:

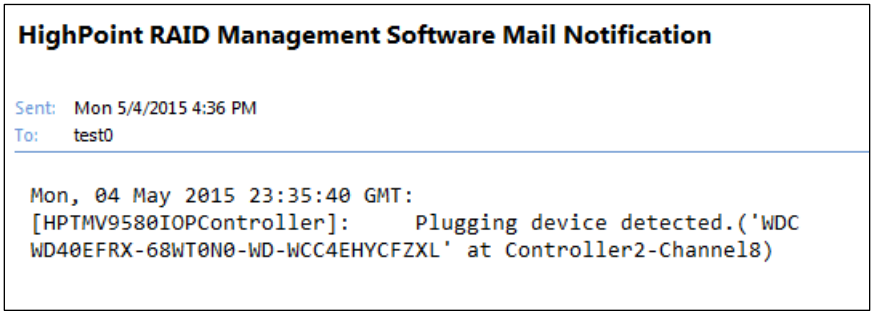
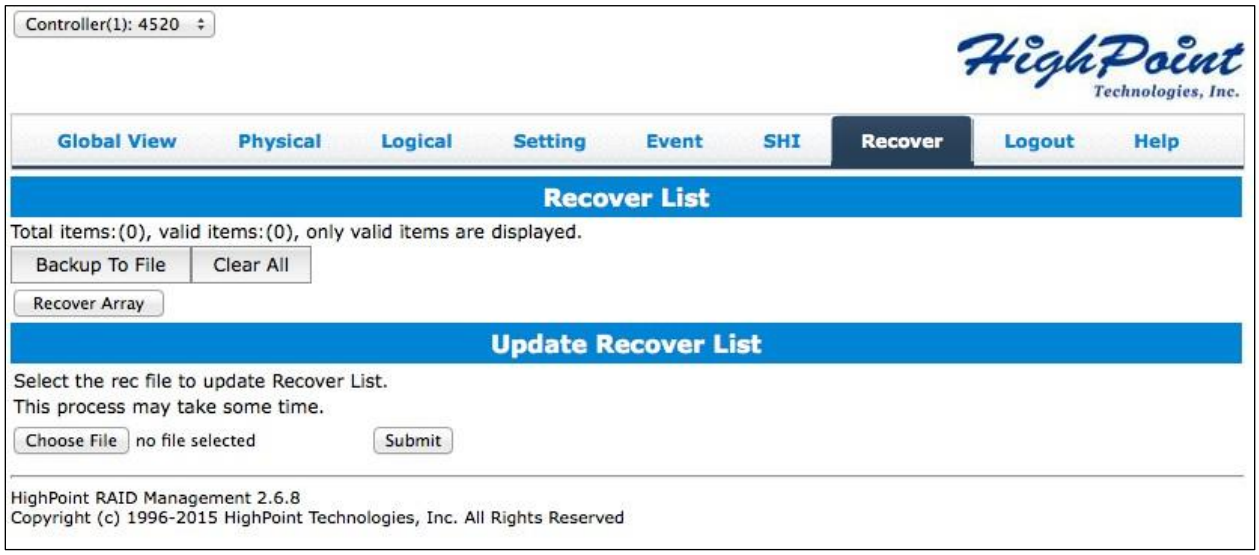


Figure 10. Example event log email

Recover Tab



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.

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

Reloading 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

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

Event Log Icon Guide

Icon	Name	Definition
	Information	Includes general administrative tasks: Create/delete arrays Configuring spares Rebuilding arrays Configuring event notifications Configuring maintenance
	Warning	Alerts issued by the Host Adapter: High temperatures

		Sector errors Communication errors Verification errors
	Error	Hardware related problems Hard disk failure Broken errors Memory failure

