

RocketRAID 3700 Series

SAS 12Gb/s PCI-Express 3.0 x8 RAID Controller



User's Guide
v1.03

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Notice

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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)

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1. HighPoint RocketRAID 3700 Overview

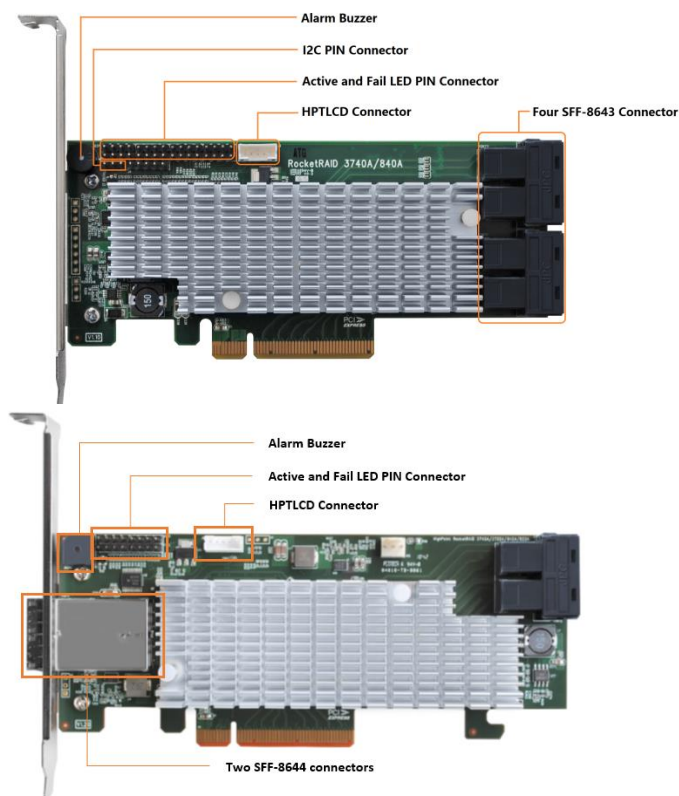
RocketRAID 3700 series host bus adapters are the world's most price competitive 12G SAS/SATA RAID controllers, and deliver unprecedented end-to-end Generation 3.0 PCI Express transfer performance with Professional class RAID Storage reliability and management capabilities.

RocketRAID 3700 series host bus adapters capitalize on HighPoint's two decades of RAID and storage technology to deliver professional grade RAID storage at a fraction of the cost of conventional host RAID solutions. Each adapter is powered by our industry proven RAID technology, superior Gen 3.0 PCIe express transfer bandwidth, and up to sixteen dedicated 12Gb/s SAS channels, which support robust, high-performance RAID 0, 1, 5, 6, 10, 50 and JBOD configurations of SAS or SATA hard drives of any disk format, including 512, 512e and 4Kn.

RocketRAID 3700 Technical Specifications	
Bus Interface	8-lane, 8 GT/s PCI Express 3.0 Compliant
Number of Channel / Port	16x 12Gb/s SAS / 6Gb/s SATA Channels
Data Transfer Rates:	Up to 12Gb/s per port
Port Type	SFF-8643 mini-SAS HD and SFF-8644 mini-SAS HD
Number of Devices	16x SAS/SATA Hard Drive/SSD
Form Factor	Low Profile
Dimensions	5.97*2.68*0.06 (in)
Weight	0.26lb
RAID Level Support	0,1,5,6, 1/0,5/0 and JBOD / Non-RAID Mode RAID 6 is not supported on macOS Bootable RAID 6 arrays are not supported RAID 1/0 is equivalent of RAID 10. RAID 5/0 is equivalent of RAID 5/0
Operating System	Windows 7 and later Windows Server 2008 and later Linux (Support Linux Driver auto Compile) macOS FreeBSD
RAID Feature Suite	
Flash ROM for Upgradeable BIOS	
Storage Health Inspector	
Redundant RAID Configurations	
BIOS PnP (plug and play) and BBS (BIOS boot specification) support	
Bootable RAID Array	
EFI for Mac Platform	
Multiple RAID Partitions supported	
Storage Configurations Support Details	
Multiple RAID Adapters supported	
Online Array Roaming	
Online RAID Level Migration (ORLM)	
Online Capacity Expansion (OCE)	
RAID Quick Initialization for fast array setup	
Drive hot plug support	
Global Hot Spare Disk support	
Automatic and configurable RAID Rebuilding Priority	
Auto resume incomplete rebuilding after power on or reboot system	
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	
SAS TCQ	
Disk media scan and repair	
Device Error Recovery support	
Automatic remap and fix drive bad block for RAID array	
Staggered Drive Spin Up	
Write Back and Write Through	

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 :	SGPIO, SES-2 and I2C (Drive LEDs supported: SGPIO, SES-2 and LED Header)
Operating Temperature :	Work Temp: +5°C ~ + 55°C. Storage Temp: -20°C ~ + 80°C Relative Humidity: 5% ~ 60% non-condensing.
Operating Voltage :	12 V / 3.3 V, Power: 14W (12V 1A, 3.3V 0.5A)
MTBF (Mean Time Before Failure):	920,585 Hours
Certification Approval:	CE FCC RoHS REACH WEEE

2. Board Layout & Hardware Installation



SFF-8643 and SFF-8644 connector

Each SFF-8643 and SFF-8644 connector supports 4 disk channels. Connect the hard disks or disk backplane to the RAID controller using the appropriate data cables.

Active/FAIL LED PIN connector:

LED pins are provided for Active/Fail status for each of the device channels.

For more information about LED functionality and connection requirements, please refer to the document below:
http://www.highpoint-tech.com/PDF/LED_connection.pdf

Alarm Buzzer

Audible alarm will sound if a disk failed status occurs.

I2C Pin Connector

The I2C Pin connector can be used to connect an enclosure device with I2C protocol for enclosure management.

HPTLCD Connector

Connector for the optional HPTLCD module.

