SSD6540M

4-Bay M.2 NVMe RAID Enclosure

User Guide

V1.03

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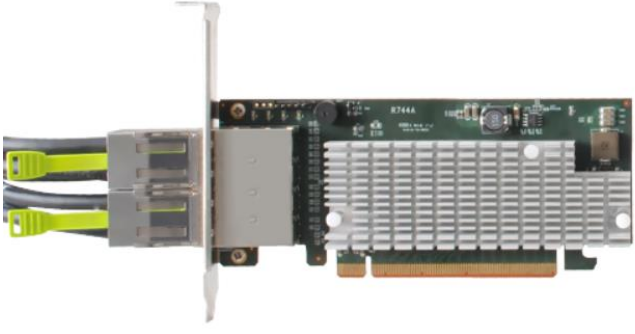
Kit Contents

- 1x 4-Bay Tower Enclosure
- 1x PCIe 3.0 x16 RAID Controller
- 4x Drive Trays
- 4x M.2 Drive to U.2 Host Adapter
- 2x HD mini-SAS cable (1 meter)
- 1x UL Power Cord
- 1x Quick Installation Guide

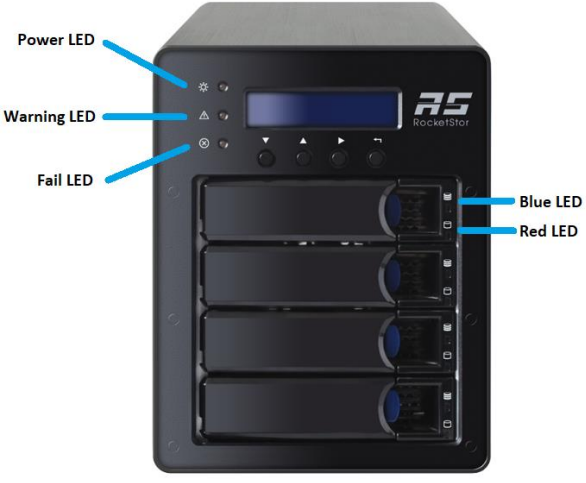
SSD6540M Hardware

Controller Card



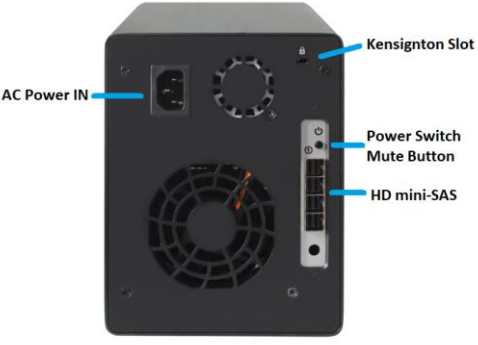
Back Port: SFF-8644

Panel Layout-Front View

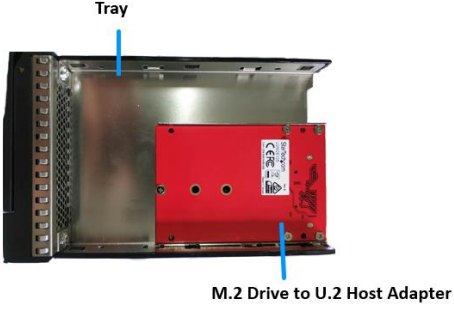


Disk Present LED: Solid Blue
Disk Active LED: Flash Blue
Disk Fail LED: Solid Red
Enclosure Power LED: Solid Blue
Temperature Warning LED: Solid Yellow
Fan/Temperature Fail LED: Solid Red

Panel Layout-Rear View



M.2 Drive to U.2 Host Adapter and Tray



System Requirements

PC Requirements

- Windows 10 or later
- Windows Server 2012 R2 or later
- macOS 10.12 or later
- Linux Kernel 3.3 or later

Enclosure Setup

1. Insert the Controller card into a PCIe x16 slot in your system.
2. Place the SSD6540M enclosure on a level surface and remove each disk tray.
3. Remove the ‘M.2 Drive to U.2 Host Adapter’ from the disk tray.
4. Connect NVMe M.2 to ‘M.2 Drive to U.2 Host Adapter’.

