



Linux Rocky Linux On HighPoint NVMe RAID Controller Installation Guide

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1 Overview

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

The following is a list of NVMe controllers and system.

Supported System	Rocky Linux 8.6 Rocky Linux 8.7 Rocky Linux 9.0 Rocky Linux 9.1
Supported Controller	SSD7202 SSD7105 SSD7505 SSD7502 SSD7540 RocketAIC 7505HW Series RocketAIC 7540HW Series RocketAIC 7749EW Series
Supported Enclosure	SSD6780A

2 Installing Linux Rocky Linux on NVMe controller

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

Step 1 Prepare Your Hardware for Installation

After you attach your NVMe SSD to the NVMe controller, 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 SSD, which are not physically attached to NVMe controller, from your system.

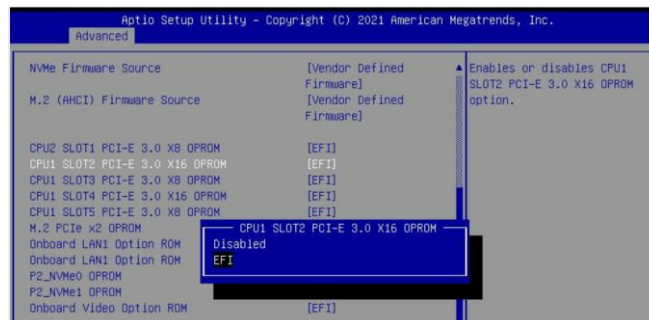
Note

NVMe controller only support EFI boot. If you have other SCSI adapters installed, you must make sure the NVMe controller 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.

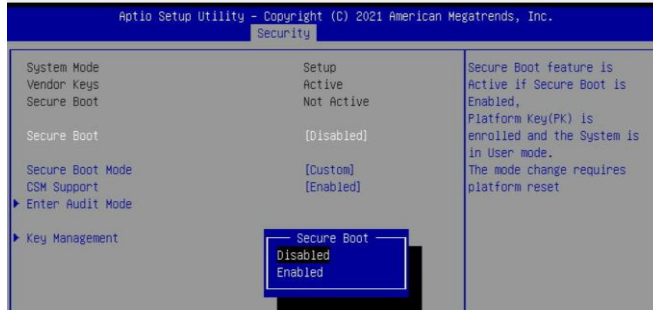
Step 2 Check System EFI Settings

In your system EFI SETUP menu, change **Boot Sequence** in such a way that the system will first boot from **EFI CDROM** or **EFI** a Bootable USB drive; after you finish installation, set the NVMe controller as the first boot device to boot up the system. Refer to your motherboard EFI manual to see how to configure the boot sequence.

1. Set UEFI setting with SuperMicro X11DPi-NT motherboard as an example.
 - a. "**Advanced->PCIe/PCI/PnP Configuration->CPUSlot PCI-E OPROM**" to "**EFI**". Suppose NVMe controller is connected to motherboard CPU1 Slot 2 PCI-E X16, then you should set "CPU1 Slot 2 PCI-E X16 OPROM" to "EFI";

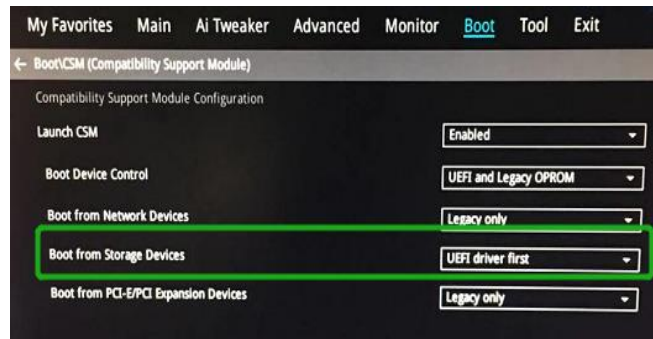


- b. Disable "Secure Boot", set "Attempt Secure Boot" to "Disabled".