Hardware Installation

3. What's in the Box

Make sure the following items are included in your purchase:

- RR3700 controller card
- Low Profile Bracket
- Quick Installation Guide

4. Using the RocketRAID 3700

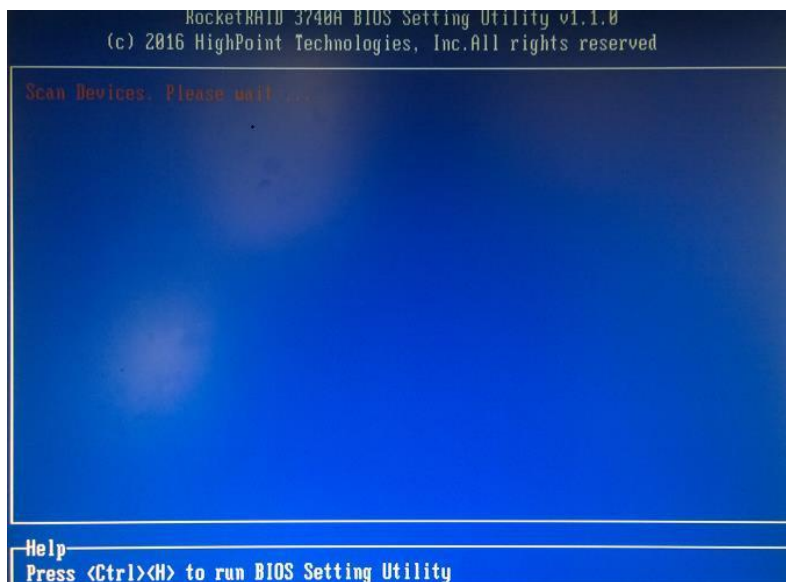
4.1. Using the RocketRAID Series HBA BIOS

4.1.1 RocketRAID BIOS Setting Utility

The RocketRAID controller BIOS utility is an interface that provides management commands and controller related settings. After installing the RAID controller and powering on the system, the RAID controller BIOS should post during the system's boot procedure.

Use **Ctrl + H** key to log-in to the BIOS setting utility. The BIOS setting utility can be used for RAID management. The BIOS Utility will display information about hard drives attached to the adapter. Make sure all attached drives are detected by this utility. If any of the hard drives is not detected, power down the system and check the power and cable connections.

Note: The following screenshots depict the RocketRAID 3700 BIOS utility. However, all RocketRAID models utilize the same interface.



4.1.2 Using the BIOS Utility

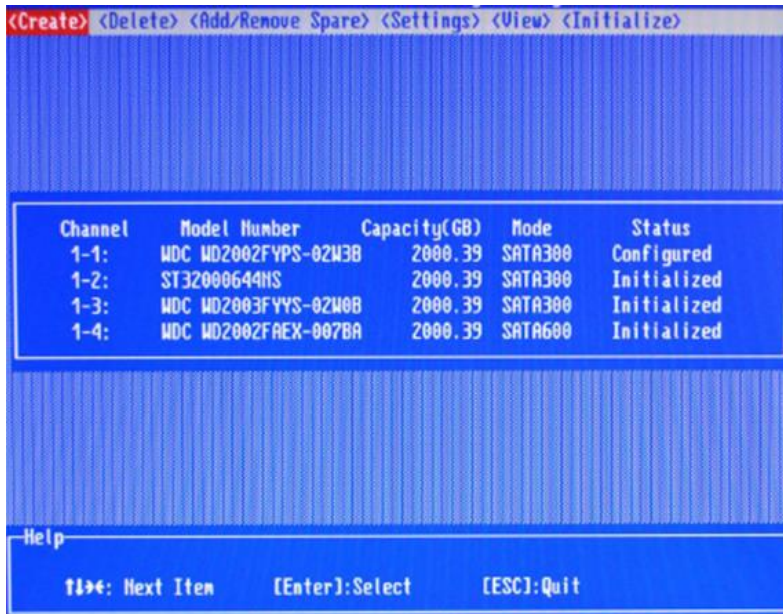
The following keys are utilized by the RocketRAID BIOS utility:

Arrow keys – Use these to move between different menu items.

Enter – Open the selected toolbar command/execute the selected command.

Esc – Move back to the previous menu, cancel the selected operation, or exit the BIOS Utility.

4.1.3 BIOS Commands



Create: This command is used to open the RAID Creation menu.

Delete: This command will delete the selected RAID array.

Add/Remove Spare: This command is used to assign hard disks to function as spare disks. The controller is capable of using spare disks to automatically rebuild broken or faulted RAID arrays.

Settings: This command opens the settings menu (To selecting the boot disk/array, staggered drive spin up etc.)

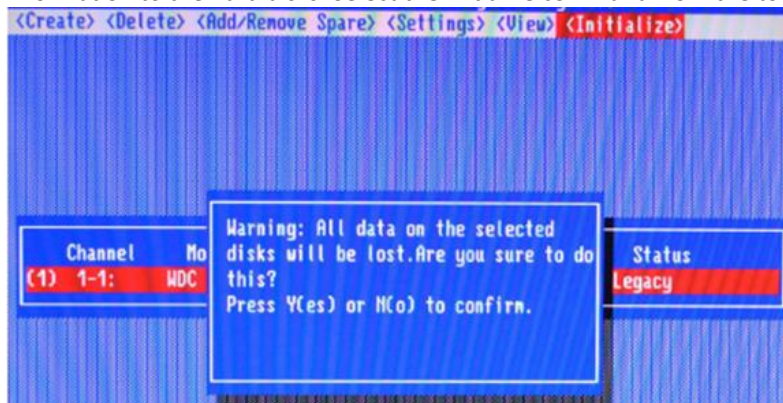
View: This command is used to view hard disk and RAID information.

Initialize: This command is used to prepare disks for use with RAID arrays. Disks must be initialized before they can be used to create arrays.