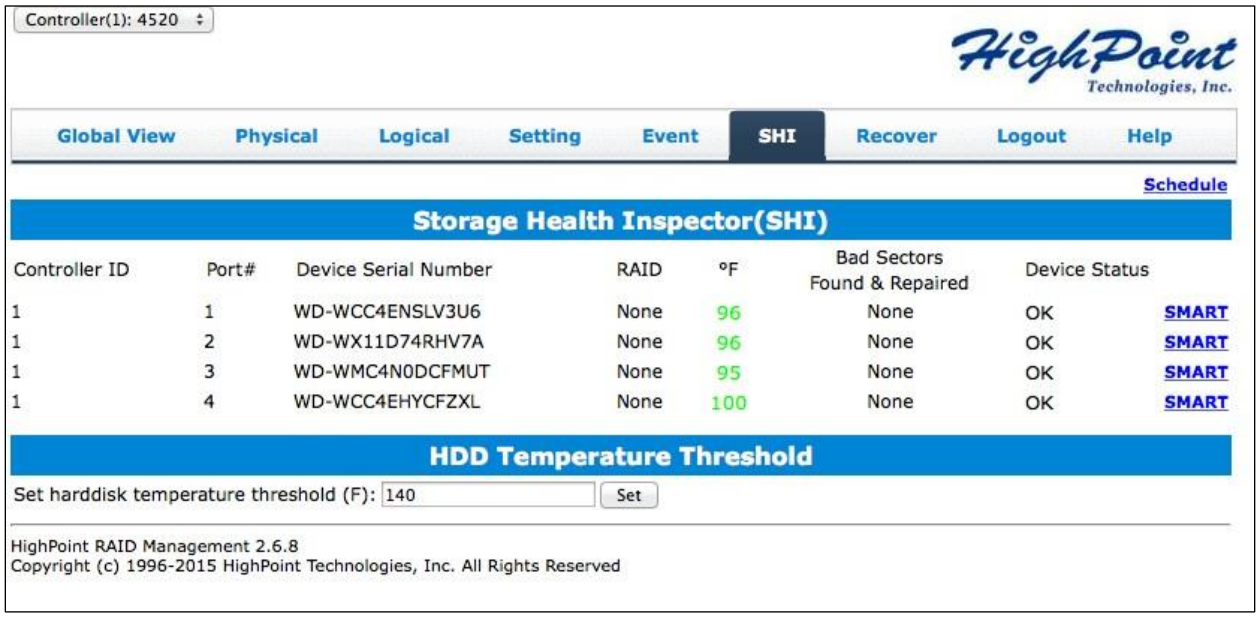
The event view is a basic error logging tool built into the HighPoint WebGUI.

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.

Enabling SMART Monitoring



To access SMART attributes of an individual disk:

1. Log in to WebGUI (default user: RAID password: hpt)

2. Select the proper controller using the dropdown 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 the disable SMART monitoring on each individual disk. To disable:

1. Select the proper controller using the dropdown menu on the top left
2. Click the SHI tab
3. Click SMART on desired disk
4. Click Disable

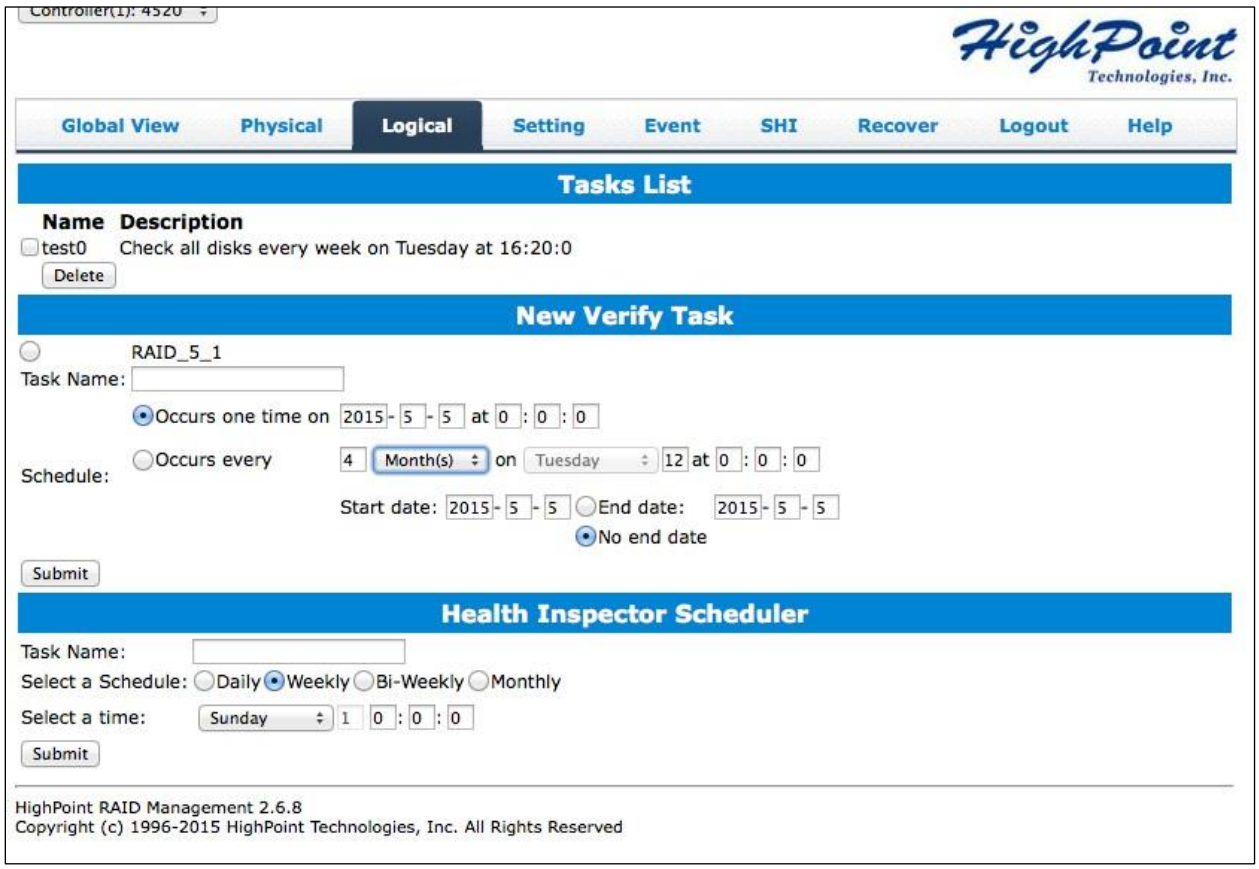
Note: Disabling SMART will prompt the Storage Health Inspector to change the disk status to 'Failed'. The alarm will not alert you when this setting is changed. And any potential warnings due to S.M.A.R.T attribute technology will not