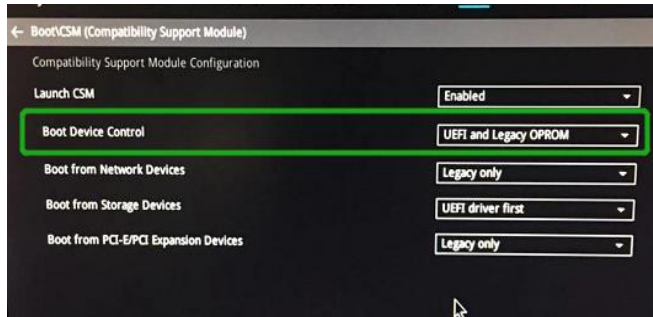


- 2. Configuring the UEFI settings (using an ASUS PRIME X299 -DELUXE motherboard as an example):

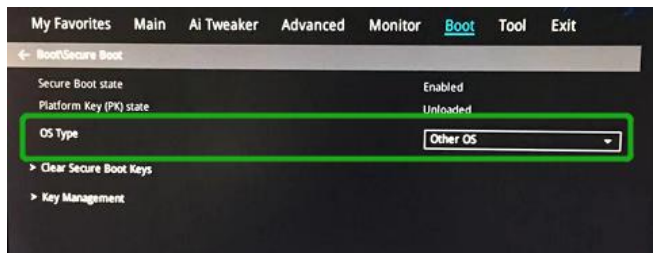
- a. Set "Boot from Storage Devices" to "UEFI driver first";



- b. And "Boot Device Control" to "UEFI Only" or "UEFI and Legacy OPROM";



- c. Set "OS Type" to "Other OS".



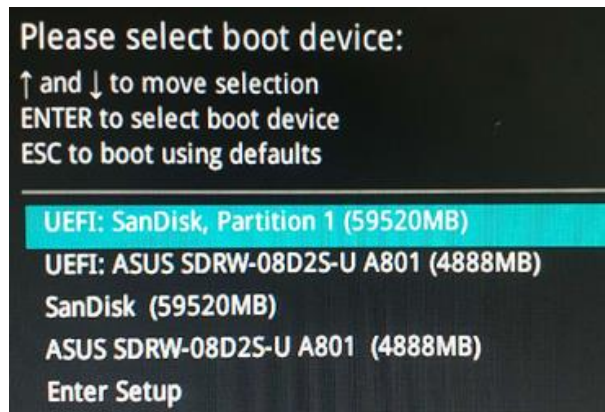
Step 3 Flash UEFI ROM to NVMe controller

Example SSD7505:

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

For other products, please refer to: [Update UEFI ROM](#)

- a. Unzip SSD7505 UEFI package to the root dir (/) of a USB flash drive, and connect the USB flash drive to the motherboard;
- b. Boot from the UEFI USB flash and enter the UEFI environment;



- c. Use the command “go.nsh” to flash UEFI ROM to the SSD7505 and reboot the system.

```
FS1:\> go.nsh
FS1:\> load.efi 7505uefi.rom
Load Utility for Flash EPROM v1.1.0
(built at Jan 5 2021 13:30:42)

Found adapter 0x75051103 at PCI 33:0:0
Flash size 0x10000, File size 0xee00
Offset address 0x20000
EPROM Vendor: WINBOND W25X40BV
Erasing .....Succeeded
Flashing ....

Flashing Success (total retry 0)

Verifying ....

Passed !
FS1:\> _
```

- d. Use the “exit” command to exit the utility.

Step 4 Create Array

Note: RocketAIC 7505HW series, RocketAIC 7540HW series and RocketAIC 7749EW series NVMe drives are already pre-configured with RAID0. You can skip this step. If you want to use another type of RAID array for a Boot-RAID configuration, you can refer to the following steps.

- a. Attach NVMe SSDs to NVMe controller.
- b. Boot, enter the motherboard's Boot List and select start from UEFI USB flash.

```
Boot Override
UEFI: USB, Partition 1
(B97/D0/F0) UEFI PXE: IPv4 Intel(R) I350 Gigabit Network
Connection(MAC:3cecef40a1dc)
```

- c. Use the command “ArrayCreate.efi” to enter the Utility:

```
F83:\> ArrayCreate.efi
Highpoint RAID utility for UEFI (version: 20200306)
==== Controller information:
  Vendor: HighPoint Technologies, Inc.
  Product: SSD7505 (7505)

==== Physical device list(count 2):
1/1 Samsung SSD 980 PRO 1TB-S5GXNGON905363B, 1000123MB(MaxFree 1000123MB), Normal
1/2 Samsung SSD 980 PRO 1TB-S5GXNGON905305N, 1000123MB(MaxFree 1000123MB), Normal

==== Logical device list(count 0):
-----
>>> Please specify command to execute:
<<< _
```

- d. Use the command “create RAID0”. This will create a RAID0 array using all of the NVMe SSDs, and the maximum available capacity.

```
<<< create RAID0
  Creating array: RAID0_000041A7.
  Array created successfully.
=====

==== Physical device list(count 2):
1/1 Samsung SSD 980 PRO 1TB-S5GXNGON905363B, 1000123MB(MaxFree 0MB), Normal
1/2 Samsung SSD 980 PRO 1TB-S5GXNGON905305N, 1000123MB(MaxFree 0MB), Normal

==== Logical device list(count 1):
1 [VD1] RAID0_000041A7 (RAID0), 2000246MB (Stripe 512KB), Normal
  1/1 Samsung SSD 980 PRO 1TB
  1/2 Samsung SSD 980 PRO 1TB
-----
>>> Please specify command to execute:
<<< _
```

- e. Use the “exit” command to exit the utility.
- f. For additional command lines, refer to [Appendix A](#).