4.1.4 Creating RAID Arrays

Initializing Disks:

Before creating a RAID array, the disks must be initialized. Disk initialization writes necessary RAID configuration information to the hard disks. Select the Initialize command from the toolbar, and press the Enter key.



Highlight the target disks using the arrow keys, and then press the Enter key. A numeral will be displayed before each selected disk. Once all target disks have been selected, press ESC key. The utility will display a warning, and ask you to press Y (yes) to initialize, or N (no) to cancel. Once initialized, these disks can be used to create RAID arrays. These disks will be displayed as "Initialized" (under Status).

Warning: Initialization will destroy all pre-existing data on the selected hard disks. Only initialize disks that do not

contain critical data.

Create Arrays:

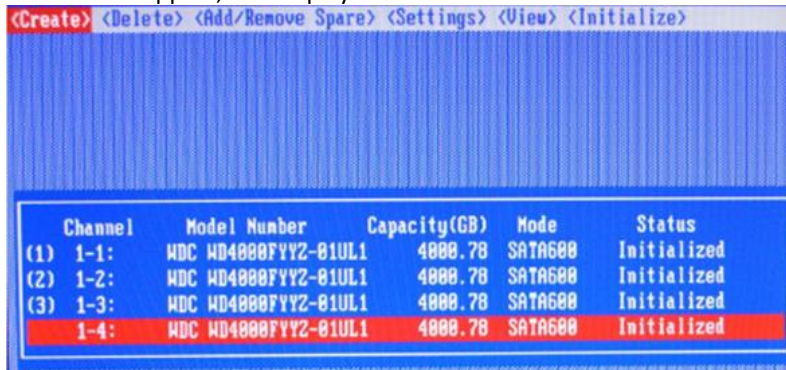
Select Create from the toolbar and press the Enter key.



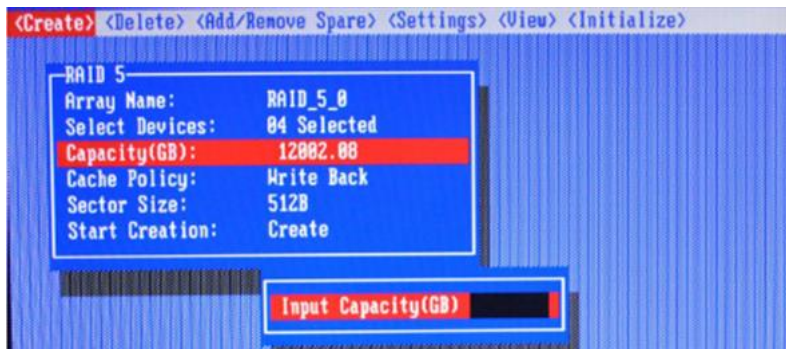
1. Use the arrow keys to select the RAID level and press the Enter key.
2. Use the arrow keys to highlight the Array Name option and press the Enter key. The array name dialogue box will appear. Use the keyboard to input a new Array Name, and press the Enter key.

Note: The Array Name command is optional – it is not necessary to name the array. The array can be named at a later time, and the name of the array can be changed at any time.

3. On the Create menu, use the arrow keys to highlight the Select Devices item and press the Enter key. A device list will appear, and display all available hard disk drives.



4. Highlight the target disks that you want to use, and press the Enter key to select them. A numeral will be displayed before each selected disk. This number designates disk order. After all of the disks have been selected and press the ESC key to return to the Create Menu.
5. Next, Use the ↓ arrow key to highlight the Capacity (GB) option and press the Enter key. The total available capacity will be displayed. Press the Enter key if you wish to use all available space. If you wish to reserve disk space for additional arrays/single disks, use the keyboard to input the amount of space (in GB) you wish to set aside for this particular array, and press the Enter key.



Note: Multiple arrays can be created using the same set of hard disk drives. The Capacity option allows you to set aside disk space that be used to create another array, set as a spare disk, or partitioned to act as a single disk (by the operating system).

6. For redundant RAID arrays (RAID 5, 50), select the Cache Policy:
Write Back – Provides higher write performance for redundant RAID arrays. Data is at risk when there is a power failure, system kernel panic and unresponsive abnormal conditions.
Write Through – Writes directly to the disks (may reduce the risk of data loss during a critical failure, but at the cost of lower performance).
7. **Sector Size** – Also known as “Variable Sector Size”. Use this option if you are using an older 32-bit Windows operating system. This allows older operating systems to support volumes over 2TB in size. Do not use if the operating system already supports large volumes (such as GPT).
8. To complete the creation procedure, use the arrow key to highlight the Start Creation item and press the Enter key.

The Window will show 2 options when creating a RAID 5 array: Background Initialization and No initialization.



Background initialization:

The RAID array is accessible while disk initialization is being performed.

- A. This option will delete all content on the disks.
- B. The initialization time will be longer when compared to "Foreground" but the logical drives can be used during the initialization process.

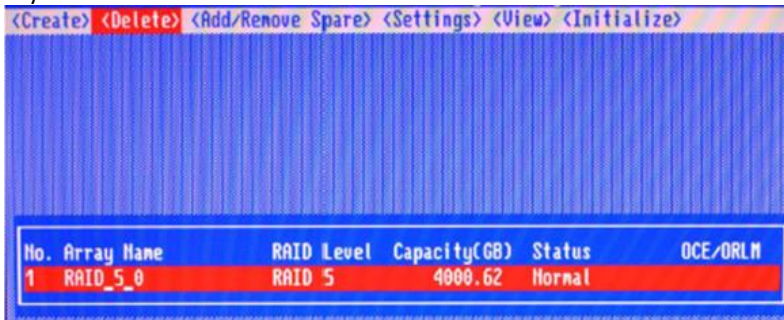
No initialization:

The No initialization option is recommended for use when rescuing an original array or for testing purposes. This option will not make any changes to the data area of each disk. When you select this option, a pop-up window will display; press Y (yes) to create the array, or N (no) to cancel the creation process.

4.1.5 Delete Arrays

Highlight the Delete command from the toolbar, and press the Enter key.