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 schedule disk/array checkups to ensure disks/array are functioning optimally.

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.

Initializing your Disks

After your array is created, the logical drive will be detected by your operating system (OS). But the drive is not accessible until after you initialize and format it to your corresponding OS file system.

For Mac Users:

When you insert a new drive or a drive with a different filesystem, Mac OSX will prompt that the disk is not readable and that you must initialize it. Clicking the initialize button will simply open up Disk Utility. From there, you can decide if you want to format your drives.

- When prompted, click Initialize
- You will now be take to Mac Disk Utility, where you will proceed to format the disk
- See Formatting your Disks

For Windows Users:

When you plug in a brand new disk or a disk that has been used before, the OS will not be able to read from it and will prompt you to initialize the disk. Initializing will map the disk in either MBR (Master Boot Record) or GPT (GUID Partition Table) depending on your needs.

The MBR partitioning scheme is limited to 2 TB, so it is okay to use if your disk has a 2 TB capacity or you want MBR bootable drive.

The GPT partitioning scheme is not limited to 2 TB and can span the entire capacity of the drive. But older/legacy motherboards may not support GPT partitioned drives to be bootable.

Formatting your Disks

After initializing the disk to either MBR or GPT, you have to format them to your respective OS file system. For Mac users, this can be done in the Disk Utility. For Windows users, this will show up in Disk Management. The RAID array you created will show up in the menu.

For Mac Users:

1. When prompted, click Initialize
2. You will be taken to Disk Utility
3. Select the disk you wish to initialize
4. Click the Erase Tab
5. Select the Format you want (Mac OS Extended (Journaled) is recommended)
6. Click Erase

Formatting the disk will clear any previous data written on it, so make sure to back up any important data on disk before proceeding.

For Windows Users:

1. Click Start
2. Go to Control Panel
3. Click System and Security
4. Under Administrative Tools click Create and format hard disk partitions.
   - Alternatively you can search Disk Management in the start search bar
5. Find the disk you wish to format
6. Right Click and select New Simple Volume
7. Follow the on-screen instructions
8. When finished, you will notice the Unallocated space becomes your OS format (NTFS).

Note: Disks capacity that are shown in Disk Utility (Mac) and Disk Management (Windows) should be equivalent or nearly equivalent to your array shown in Logical Device Information. If you created a 12 TB RAID 5 array using 4 disks, you will see one 12 TB disk appear in your OS disk manager and not 4 disks.

Replacing a Failed Disk

When a disk in your array fails it is important to get it replaced or rebuilt as soon as possible to prevent any data loss.