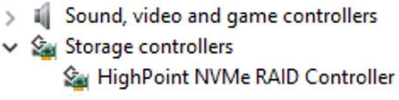
5. Carefully insert the ‘M.2 Drive to U.2 Host Adapter’ into each disk tray and secure them with the provided mounting screws.

6. After installing the hard drives, connect the SSD6540M to a power source.
7. With the power cord connected to the power source, turn on the SSD6540M using the power button on the rear panel (click the button to power on the SSD6540M).
8. Connected the SSD6540M to the Controller Card with the HD mini-SAS cable.

Setting up the SSD6540M

Driver Installation for Windows

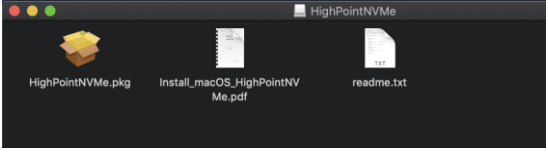
1. Boot up the Windows operating system.
2. Download the Windows driver package from the HighPoint website:
   http://highpoint-tech.com/USA_new/series-ssd6540m-download.htm
3. Extract the package and click the setup.exe program to install the driver. The installation program will install the SSD6540M Driver, automatically.
4. If prompted by Windows, reboot the system after the driver is installed to complete installation.
5. After reboot the Windows, open Device Manager.
   A HighPoint NVMe RAID Controller entry should appear under **Storage Controllers**



Driver Installation for macOS

1. Download the Mac driver package from the HighPoint website:
   http://highpoint-tech.com/USA_new/series-ssd6540m-download.htm
2. Once downloaded, locate the folder you downloaded the driver to and double click on the file named “HighPointNVMe”

3. The file will be mounted onto the operating system, click on HighPointNVMe.pkg located on the mounted drive.



4. Please refer to the installation guide to complete the driver installation.

Driver Installation for Linux

1. Please download the Linux Software Package from the HighPoint Website:
   http://highpoint-tech.com/USA_new/series-ssd6540m-download.htm
2. Please follow the Linux Installation guide included with the software package to install and setup the SSD6540M.

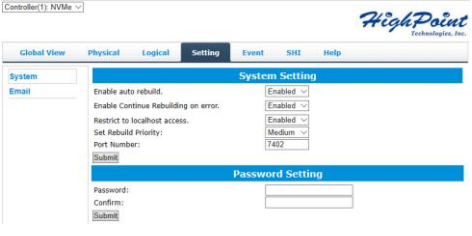
Install the HighPoint RAID Management software.

1. Download the HighPoint RAID Management Software. (WebGUI) from HighPoint Website: http://highpoint-tech.com/USA_new/series-ssd6540m-download.htm
2. Extract the package and double Click the Installation program to start installing the WebGUI
3. Follow the on-screen instructions to complete the installation procedure.

Using the HighPoint RAID Management

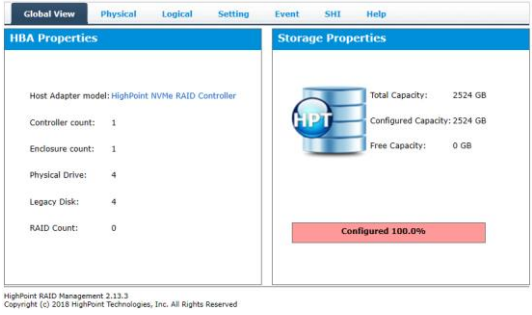
Starting the HighPoint RAID Management

Double click the Desktop **HPT** ICON to start the Web browser. It will automatically log-in to the HighPoint RAID Management using the default password.
The password can be set after the first log-in. To change the password, select **Setting**>**System** from the menu bar (see page 21 for more information).