The BIOS utility will display a list of available RAID arrays. Select the array you wish to delete, and press the Enter key.



The utility will display a warning message. Press Y (yes) to delete the array, or select N (no) to cancel.

Warning: All data stored on the array will be lost – do not delete if the array contains critical data.

4.1.6 Add/Remove Spare Disks

The Add/Remove Spare command is used to assign a hard disk to act as a Spare Disk. Spare Disks are used to

automatically rebuild Redundant RAID arrays (RAID 1, 5, 10) in the case of disk failure. As with creating RAID arrays, disks must be initialized before they can be used as spares. To set a hard disk to act as a Spare Disk, use the arrow keys to select the target disk from the list of initialized disks, and press the Enter key. To remove the Spare Disk setting from a hard disk, highlight the spare disk, and press the Enter key. Generally, single disks are designated to act as spares (disks that are not configured into RAID arrays). However, in some instances, disks that are members of RAID arrays may also be designated to act as a spare. If the disks in question are part of a RAID array that did not utilize the full available capacity at the time of creation, these disks may be used as spares.

4.1.7 Settings

To access the Settings menu, highlight the Settings command from the toolbar, and press the Enter key. There are Select Boot Device and Parameter Setting options in the menu.



Select Boot Device:

Select which disk or array will act as the boot disk, if the motherboard BIOS instructs the card to act as the boot device.

- When booting up the system, press **CTRL + H** during the HighPoint RocketRAID splash screen to enter the BIOS RAID creation utility.
- Navigate to **Settings** using arrow keys.
- Press **Enter**.
- Press **Enter** again.
- Select the desired RAID array.
- You will return to the main screen once the **boot flag** is set

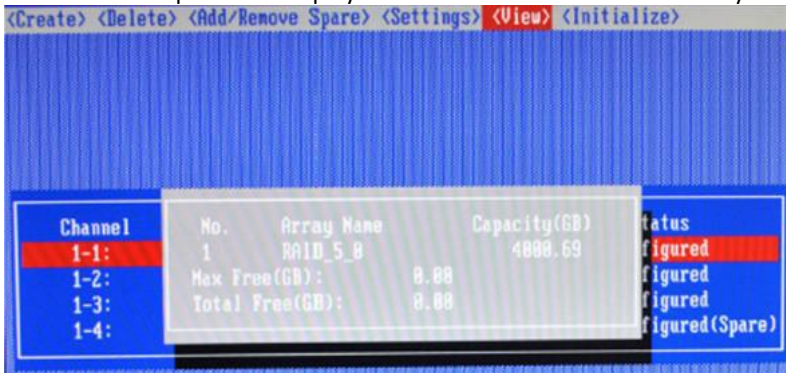
Staggered Spin up:

The default value of this option is disabled. Enabling this setting will instruct the card to power up the hard disks, sequentially (one disk approximately every 2 seconds). Not all disk support this setting – consult the disk documentation for more information.

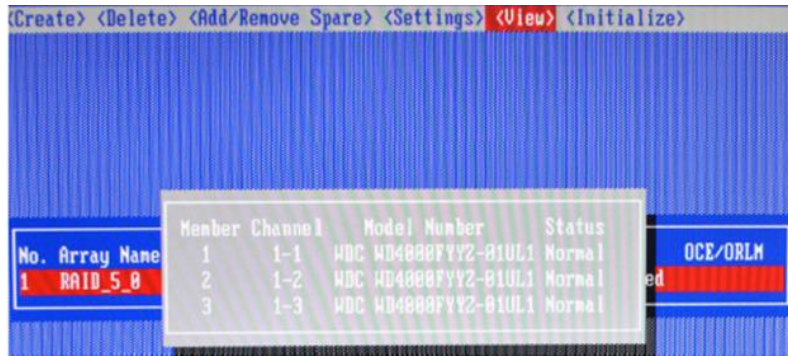
4.1.8 View

The View menu provides two options:

Devices – This option will display information for each disk hosted by the HBA.



RAID Array – This option will display information about each RAID array hosted by the HBA. Highlight the target device and press the Enter key to view details about the configuration.



4.2. Driver & WebGUI Installation

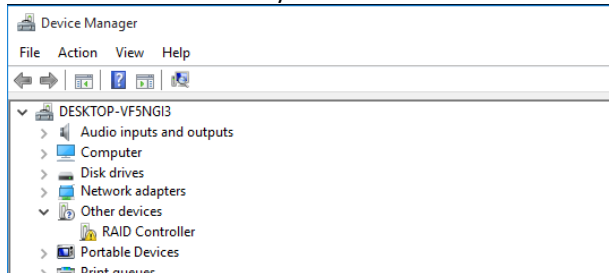
4.2.1 Driver and WebGUI Installation (Windows)

Download and prepare the Windows Driver and WebGUI from the product download page.

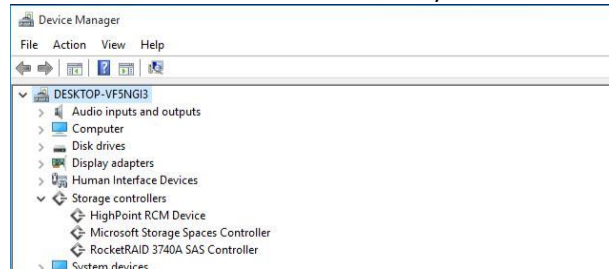
RocketRAID 3700:

http://www.highpoint-tech.com/USA_new/series_rr3700a-Download.htm

1. After installing the RAID controller, boot to the Windows operating system.
2. Windows should automatically detect the card as a new "RAID Controller" under device manager.



3. Extract the Windows driver and double click on the Setup.exe in the driver folder.
4. Restart the system for the driver to be loaded completely.
5. The RocketRAID 3700 controller will be ready for use after Windows reboots.



6. Extract the WebGUI package and double click the setup program to install.

4.2.2 Driver and WebGUI Installation (Linux)

Download and prepare the Driver and WebGUI from the product download page.

