

# Rocky Linux On HighPoint NVMe RAID AICs Installation Guide

# V1.00-July 31st 2023

Copyright © 2023 HighPoint Technologies, Inc.

All rights reserved.

# **Table of Contents**

1 Overview	1
2 Installing Linux Rocky Linux on NVMe RAID AIC	3
Step 1 Prepare Your Hardware for Installation	3
Step 2 Check System BIOS Settings	3
Step 3 Flash UEFI ROM to NVMe RAID AICs	4
Step 4 Create the RAID Array	5
Step 5 Prepare the Driver Diskette	7
Step 6 Install Rocky Linux	7
3 Monitoring the Driver	12
4 Installing RAID Management Software	12
5 Trouble Shooting	13
6 Rebuilding Driver Module for System Update	13
7 Appendix A	14

# **1 Overview**

The purpose of this document is to provide clear instructions on how to install Linux Rocky Linux to an SSD or RAID array hosted by HighPoint NVMe RAID AICs.

The following is a list of supported RAID AICs, Linux distributions and computing platforms.

Supported Linux distributions	Rocky Linux 8.6
	Rocky Linux 8.7
	Rocky Linux 9.0
	Rocky Linux 9.1
Supported RAID AICs	SSD7105
	SSD7202
	SSD7502
	SSD7505
	SSD7540
Supported computing platforms	Dell Precision 7920 Tower
	Dell Precision 7960 Tower

In order to configure a bootable NVMe RAID array, you will need the following:

*Note: Prior to system installation, please do not connect any NVMe to the system board M.2 SLOT to prevent any unexpected situation during the installation process.* 

- 1. An NVMe SSD must be installed. You must have at least one NVMe SSD installed into the NVMe RAID AICs.
- 2. A PCIe 3.0/ 4.0/ 5.0 slot with x8 or x16 lanes. The NVMe RAID AICs must be installed into a PCIe 3.0/ 4.0/ 5.0 slot with x8 or x16 lanes.
- 3. Secure Boot must be disabled. The UEFI capability of the NVMe NVMe RAID AIC has not been signed and certified. If Secure Boot is enabled, the system board will not recognize the NVMe NVMe RAID AIC, and you will be unable to proceed with installation.
- 4. **Prepare the Linux OS Installation media.** You will need an official Linux installation DVD or flash drive, or access to an official downloadable copy (which will then have to be burned/transferred to a DVD or flash drive).

- 5. If you are installing the OS using a DVD/Blu-Ray disc, you will need to **Install an optical drive into the system** (such as a DVD-ROM, DVD-RW or Blu-Ray drive).
- 6. You will need a USB flash drive the UEFI package and driver should be extracted to the root directory of this flash drive.

*Note:* If you are using a USB flash drive as the Linux OS Installation media, then you will need to prepare another USB flash drive. Linux OS cannot be stored in a USB flash drive with UEFI package and driver.

- 7. **Remove all other drives during the OS installation process.** Make sure only the NVMe RAID AICs, the USB flash drive, and the optical drive are installed into the system during this procedure. This includes any other USB hard drives, USB flash drives, memory sticks, or SAS/SATA drives. You can reattach these drives after the operating system has been successfully installed.
- Make sure any non-HighPoint drivers are uninstalled for any SSDs hosted by the NVMe RAID AIC. 3rd party software and manufacturer provided drivers may prevent the NVMe RAID AIC from functioning properly.

# 2 Installing Rocky Linux

If you would like to install Linux Rocky Linux onto drives attached to the NVMe RAID AIC, please perform the following operations:

### **Step 1 Prepare Your Hardware for Installation**

After you attach your NVMe SSDs to the NVMe RAID AICs, you can use **EFI Utility** to configure your NVMe SSDs into RAID arrays, or just use them as single disks.

Before installation, you must remove all the NVMe SSDs, which are not physically attached to NVMe RAID AIC, from your system.

Note

**NVMe RAID AICs only support EFI boot.** If you have other SCSI adapters installed, you must make sure the NVMe RAID AIC EFI will be loaded firstly. If not, try to move it to another PCI slot. Otherwise, you may be unable to boot up your system.