Verify the Controller Status

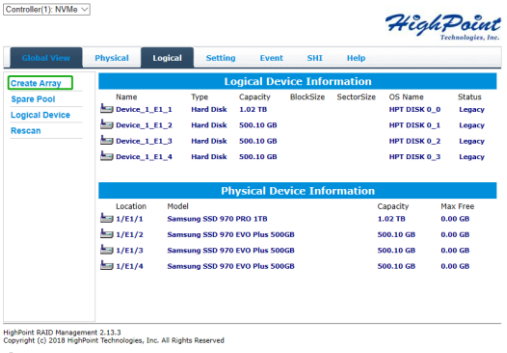
The **Global View** Tab will display the status of the installed SSD6540M. Show 'HBA Properties' and 'Storage Properties' .



Logical Tab

Creating An Array

To create a new RAID disk:
Click the **Create Array** link from the **Logical** page:



Array Type:

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

The SSD6540M is capable of creating the following array types:

- RAID 0 — Striping
- RAID 1 — Mirroring
- RAID 5 — Rotating Parity bit (Not Supported on macOS)
- RAID 10 — Striping Mirrored array

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 MBR. 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.
- **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)**:**
[16K to 1024K 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.

Review the array settings and confirm RAID creation.
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).

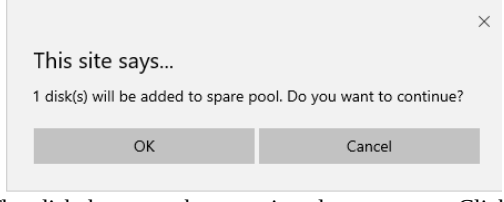
Adding Spare Disks

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

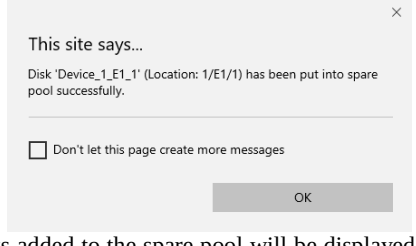
To add spare disks:

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 clicking 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

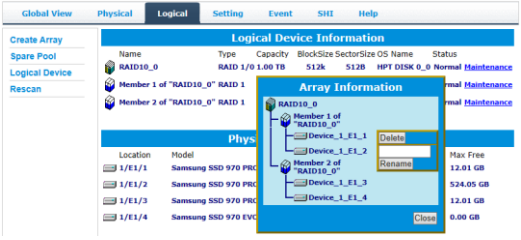
The Logical device tab is the default page after clicking the Logical tab of the HRM. This page contains information about your RAID arrays and the individual disks your system detects.

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



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

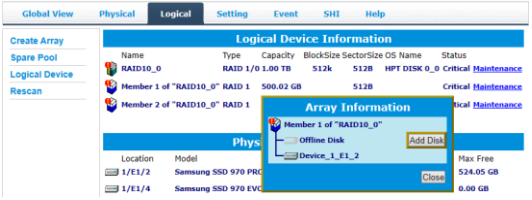
Rename – renames the RAID array.

Warning:

Deleting the RAID disk will destroy all data on the existing RAID array.

Please make sure to back up important data before proceeding.

Array Information & Maintenance Options: Critical Status



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

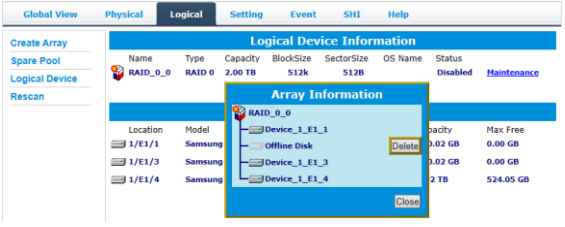
Reinserting the same disk should trigger the rebuilding status, since data on the disk would be recognized.