RocketRAID 3700:

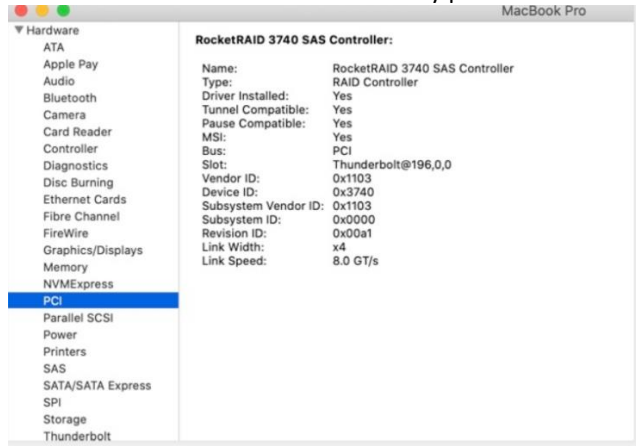
http://www.highpoint-tech.com/USA_new/series_rr3700a-Download.htm

Refer to the README file and Installation Guide under the software folder for the appropriate installation procedure.

4.2.3 Driver and WebGUI Installation (Mac)

http://www.highpoint-tech.com/USA_new/series_rr3700a-Download.htm

1. Extract the Mac driver and double click on the package in the driver folder.
2. Restart the system for the driver to be loaded completely.
3. The RocketRAID 3700 controller will be ready please check the driver is installed



- a) Apple Icon > About this Mac... > System Report > PCI.
4. Extract the WebGUI package and double click the setup program to install.

4.3 Using the HighPoint WebGUI

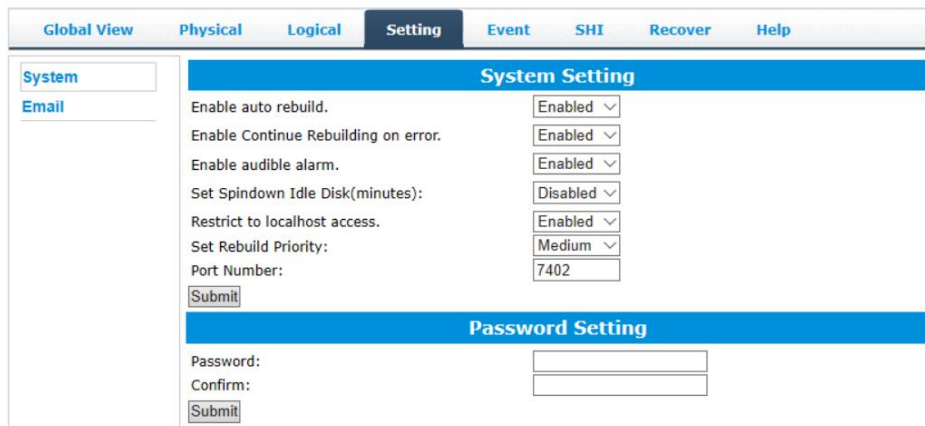
Please refer to the Online Help guide for more information about using the WebGUI:

<http://www.highpoint-tech.com/help/>

Double click the Desktop ICON to start the Web browser. It will automatically log-in to the HighPoint RAID Management.



The password can be set after the first log-in. To change the password, select **Setting>Security** from the menu bar



Verify the Controller Status

The **Global View** Tab will display the overall status of the controller. The Virtual Disk is listed under **Logical Device Information**. The individual drives are listed under **Physical Device Information**.

Controller(1): RR3740



Global View Physical Logical Setting Event SHI Recover Help

HBA Properties

Host Adapter model: RocketRAID 3740 SAS Controller

Controller count: 1


Enclosure count: 0

Physical Drive: 4

Legacy Disk: 4

RAID Count: 0

Storage Properties



Total Capacity: 1024 GB

Configured Capacity: 1024 GB

Free Capacity: 0 GB

Configured 100.0%

HighPoint RAID Management 2.13.3
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Creating an Array

To create an array:

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

Controller(1): RR3740



Global View Physical Logical Setting Event SHI Recover Help

Create Array

Array Type: RAID 0

Array Name: Default

Initialization Method: Keep Old Data

Cache Policy:

Block Size: 64K

Select All

Location	Model	Capacity	Max Free
1/1	Samsung SSD 860 PRO 256GB-S42WNF0K402232Z	256.06 GB	0.00 GB
1/2	Samsung SSD 860 PRO 256GB-S42WNF0K401265A	256.06 GB	0.00 GB
1/3	Samsung SSD 860 PRO 256GB-S42WNF0K401287J	256.06 GB	0.00 GB
1/4	Samsung SSD 860 PRO 256GB-S42WNF0K401273K	256.06 GB	0.00 GB

Capacity: (According to the max free space on the selected disks) Maximum (MB)

Create

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Array Type:

An array is a collection of physical disks that will be seen as one virtual drive by your Operating System (OS).

The RR3700 is capable of creating the following array types:

- RAID 0 — Striping
- RAID 1 — Mirroring
- RAID 5 – 1 drive redundant
- RAID 6 – 2 drive redundant
- RAID 1/0 — Striping Mirrored array
- RAID 5/0 – 1 drive redundant mirror

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: Initialization of a disk sets all data bits to 0, essentially clearing all the data on the drive. It is important to initialize disks as 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 as 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 is not accessible, but the initialization process will complete much faster. **(Recommended)**
- **Background:** The array initialization process will have a lower priority. During this time the array will be accessible, but the initialization process will take much longer to complete.

Note: Initializing takes a significant amount of time (approximately 2 hours per 1 TB when using hard drives).

Background and Foreground Initialization

Foreground 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. Background 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: 512K)

[128K to 512K are the supported block sizes]

Adjusting the block size towards your disk usage can result in 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.

