

Revision History

Date	Internal Ver	Official Ver	Editor	HPT_U	FAE	MCM	Description
2023/4/20	V0.10	V1.00	YYC				Init version

SSD7000 Controller

Linux CentOS

Installation Guide

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Last updated on May 8, 2023

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1 Overview

The purpose of this document is to provide clear instructions on how to install Linux CentOS on the SSD7000 RAID controller.

- ◇ Supported system: CentOS7.4/7.5/7.6/7.7/7.8/7.9/8.0/8.1
- ◇ Supported controller: SSD7580A/7580B/7540/7505/7502/7202/7105

2 Installing Linux CentOS on SSD7000 RAID controller

If you would like to install Linux CentOS onto drives attached to SSD7000 RAID controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

After you attach your NVMe SSD to SSD7000 controller, you can use SSD7000 **EFI Utility** to configure your NVMe SSD as RAID arrays, or just use them as single disks.

Before installation, you must remove all the NVMe SSD, which are not physically attached to SSD7000 controller, from your system.

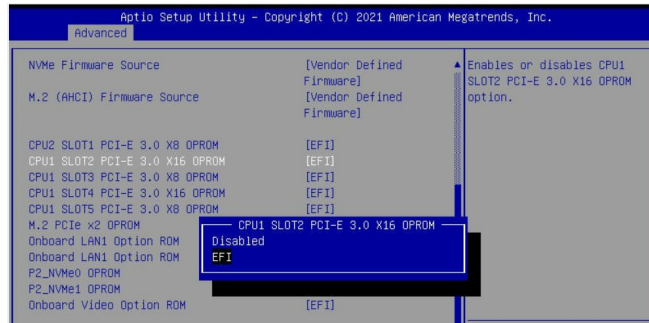
Note

RAID Controller support EFI boot. If you have other SCSI adapters installed, you must make sure the SSD7000 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.

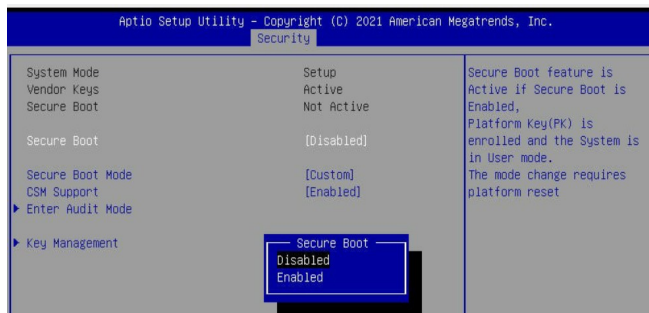
Step 2 Check System EFI Settings

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 SSD7000 RAID controller as the first boot device to boot up the system. Refer to your motherboard EFI manual to see how to set 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 RAID Controller is connected to motherboard CPU1 Slot 2 PCI-E X16, then you should set "CPU1 Slot 2 PCI-E X16 OPROM" to "EFI";

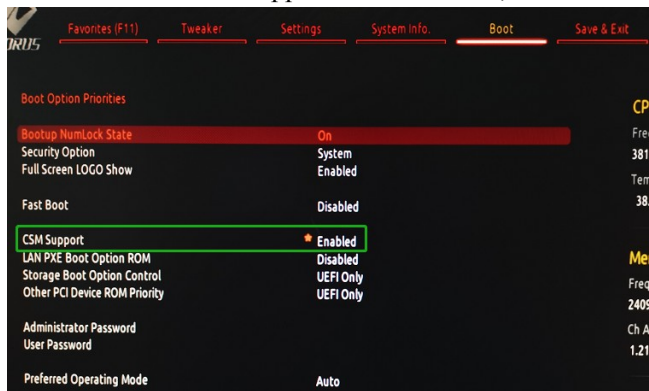


- b. Disable "Secure Boot", set "Attempt Secure Boot" to "Disabled".