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:

```
[root@localhost home]# tar zxvf HighPoint_NVMe_Rocky_Linux9.1_x86_64_v1.5.1_23_04_12.tar.gz
hptdd/
hptdd/60-persistent-storage-hptblock.rules
hptdd/dracut-hptdrv.sh
hptdd/install.sh
hptdd/modinfo
hptdd/module-setup.sh
hptdd/modules.alias
hptdd/modules.cgz
hptdd/modules.dep
hptdd/modules.pciimap
hptdd/pci.ids
hptdd/pcitable
hptdd/rhdd
hptdd/rhel-install-step1.sh
hptdd/rhel-install-step2.sh
hptdd/readme.txt
```

Step 6 Install Rocky Linux

Example: Rocky Linux9.1

- 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.
- Insert the USB flash drive into the target system.
- Boot the system using a bootable USB drive.
- When the Installation screen appears, press 'e' to edit boot command line option.

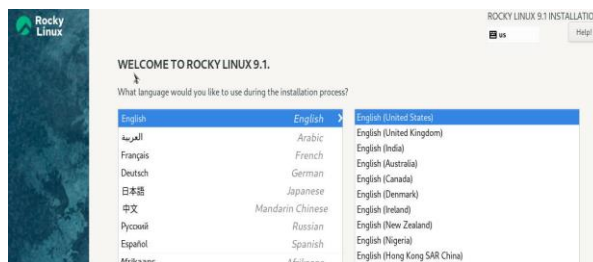


On the edit command window, move the cursor to the end of line "linuxefi /images /pxeboot... ", and append "**modprobe.blacklist=nvme** " (d do not include the quotation marks).



Press **CTRL+X** or **F10** to start the system.

- When the following window appears during the installation process,



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

```
Rocky Linux 9.1 (Blue Onyx)
Kernel 5.14.0-162.6.1.el9_1.x86_64 on an x86_64

[anaconda root@localhost /]#
```

Next, execute the following commands:

```
# mkdir /hptdd           ← Create mount point for USB flash drive
# mount /dev/sda1 /hptdd ← Mount the USB flash drive to /hptdd
# cp -a /hptdd/hptdd /tmp/ ← Copy driver installation file to system
                           temporary directory
# umount /hptdd          ← Unmount the USB flash drive
```

```
[anaconda root@localhost /]# mkdir /hptdd
[anaconda root@localhost /]# mount /dev/sdb1 /hptdd/
[anaconda root@localhost /]# cp -a /hptdd/hptdd/ /tmp/
[anaconda root@localhost /]# umount /dev/sdb1
```

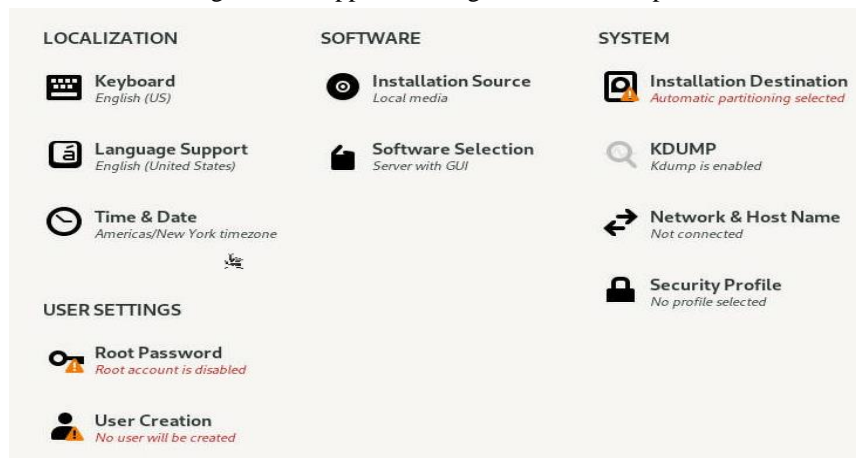
When the USB flash drive is unmounted, please unplug the USB flash drive from the system.