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 2 drives connected to the enclosure.
- The first drive is 6 TB, the second is 4 TB
- After creating a RAID level 1 using both drives and maximum capacity, the first drive will have 2 TB, the second 0 TB of free capacity
- The free capacity on the second drive can be used to create a separate array with other drives.

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

Adding Spare Disks

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

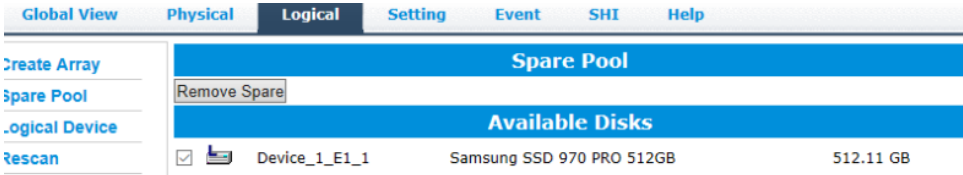
The screenshot shows a RAID management interface with a navigation bar at the top containing 'Global View', 'Physical', 'Logical' (selected), 'Setting', 'Event', 'SHI', and 'Help'. On the left, there is a sidebar with 'Create Array', 'Spare Pool', 'Logical Device', and 'Rescan'. The main area is divided into two sections: 'Spare Pool' and 'Available Disks'. The 'Spare Pool' section has a 'Remove Spare' button. The 'Available Disks' section contains a table with four rows, each representing a disk with a checkbox, a device name, a manufacturer/model, and a capacity.

Available Disks			
<input type="checkbox"/>	Device_1_E1_1	Samsung SSD 970 EVO 250GB	249.98 GB
<input type="checkbox"/>	Device_1_E1_2	Samsung SSD 970 EVO 250GB	249.98 GB
<input type="checkbox"/>	Device_1_E1_3	Samsung SSD 970 EVO 250GB	249.98 GB
<input type="checkbox"/>	Device_1_E1_4	Samsung SSD 970 EVO 250GB	249.98 GB

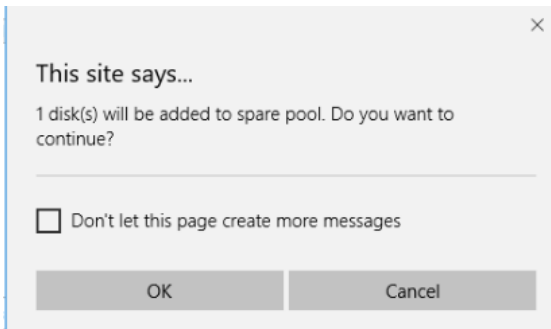
Below the table is an 'Add Spare' button.

To add spare disks:

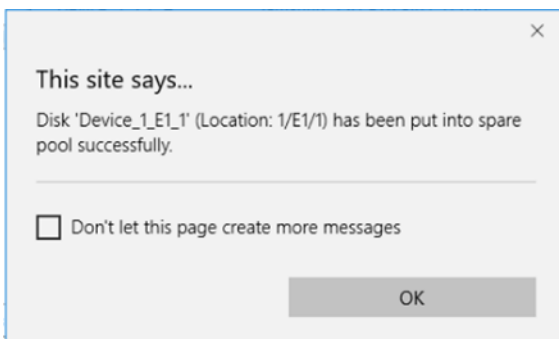
1. Log into the HRM
2. Click **Logical**
3. Click **Spare Pool**:



4. Check the box for the disk you want as a spare under **Available Disks**
5. Click **Add Spare**, and confirm by selecting **OK** from the pop-up window:



6. The disk has now been assigned as a spare. Click **OK** to confirm:



Disks added to the spare pool will be displayed under **Spare Pool** and can be removed by checking the box before the target drive, then click the **Remove Spare** button.

Physical drives marked as a spare will automatically be added to an array whenever there is a disk failure. This feature minimizes the chances of a data loss by reducing the time an array is in the critical status.

Obtaining Logical Device Information

The Logical device tab is the default page after clicking the Logical tab of the HRM. This page contains information about your RAID arrays and the 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, the Maintenance menu provides options to maintain or edit it. To access the Maintenance menu, click the **Maintenance** button towards the right-hand side of the array name.

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.

Array Information & Maintenance Options: Normal Status

The screenshot shows the 'Logical Device Information' page in a web application. The main table lists RAID arrays. One array, 'RAID_0_0', is highlighted. An 'Array Information' dialog box is open over it, showing details for the array and its constituent disks. The dialog box has a 'Delete' button, a 'Rename' button, and a 'Close' button. The background table has columns for Name, Type, Capacity, BlockSize, SectorSize, OS Name, and Status. The array 'RAID_0_0' has a capacity of 2.05 TB, block size of 512k, sector size of 512B, and OS Name 'HPT DISK 0_8'. The status is 'Normal' and there is a 'Maintenance' link next to it. The dialog box shows the array name 'RAID_0_0' and a tree view of disks: 'Device_1_E1_1', 'Device_1_E1_2', 'Device_1_E1_3', and 'Device_1_E1_4'. Each disk has a 'Delete' button and a 'Rename' button. The dialog box also shows the capacity and max free space for each disk, all of which are 2.04 GB and 0.00 GB respectively.

Name	Type	Capacity	BlockSize	SectorSize	OS Name	Status
RAID_0_0	RAID 0	2.05 TB	512k	512B	HPT DISK 0_8	Normal Maintenance

Location	Model	Capacity	Max Free
1/E1/1	Samsur	2.04 GB	0.00 GB
1/E1/2	Samsur	2.04 GB	0.00 GB
1/E1/3	Samsur	2.04 GB	0.00 GB
1/E1/4	Samsur	2.04 GB	0.00 GB

Arrays with the **Normal** status are healthy and functioning properly.

Arrays with the **Normal** status will have the following options:

Delete – deletes the selected RAID array

Verify – verifies the integrity of the RAID array

Rename – renames the RAID array.