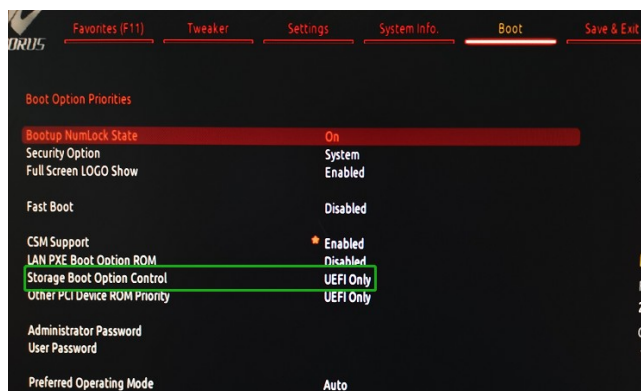


- 2. Set UEFI setting with GA-X570 AORUS MASTER motherboard as an example.

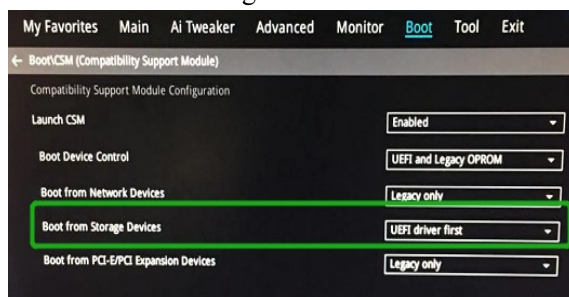
- a. Set " Boot->CSM Support " to "Enabled";



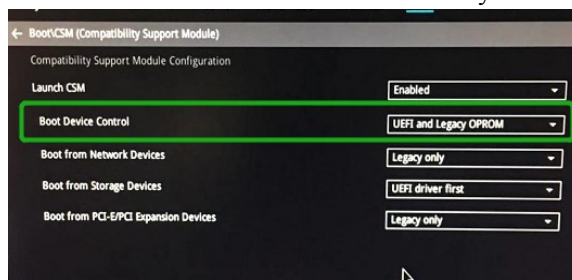
- b. And" Boot-> Storage Boot Option Control " to "UEFI Only";



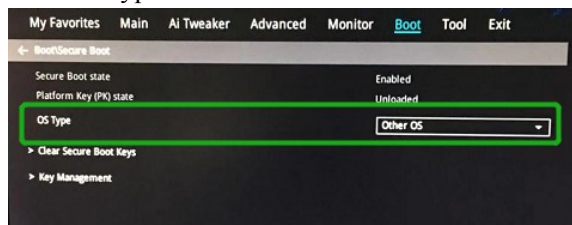
3. Set UEFI setting with ASUS PRIME X299 -DELUXE motherboard as an example:
 - a. Set "Boot from Storage Devices" to "UEFI driver first";



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



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



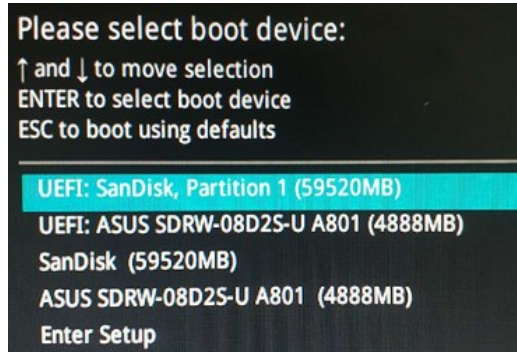
Step 3 Flash UEFI Rom to RAID Controller

For Example SSD7505 :

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

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

- a. Unzip SSD7000 UEFI package to root dir(/) of a USB flash drive, and insert the USB flash drive to the motherboard;
- b. Booting from the UEFI USB flash and enter the UEFI environment;



- c. Command with “go.nsh”, flash UEFI rom to SSD7000 Controller and reboot;

```
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 ....

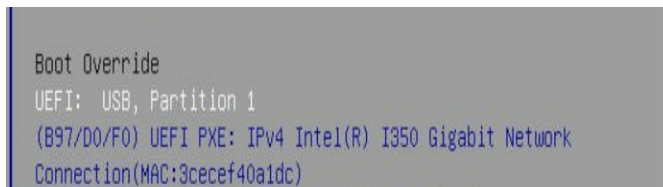
Flashing Success (total retry 0)

Verifying ....

Passed !
FS1:\> _
```