Next, execute the following commands to install the driver for Linux Rocky Linux.

```
# sh /tmp/hptdd/ rhel-install-step1.sh ← Load NVMe controller driver.
```

```
[anaconda root@localhost /]# sh /tmp/hptdd/rhel-install-step1.sh
Driver Installation
Driver installation step 1 completed.
[anaconda root@localhost /]# _
```

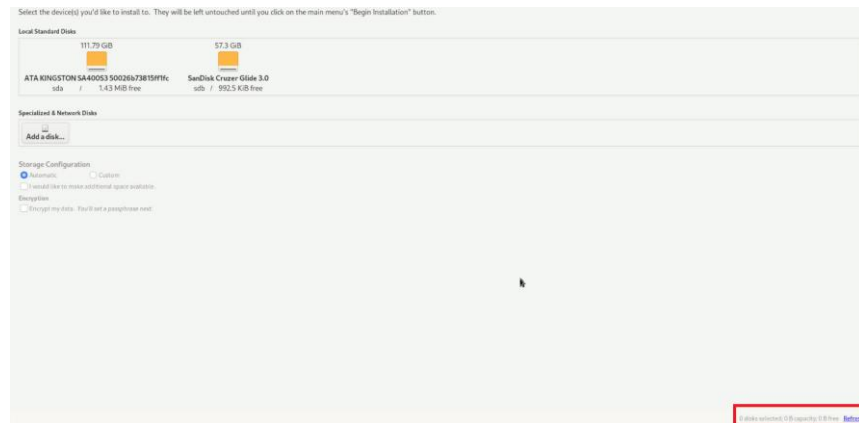
- f. Then press **ALT+F6** to switch back to installation screen and continue the installation as usual.
- g. When the following window appears during the installation process,



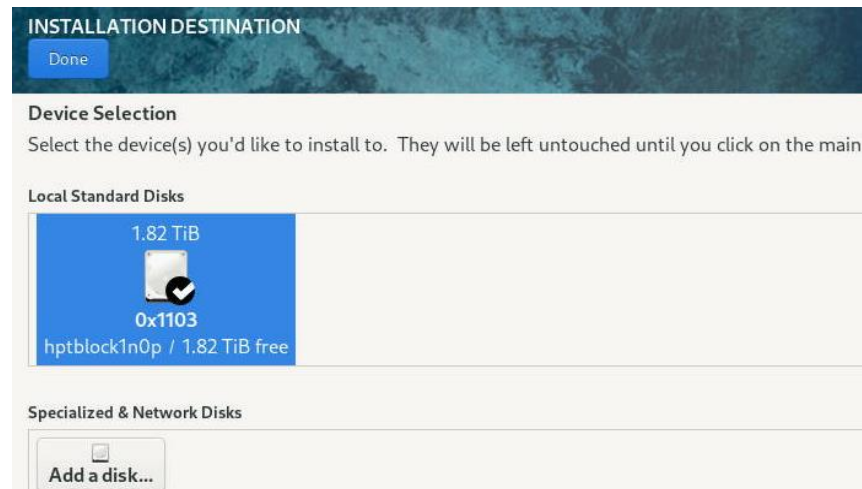
- 1) Set **Root Password**



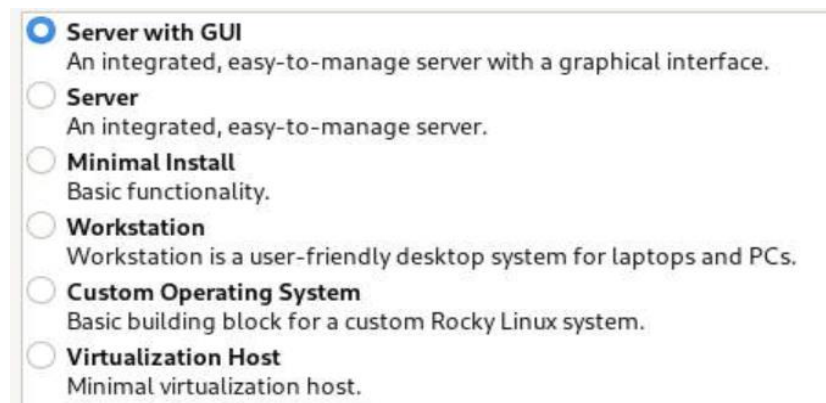
- 2) Select **Installation Destination** and click “refresh”



- 3) Then choose your own disk.