Array Information & Maintenance Options: Critical Status

The screenshot shows the 'Logical Device Information' page in a management console. The 'Logical' tab is selected. On the left, there are links for 'Create Array', 'Spare Pool', 'Logical Device', and 'Rescan'. The main table lists RAID_1_0 with a 'Critical' status and a 'Maintenance' link. An 'Array Information' dialog box is overlaid, showing a tree view of RAID_1_0 containing three disks: Device_1_E1_1, Device_1_E1_4, and an Offline Disk. The dialog includes buttons for 'Delete', 'Rebuild', and 'Rename', and a 'Close' button at the bottom.

Arrays in the **Critical** status can be accessed and utilized, but are no longer fault tolerant. A Critical array should be rebuilt as soon as possible to restore redundancy.

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 the 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 the 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. If a spare disk is available, an array that has entered the critical state will begin rebuilding using the next available spare disk.

Array Information & Maintenance Options: Disabled Status

The screenshot shows the 'Logical Device Information' page. The 'Logical' tab is selected. The main table lists RAID_0_0 with a 'Disabled' status and a 'Maintenance' link. An 'Array Information' dialog box is overlaid, showing a tree view of RAID_0_0 containing four disks: Device_1_E1_1, Device_1_E1_2, Device_1_E1_3, and an Offline Disk. The dialog includes a 'Delete' button and a 'Close' button at the bottom.

An array with the **Disabled** status means that the RAID level does not have enough disks to function.

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

Your options in Maintenance are:

- Delete

Delete – will delete the array

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
- **Revision** — revised version of drive
- **Status** — Current state of drive
- **PCIe Width** — PCIe width occupied by drivers
- **PCIe Speed** — Rate of current bandwidth

Rescan

Clicking rescan will force the drivers to report the 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.

System Setting

Global View	Physical	Logical	Setting	Event	SHI	Recover	Help
System Setting							
System	Enable auto rebuild. <input type="text" value="Enabled"/>						
Email	Enable Continue Rebuilding on error. <input type="text" value="Enabled"/>						
	Enable audible alarm. <input type="text" value="Enabled"/>						
	Set Spindown Idle Disk(minutes): <input type="text" value="Disabled"/>						
	Restrict to localhost access. <input type="text" value="Enabled"/>						
	Set Rebuild Priority: <input type="text" value="Medium"/>						
	Port Number: <input type="text" value="7402"/>						
	<input type="button" value="Submit"/>						
Password Setting							
	Password: <input type="text"/>						
	Confirm: <input type="text"/>						
	<input type="button" value="Submit"/>						

Using this tab, you can change the following:

- Enable auto-rebuilding
- Enable rebuilding on error
- Enable audible alarm
- Set Spindown Idle Disk(minutes)
- Restrict to localhost
- Set rebuild priority
- Change port number
- Change HRM password

System Setting

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 the rebuild is finished, the data may be accessible but may also be inconsistent, due to any bad sectors that were ignored during the procedure. If this option is enabled, HighPoint recommends checking the event log periodically for bad sectors warnings.

Enable audible alarm(default: Enable)

When the disk is dropped, the buzzer will beep. If this option is disable, you won't hear any sound.

Set Spindown Idle Disk(minutes)(default:Diabile)

If this option is disabled, the disk attached to the RR3740A will not stop spinning. If you set the time limit, the disk will stop rotating according to the specified time when the system is not reading or writing.

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 HRM.

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 HRM listens on is 7402. You may change it to any open port.

Password Settings

Changing your HRM password

Under Password Setting, type your new password, confirm it, then click **Submit**.

Recovering your HRM password

If you forget your password, you can delete the file hptuser.dat. Then you need to restart the computer and open the WEBGUI to set a new password

For **Windows** Users:

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

Email Setting

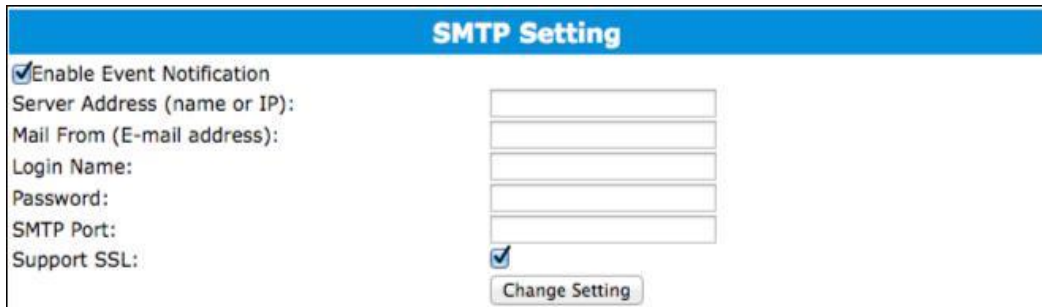
The following topics are covered under email:

SMTP Setting

Adding Recipients

You can instruct the controller to send an email out to the recipients of your choosing when certain events trigger (for more information, see Event Tab).

SMTP settings



SMTP Setting

Enable Event Notification

Server Address (name or IP):

Mail From (E-mail address):

Login Name:

Password:

SMTP Port:

Support SSL:

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**).

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

How to Add Recipients

Recipients		
E-mail	Name	Event Level
Add Recipient		
E-mail:	<input type="text"/>	
Name:	<input type="text"/>	
Event Level:	<input type="checkbox"/> Information <input type="checkbox"/> Warning <input type="checkbox"/> Error	
<input type="button" value="Add"/> <input type="button" value="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 using the respective **Event Level** check boxes.
4. **(Optional)** Click **test** to confirm the 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 include the output recorded in the event log.