### Step 2 Check System BIOS Settings

- 1. Boot the system and press **F12** to enter BIOS menus.
- 2. Enter BIOS Setup.

Boot mode is set to: UEFI; Secure Boot: OFF
LEGACY BODT:
PO: PLDS DVD+/-RW DU-845LH
Onboard NIC
UEFI BOOT:
OTHER OPTIONS:
BIOS Setup
Device Configuration
BIOS Flash Update
Diagnostics
Change Boot Mode Settings

3. Find Settings→Secure Boot→Secure Boot Enable, select Disabled.



4. Save configuration and restart the system.

### Step 3 Flash UEFI ROM to NVMe RAID AICs

#### Example: SSD7505

#### Note: Make sure your USB flash partition format is FAT32.

- 1. Unzip SSD7505 UEFI package to the root dir(/) of a USB flash drive, and connect the USB flash drive to the system board.
- 2. Enter the system board's BIOS menus, and select the "UEFI: USB" from the UEFI BOOT.



3. Use the command "go.nsh" to flash UEFI ROM to the SSD7505 and reboot the system.



4. Use the "**exit**" command to exit the utility.

#### Step 4 Create the RAID Array

Two methods are provided to create the RAID arrays. *Note: The following installation process uses the SSD7505 as an example. Note2: The following screenshots are only used for reference.* 

#### Method 1 UEFI Command Line (RAID Tool)

- 1. Attach NVMe SSDs to the NVMe RAID AIC.
- 2. Enter the system board's BIOS menus, and select the "UEFI: USB" from the UEFI BOOT.



3. Use the command "ArrayCreate.efi" to enter the Utility:



4. Use the command "create RAID0".

This will create a RAID0 array using all of the NVMe SSDs, and the maximum available capacity.

Creating array: RAIDO_000041A7. Array created successfully. ===== Physical device list(count 4): 1/1 Sabrent Rocket 4.0 1TB-7FE00707087104034542, 1000123MB(MaxFree 0MB), 1/2 Sabrent Rocket 4.0 1TB-7FE00707089D04033529, 1000123MB(MaxFree 0MB), 1/3 Seagate EireCuda 520 SSD 2220005M30002-70H00282, 2000313MB(MaxFree 0MB),	Normal
Array created successfully. ===== Physical device list(count 4): 1/1 Sabrent Rocket 4.0 1TB-7FE00707087104034542, 1000123MB(MaxFree OMB), 1/2 Sabrent Rocket 4.0 1TB-7FE00707089D04033529, 1000123MB(MaxFree OMB), 1/3 Sabrent Rocket 4.0 1TB-7FE00707089D0423529, 1000123MB(MaxFree OMB),	Normal
===== Physical device list(count 4): 1/1 Sabrent Rocket 4.0 1TB-7FE00707087104034542, 1000123MB(MaxFree 0MB), 1/2 Sabrent Rocket 4.0 1TB-7FE00707088D04033529, 1000123MB(MaxFree 0MB), 1/3 Sabrent Rocket 4.0 1TB-7FE00061840002-720400282, 2000313MB(MaxFree 0MB),	Normal
==== Physical device list(count 4): 1/1 Sabrent Rocket 4.0 1TB-7FE00707087104034542, 1000123MB(MaxFree OMB), 1/2 Sabrent Rocket 4.0 1TB-7FE00707089D04033529, 1000123MB(MaxFree OMB), 1/3 Sapagte Eirepund 520 SSD 22000BM30002-7200002840, 2000313MB(MaxFree	Normal
1/1 Sabrent Rocket 4.0 1TB-7FE00707087104034542, 1000123MB(MaxFree 0MB), 1/2 Sabrent Rocket 4.0 1TB-7F600707089D04033529, 1000123MB(MaxFree 0MB), 1/3 Sapagate Eireplund 520 SSD 22000BM30002-7D040282, 2000313MB(MaxFree	Normal
1/2 Sabrent Rocket 4.0 1TB-7F600707089D04033529, 1000123MB(MaxFree OMB), 1/3 Seagate FireCuda 520 SSD 2P20006M30002-70H00282, 2000313MB(MaxFree 1	
1/3 Seavate FireCuda 520 SSD 2220006M30002-70H002A2, 2000313MB(MaxEree 1	Normal
The bodgate in board bet obe Electronaliooove renoveries Econolising (naxin de r	.000190MB), Norm
1/4 Seagate FireCuda 520 SSD ZP2000GM30002–7QH0025Q, 2000313MB(MaxFree 1	.000190MB), Norm
==== Logical device list(count 1):	
1 [VD4] RAIDO_000041A7 (RAIDO), 4000493MB (Stripe 512KB), Normal	
1/1 Sabrent Rocket 4.0 1TB	
1/2 Sabrent Rocket 4.0 1TB	
1/3 Seagate FireCuda 520 SSD ZP2000GM30002	
1/4 Seagate FireCuda 520 SSD ZP2000GM30002	