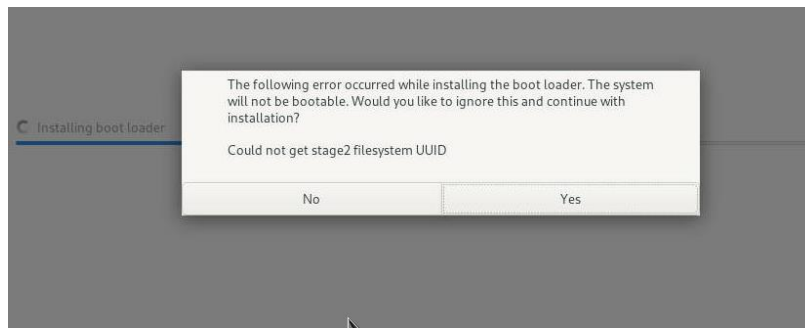


- 4) Set **Software Selection** and choose **Server with GUI**→**Development Tools**

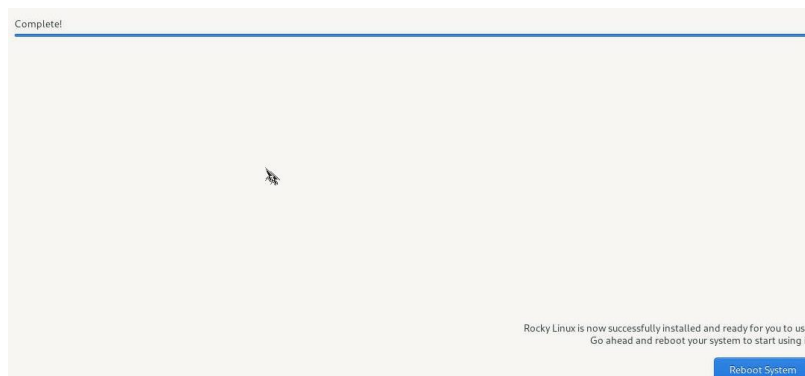


- Console Internet Tools**
Console internet access tools, often used by administrators.
- Container Management**
Tools for managing Linux containers
- Development Tools**
A basic development environment.
- .NET Development**
Tools to develop and/or run .NET applications
- Graphical Administration Tools**
Graphical system administration tools for managing many aspects of a system.
- Headless Management**
Tools for managing the system without an attached graphical console.

- h. Then begin installation.
- i. If the following information is displayed during the installation, select “Yes”.



- j. When the screen shows that “complete!”.



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 |
| # chroot /mnt/sysimage | ← Switch to the top(/) directory |
| # sh /tmp/hptdd/rhel-install-step2.sh | ← Install NVMe controller driver |
| # rm -rf /tmp/hptdd | ← Delete the driver file |
| # exit | ← Exit the top(/) directory |

```

[anaconda root@localhost /]# cp -r /tmp/hptdd /mnt/sysimage/tmp/hptdd
[anaconda root@localhost /]# chroot /mnt/sysimage/
[anaconda root@localhost /]# sh /tmp/hptdd/rhel-install-step2.sh
Driver Installation
Updating 5.14.0-162.6.1.el9_1.x86_64...
Driver installation step 2 completed.
[anaconda root@localhost /]# rm -rf /tmp/hptdd/
[anaconda root@localhost /]# exit
exit
[anaconda root@localhost /]#

```

- k. Press **ALT+F6** to switch back to installation screen and finish the installation.
- l. If you want to boot from another kernel, please install the NVMe controller opensource driver after entering the system.
- m. Restart to enter the system, **please connect to the internet:**
- n. Download the appropriate driver from the Software Downloads web page.
- o. Extract the driver package:

```
tar zxvf HighPoint_NVMe_G5_Linux_Src_Src_vx.xx.xx_xx_xx_xx.tar.gz
```

- p. 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
```

```

[root@localhost home]# ./hptnvme_g5_linux_src_v1.5.1_2023_02_21.bin
Verifying archive integrity... All good.
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package install
.....
Checking and installing required toolchain and utility ...
Found program make (/usr/bin/make)
Found program gcc (/usr/bin/gcc)
Found program perl (/usr/bin/perl)
Found program wget (/usr/bin/wget)

```

- q. 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.
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]#

```

- r. 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 controller. 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 Onyx)
Rocky Linux (0-rescue-fe62cd9bef094e579ef52bf9e0800eed) 9.1 (Blue Onyx)
FreeDOS (on /dev/sdb1)
UEFI Firmware Settings
```

- 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

```
[root@localhost home]# ./hptnvme_g5_linux_src_v1.5.1_2023_02_21.bin
Verifying archive integrity... All good.
Uncompressing HighPoint NVMe RAID Controller Linux Open Source package install
.....
Checking and installing required toolchain and utility ...
Found program make (/usr/bin/make)
Found program gcc (/usr/bin/gcc)
Found program perl (/usr/bin/perl)
Found program wget (/usr/bin/wget)
```

- e. 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.
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 controller 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.