Example email message:

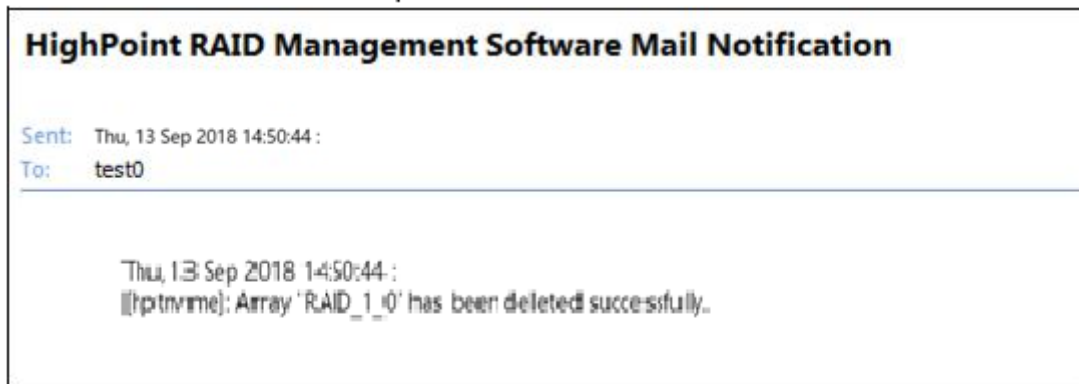


Figure 1. Example event log email

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

SHI (Storage Health Inspector)

- S.M.A.R.T Attributes
- Schedule a task(Task list and Health Inspector Scheduler)

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.

How to Enable SMART Monitoring

To access SMART attributes of an individual disk:

1. Log in to the HRM
2. Select the proper controller using the drop down menu on the top left
3. Click the **SHI** tab
4. Click **Detail** on the desired disk

Controller(1): NVMe ▾

HighPoint
Technologies, Inc.

Global View Physical Logical Setting Event **SHI** Help

Storage Health Inspector(SHI)

Controller ID	Location#	Device Serial Number	RAID	Temperature	Total Bytes Written	S.M.A.R.T
1	E1_1	S3ESNX0J109316P	RAID_0_0	Normal	329.87 TB	Detail
1	E1_2	S463NF0K409211V	RAID_0_0	Normal	615.22 TB	Detail
1	E1_3	S3ESNX0J111782M	RAID_0_0	Normal	239.55 TB	Detail
1	E1_4	S46ENB0K500703A	RAID_0_0	Normal	50.52 TB	Detail

[Schedule a task](#)

HighPoint RAID Management 2.13.3
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How to Use the Health Inspector Scheduler

The screenshot shows two forms from the HighPoint RAID Management 2.13.3 interface. The top form is titled 'New Verify Task' and is part of a 'Tasks List' section. It has a navigation bar with 'Global View', 'Physical', 'Logical', 'Setting', 'Event', 'SHI', and 'Help'. The 'SHI' tab is selected. The form includes a radio button for 'RAID_1_0', a 'Task Name' input field, and two scheduling options: 'Occurs one time on' (selected) and 'Occurs every'. The 'Occurs one time on' option has date and time pickers set to 2018-10-23 at 0:0:0. The 'Occurs every' option has a frequency of 1 Day(s) on Sunday at 0:0:0. There are also 'Start date' and 'End date' pickers, with 'No end date' selected. A 'Submit' button is at the bottom. The second form is titled 'Health Inspector Scheduler' and includes a 'Task Name' input field, a 'Select a Schedule' section with radio buttons for 'Daily', 'Weekly' (selected), 'Bi-Weekly', and 'Monthly', and a 'Select a time' section with a dropdown for 'Sunday' and a time picker set to 0:0:0. A 'Submit' button is at the bottom. Below the forms is the footer text: 'HighPoint RAID Management 2.13.3 Copyright (c) 2018 HighPoint Technologies, Inc. All Rights Reserved'.

The **Health Inspector Scheduler (HIS)** enables you to schedule disk/array checkups to ensure disks/array are functioning optimally.

How to Create a New Verify Task

All Redundant RAID's will appear under New Verify Task

1. Log into the HRM
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
8. One time verify task on specific date (YYYY-MM-DD) at (HH:MM:SS, 24-hr clock)
9. Or a specific schedule you can adjust based on Daily, Weekly, or Monthly options
10. Click **Submit**
11. 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.

Troubleshooting

This section provides guidelines to some problems you may encounter:

- Handling Critical Arrays
- Handling Disabled Arrays
- PC hangs when card is installed.

Handling Critical Arrays

When your disk status turns critical, your array as a whole is still accessible, but one or more disks is faulty (depending on your RAID level), and the array is in danger of failing.

Common scenarios for critical status

Bad sector is detected on a disk that is part of an 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 HRM Logical tab and Event tab.
3. Re-insert the faulty disk or replace with a new disk.
The array will rebuild automatically if your auto-rebuild setting is enabled and you reseated the faulty disk.

Note: Click **Rescan** if the array still does not rebuild automatically.

4. If the new disk is added and it does not automatically start rebuilding, you can manually add the disk in maintenance.

Log into the HRM Click **Logical Tab**

Click **Maintenance>Add Disk>** select the appropriate disk

5. Rebuild should now start.
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.

Rebuilding Stops Due to Bad Sectors

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 the HighPoint HRM.

1. Log into the HRM
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 the disks with bad sectors.

Critical array becomes disabled when you removed faulty disk

If this is the case, you may have removed the wrong 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 array to the previous state.

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

Your array should be back to Critical status. Identify the correct disk and rebuild from there.

Handling Disabled Arrays

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

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 HRM.

Register Product takes you to the HighPoint Online Web Support Portal. On this page you can create a new customer profile where you can register your product, or post an online support ticket.

Table 1.HRM Icon Guide

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



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 2. RAID Level Reference Guide

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 results in complete data loss	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	67-87%	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 50	Disk Mirroring followed by RAID5	6	67-75%	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
RAID 6	Disk Striping with dual rotating parity	4	50-75%	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

5. Customer Support

If you encounter any problems while utilizing the RocketRAID series HBA, or have any questions about this or any other HighPoint Technologies, Inc. product, feel free to contact our Customer Support Department.

Web Support: <http://www.highpoint-tech.com/websupport/>

HighPoint Technologies, Inc. websites: http://www.highpoint-tech.com/USA_new/main.htm