- 5. Use the "exit" command to exit the utility.
- 6. For additional command lines, refer to <u>Appendix A</u>.

#### Method 2 UEFI HII (UEFI Utility)

- 1. Boot the system and press F12 to enter BIOS menus.
- 2. Enter Device Configuration.



3. Select "HighPoint RAID Management Utility".



#### 4. Select Create RAID...

Dell Precision 7920 Tower		
Driver Health HighPoint RAID Management Utility Intel(R) Vi	rtual RAID on	CPU
Controller Information 1/E1/S507505 (1505) Physical Device Information 1/E1/1 Samsung SSD 980 PRO 500GB, Normal 1/E1/2 Samsung SSD 980 PRO 500GB, Normal 1/E1/2 Samsung SSD 980 PRO 500GB, Normal	PCI Express Current: Designed: PCI Express Current: Designed:	Speed: 8GT/s 16GT/s Width: x4 x16
Logical Device Information         S0000, NUTWAI           Logical Device Information         (VD 0) RAID0.000041A7 (RAID0), 2000GB Normal           Create RAID         Delete RAID           Utility built on         Dec 19 2022 15:18:39	Mar 23 2023	16:08:4:

In Create menu, a device list will appear, and display all available hard disks.
 Select the RAID type from dropdown list. Use the up and down keys of the keyboard or the mouse to select the RAID type and press the Enter key.



### Step 5 Prepare the Driver Diskette

Extract **HighPoint\_NVMe\_Rocky\_Linuxxx.xx\_x86\_64\_vx.x.x\_xx\_xx\_xx\_tar.gz** to the top(/) directory of an USB flash drive. It will look like:



#### **Step 6 Install Rocky Linux**

#### **Example: Rocky Linux 9.1**

- 1. Before starting the installation procedure, verify the status of your network environment. To ensure Rocky Linux is successfully installed to the RAID array, we recommend that the system is disconnected from the internet and any local network.
- 2. Insert the USB flash drive into the target system.
- 3. Boot the system using a bootable USB drive.
- 4. When the Installation screen appears, press 'e' to edit boot command line option.



On the edit command window, move the cursor to the end of line "linuxefi /images / pxeboot... ", and append "**modprobe.blacklist=nvme** " (d do not include the quotation marks).



Press CTRL+X or F10 to start the system.

5. When the following window appears during the installation process,

Rocky				ROCKY LINUX 9	1 INSTALLATION
Linux				🖽 us	Help!
	WELCOME TO RO	CKY LINUX 9.1.			
	X What language would ve	ou like to use during the installation proces	sî		
	English	English >	English (United States)		
131 2	العربية	Arabic	English (United Kingdom)		
	Français	French	English (India)		
	Deutsch	German	English (Australia)		
	日本語	Japanese	English (Canada) English (Denmark)		
10	中文	Mandarin Chinese	English (Ireland)		
	Русский	Russian	English (New Zealand)		
-	Español	Spanish	English (Nigeria)		
			English (Maga Kang SAR China)		

Press **CTRL+ALT+F2** to switch to the shell on console 2, and press **ENTER** to activate this console.