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



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

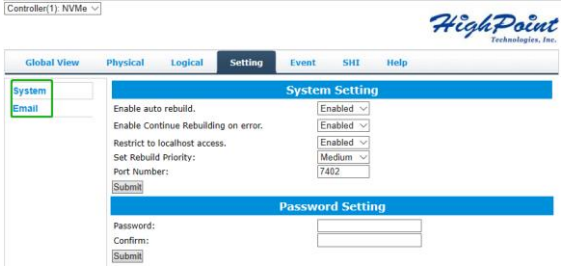
Location — which controller and port the drive is located in
Model — model number of the drive connected
Capacity — total capacity of the drive

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.

Setting Tab



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.

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.

Set 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 Setting

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

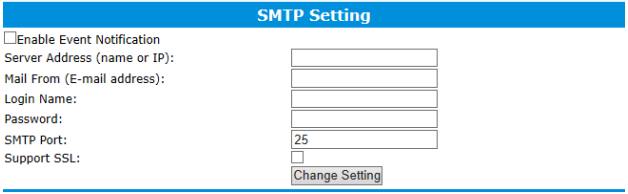
Email Setting

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

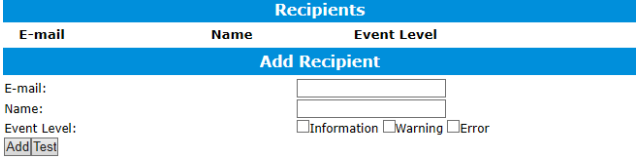


To set up email alerts:

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



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.

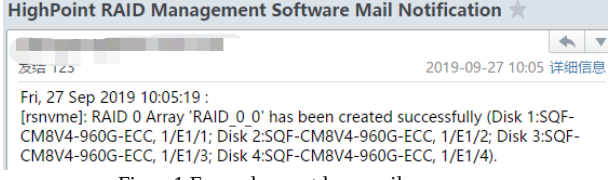


Figure1 Example event log email

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
Next – View next log page

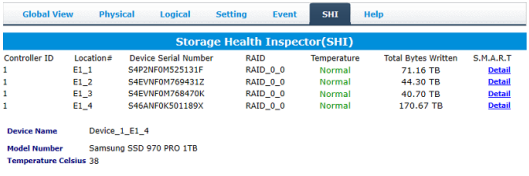
SHI (Storage Health Inspector)

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

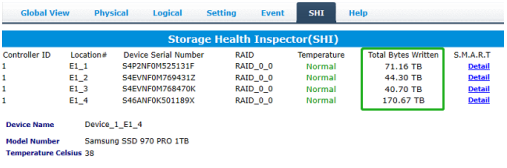
SHI outputs information collected using SMART (Self-Monitoring Analysis and Reporting Technology) Hard Drive Technology. The data provided on this tab helps you to anticipate any disk failures based on a variety of monitored hard disk properties.

How to Enable SMART Monitoring

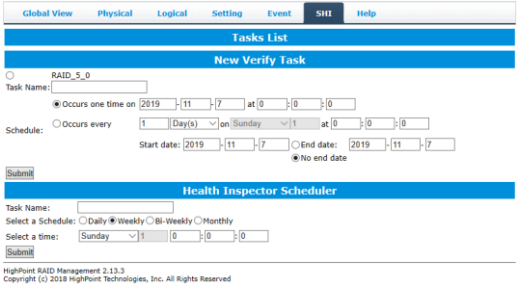
1. To access SMART attributes of an individual disk:
2. Log in to the HRM
3. Select the proper controller using the drop down menu on the top left
4. Click the **SHI** tab
5. Click **Detail** on the desired disk



The TBW (Total Bytes Written) information can be used to monitor the lifespan of the NVMe drives.



How to Use the Health Inspector Scheduler



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 RAIDs 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

	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 are 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 disks 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.

Customer Support

If you encounter any problems while utilizing the SSD6540M, or have any questions about this or any other HighPoint Technologies, Inc. product, feel free to contact our Customer Support Department or check our FAQ for more information.

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

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

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