1. There are 2 ways to locate a failed disk:
   - Look at the front panel for the RED disk error LED to be LIT.
   - Log in to WebGUI and check the Logical Tab
2. Once disk has been identified press the disk tray blue tab and slide the drive out.
3. Replace the failed drive with a new drive
4. If auto rebuild is enabled, the rebuild process should start immediately
5. If auto rebuild is disabled, click rescan on the left panel to initiate rebuilding

Rebuilding Your Array

In order to rebuild your array, the first step is to identify which physical disk is causing the error.

Identify a failed disk	● Check Disk Tray LEDs ● Check WebGUI Event Log

Front Panel LED
The LED for a failed disk will be a SOLID RED. Promptly replace the disk with a new one and begin rebuilding.

Checking in the Event Log
Some common disk failures will be logged under Events as:

- Disk bad sectors
- Disk controller#-channel# failed

The controller assigns the disk numbers chronologically from bottom to top.

Critical Condition

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 status	• Unplugging disk that is part of an array • Bad sector detected on a disk part of the array • Unrecoverable data during rebuilding • Defective port or cable interrupts 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 Interrupted Due to Bad Sectors

If you are in the middle of rebuilding, and it stops because of a disk sector error (check in the Event Log), there is an option to continue rebuilding on error.

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.

Critical array becomes disabled when disk removed

You removed the wrong disk from a critical array, now you have a disabled array and your data is inaccessible.

1. Shut down your PC
2. Shut down the RS6314X Enclosure
3. Place all the disks back to original configuration
4. Boot up PC

Your array should be back to Critical status, and you can identify the correct disk.

Disabled Condition

If two or more disks in your array go offline due to an error or physical disconnection your array will become disabled. Disabled arrays are difficult to recover, so it is important to fix any critical status as soon as possible.

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 under the *recover list*.

How to recover from a Disabled Array

1. Log in to WebGUI
2. Click Maintenance for the array that is disabled
3. Click Recover

Alternatively:

1. Log in to WebGUI
2. Click Maintenance for the array that is disabled
3. Click delete
4. Click Recover Tab
5. Select the RAID configuration you want to recover
6. Click Recover Array

The Recover tab will attempt to bring the array to normal status so data will be accessible.

Important: If you are able to recover the disabled array back to normal status, immediately back up the data. Bad sectors may still be present on the physical drives, which is why the status changed to disabled in the first place.

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. So if a card fails or you wish to switch cards, the RAID configuration data can still be read by another HighPoint card.

Help

- Online Help
- Register Product

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.

WebGUI Icon Guide

	**Critical – 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.
	**Verifying** The array is currently running a disk integrity check.
	**Rebuilding** The array is currently rebuilding meaning you replaced a failed disk or added a new disk to a 'critical' state array.
	**Critical – rebuild required** The array has all disks, but one disk requires rebuilding.
	**Disabled** The icon represents a disabled array, meaning more than one disk failed and the array is no longer accessible
	**Initializing** The array is initializing. The two types of initialization is Foreground and Background. (See Initialization)
	**Uninitialized** The array initialization process has been interrupted, and the process is incomplete.
	**Not Initialized** Disk is not initialized yet, and needs to be initialized before use
	**OCE/ORLM** Array is performing a OCE/ORLM operation
	**OCE/ORLM has stopped** The array expansion process has been stopped.
	**Legacy** An existing file system has been detected on the disk. These disk are classified as legacy drives.
	**Spare** The device is a spare drive, it will automatically replace any failed drive part of an array.

	**Normal** The array status is normal
	**Initializing** The array is initializing, either foreground or background initialization
	**Initialization Stopped** The initialization has been stopped. Current status is uninitialized.
	**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.
	**Rebuilding** The array is currently rebuilding.
	**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.
	**OCE/ORLM** Array is expanding its capacity or migrating to a different raid level. Status will display 'Expanding/Migrating'
	**OCE/ORLM stopped** The 'Expansion/Migrating' process has been stopped. The status will display 'Need Expanding/Migrating'
	**Critical – OCE/ORLM** A disk member is lost during the OCE/ORLM process.
	**Critical – OCE/ORLM - rebuild** The expanding/migrating array requires a rebuild.

Table 3. RAID Level Reference Table

Type	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 10	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

HighPoint Recommended List of 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.

http://highpoint-tech.com/PDF/Compatibility_List/RocketRAID_600_2700_3600_and_4500_Series_RAID_HBA_Hard_Drive_Compatiblity_List.pdf

Contacting Technical Support

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

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