# sh /tmp/hptdd/ rhel-install-step1.sh ← Load NVMe RAID AIC driver.



6. Then press **ALT+F6** to switch back to installation screen and continue the installation as usual.

7. When the following window appears during the installation process,

LOCALIZATION	SOFTWARE	SYSTEM
Keyboard English (US)	Installation Source Local media	Installation Destination Automatic partitioning selected
Language Support English (United States)	Software Selection Server with GUI	KDUMP Kdump is enabled
S Time & Date Americas/New York timezone		Network & Host Name Not connected
USER SETTINGS		Security Profile No profile selected
Root Password Root account is disabled		
User Creation		
Set Root Password		

### 1)



### 2) Select Installation Destination and click "refresh"

111.79 GB 57.3 GB 74.4		
ATA KINGSTON SA40053 500.266/73815/fffc SanDisk Cruzer Glide 3.0 sda / 1.4.3 MB free sdb / 992.5 KB free jeecialized & Network Disks		
ipecialized & Network Disks		
Add a disk		
Storage Configuration		
Automatic O Custom		
I would ske to make additional space available.		
Encrypt my data. You'll set a passphrase next.		
	h	

3) Then choose your own disk.

INSTALLATION DESTINATION
Device Selection Select the device(s) you'd like to install to. They will be left untouched until you click on the mai
Local Standard Disks
1.82 TiB
0x1103
hptblock1n0p / 1.82 TiB free
Specialized & Network Disks
Add a disk

- Server with GUI An integrated, easy-to-manage server with a graphical interface. Server An integrated, easy-to-manage server. Minimal Install Basic functionality. **Console Internet Tools** Console internet access tools, often used by administrators. Container Management Tools for managing Linux containers Development Tools .NET Development Tools to develop and/or run .NET applications Graphical Administration Tools Graphical system administration tools for managing many aspects of a system. Headless Management Tools for managing the system without an attached graphical console.
- 8. Then begin installation.
- 9. If the following information is displayed during the installation, select "Yes".

Installing boot loader	The following error occurred while i will not be bootable. Would you like installation? Could not get stage2 filesystem UU	nstalling the boot loader. The system to ignore this and continue with D	
	No	Yes	

10. When the screen shows that "complete!".

Complete!		
	<i>h</i> t	
		Rocky Linux is now successfully installed and ready for you to use! Go ahead and reboot your system to start using it!
		Reboot System

press CTRL+ALT+F2 to the shell and type the following commands: # cp -r /tmp/hptdd /mnt/sysimage/tmp/hptdd ← Copy the driver installation file to system

4) Set Software Selection and choose Server with GUI-Development Tools

# chroot /mnt/sysimage	$\leftarrow \text{Switch to the top}(/) \text{ directory}$
# sh /tmp/hptdd/rhel-install-step2.sh	← Install NVMe RAID AIC driver
# rm -rf /tmp/hptdd	$\leftarrow$ Delete the driver file
# exit	$\leftarrow$ Exit the top(/) directory
Lanaconda root@localhost /]# cp -r /tmp/hptd Lanaconda root@localhost /]# chroot /mnt/sys Lanaconda root@localhost /]# sh /tmp/hptdd/r Driver Installation Jpdating 5.14.0-162.6.1.e19_1.x86_64 Driver installation step 2 completed. Lanaconda root@localhost /]# rm -rf /tmp/hpt Lanaconda root@localhost /]# exit exit Lanaconda root@localhost /]#	d /mnt/sysimage/tmp/hptdd image/ hel-install-step2.sh dd/

- 11. Press ALT+F6 to switch back to installation screen and finish the installation.
- 12. If you want to boot from another kernel, please install the NVMe RAID AIC opensource driver after entering the system.
- 13. Restart to enter the system, please connect to the internet:
- 14. Download the appropriate driver from the Software Downloads web page.
- 15. Extract the driver package:

```
tar zxvf HighPoint_NVMe_G5_Linux_Src_Src_vx.xx.xx_xx_xx_tar.gz
```

16. Run the **.bin** file to install the driver package.

sh hptnvme\_g5\_linux\_src\_vxx.x.x\_xx\_xx\_xx.bin or



17. Follow the prompts to complete the driver installation.

```
Created symlink /etc/systemd/system/default.target.wants/hptdrv-monitor.service

→ /usr/lib/systemd/system/hptdrv-monitor.service.

SUCCESS: Driver hptnvme is installed successfully for kernel 5.14.0-162.6.1.el9_

1.x86_64. I

Please restart the system for the driver to take effect.

If you want to uninstall the driver from the computer, please run hptuninhptnvme

to uninstall the driver files.

[root@localhost home]#
```

18. After Rocky Linux has been installed, you can reconnect the system to the network/internet and update the system as needed.

# **3** Monitoring the Driver

Once the driver is running, you can monitor it through the Linux proc file system support. There is a special file under /proc/scsi/hptnvme /. Through this file you can view driver status and send control commands to the driver.

#### Note

The file name is the SCSI host number allocated by OS. If you have no other SCSI cards installed, it will be 0. In the following sections, we will use x to represent this number.

Using the following command to show driver status:

#### # cat /proc/scsi/hptnvme /x

This command will show the driver version number, physical device list and logical device list.

# **4 Installing RAID Management Software**

HighPoint's RAID Management Software can be used to check the status of the SSDs and RAID arrays hosted by the NVMe RAID AIC. Installation of the management software is optional but recommended.

Please refer to HighPoint RAID Management Software documentation for more information.

# **5** Trouble Shooting

If you do not install the system or update the kernel according to the installation manual, the system will crash and you will not be able to enter. Please follow the steps below.

a. Select the default (kernel: 5.14.0-162.6.1.el9.x86\_64) and enter the system.

Rocky Linux	(5.14.0-162.6.1.el9_1.x86_64)	9.1	(Blue Ony	x) —		
Rocky Linux FreeDOS (on	(0-rescue-fe62cd9bef094e579ef /dev/sdb1) >> Settings	52bf	3e0800eed)	9.1	(Blue	Onyx,

- b. Install Linux Opensource driver.
- c. Download the appropriate driver from the Software Downloads web page.
- d. Run the .bin file to install the driver package.

sh hptnvme\_g5\_linux\_src\_vxx.x.x\_xx\_xx\_xx.bin or

```
./hptnvme g5 linux src vxx.x.x xx xx xx.bin
```

1.x86\_64. Please restart the system for the driver to take effect. If you want to uninstall the driver from the computer, please run hptuninhptnvme to uninstall the driver files. [root@localhost home]#

f. After the installation is complete, you can perform system update operations.

# **6 Rebuilding Driver Module for System Update**

When the system updates the kernel packages, the driver module hptnvme.ko should be built and installed manually before reboot.

Please refer to the README file distributed with NVMe RAID AIC opensource package on how to build and install the driver module.

# 7 Appendix A

•

#### Support command: help/info/quit/exit/create/delete.

```
Create Command
Syntax
Create Array Type (RAID0/RAID1/RAID10) Member Disk list (1/1,1/2|*)
Capacity (100|*)
```

#### Examples

<<< create RAID0 <<< create RAID0 \* <<< create RAID0 \* Create RAID0 array with all disks and with maximum capacity.

<<< create RAID1 1/1, 1/3 10 Create RAID1 array with disk 1/1 and 1/3 and with 10GB capacity.

<-< create RAID10 <<< create RAID10 \* <<< create RAID10 \* \* Create RAID10 array with all disks and with maximum capacity.

### Delete Command

Syntax

delete {array ID}

### Examples

<<< delete 1 Delete the first array from Logical device list.
<<< delete 2 Delete the second array from Logical device list.

## • Info Command

Syntax info Display physical device list and logical list

### • Exit Command

.

Syntax Q/q/quit/exit Quit the application

Help Command Syntax H/h/help This is help message.