Step 4 Create Array

- a. Attach two NVMe SSD to SSD7000 Controller;
- b. Boot, enter the motherboard’s Boot List and select start from UEFI USB flash:



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

```
FS3:\> 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-S5GXNG0N905363B, 1000123MB(MaxFree 1000123MB), Normal
1/2 Samsung SSD 980 PRO 1TB-S5GXNG0N905305N, 1000123MB(MaxFree 1000123MB), Normal

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

- d. Command “create RAID0”.
Create RAID0 array with all disks and with maximum capacity.

```
<<< create RAID0
  Creating array: RAID0_000041A7.
  Array created successfully.
=====
==== Physical device list(count 2):
1/1 Samsung SSD 980 PRO 1TB-S5GXNG0N905363B, 1000123MB(MaxFree 0MB), Normal
1/2 Samsung SSD 980 PRO 1TB-S5GXNG0N905305N, 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. Command “exit” ;
f. For more command usages, refer to [Appendix A](#).

Step 5 Prepare the Driver Diskette

Extract `HighPoint_NVMe_centosx.x_x86_64_vx.x.x_xx_xx_xx.tar.gz` to top(/) directory of an USB flash drive. It will look like:

```
[root@localhost home]# tar zxvf HighPoint_NVMe_centos8.1_x86_64_v1.5.1_23_04_18.tar.gz
hptdd/
hptdd/rhdd
hptdd/pcitable
hptdd/pci.ids
hptdd/modules.pciimap
hptdd/module-setup.sh
hptdd/modules.dep
hptdd/modules.cgz
hptdd/modules.alias
hptdd/modinfo
hptdd/install.sh
hptdd/dracut-hptdrv.sh
hptdd/60-persistent-storage-hptblock.rules
hptdd/rhel-install-step1.sh
hptdd/rhel-install-step2.sh
hptdd/readme.txt
```

Step 6 Install CentOS

For Example : CentOS8.1

- Before you do the following, verify the status of your network environment. To ensure a proper installation, it is recommended to disconnect the network and install the system in a network less environment.**
- Insert the USB flash drive to the target system.
- Booting from Bootable USB drive (EFI mode).
- When the Installation screen appears, press ‘e’ to edit boot command line option.

```
Install CentOS Linux 8
Test this media & install CentOS Linux 8
Troubleshooting -->
```

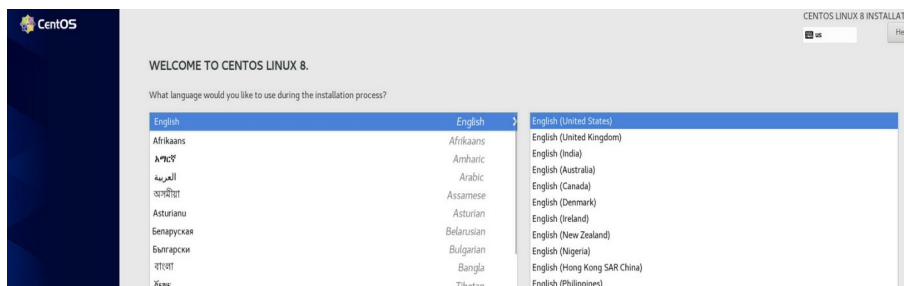
On the edit command window, move the cursor to the end of line "linuxefi /images /

pxeboot... ", and append "**modprobe.blacklist=nvme** " (double quotation mark are not include).

```
setparams 'Install CentOS Linux 8'
linuxefi /images/pxeboot/vmlinuz inst.stage2=hd:LABEL=CentOS-8-1-1911-x86_64-dvd quiet mod\
probe.blacklist=nvme
initrd /images/pxeboot/initrd.img
```

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

- e. When the following window appears during the installation process,



Press **Ctrl+ALT+F2** to switch to the shell on console and press **Enter** to activate this console.

```
CentOS Linux 8 (Core)
Kernel 4.18.0-147.el8.x86_64 on an x86_64
[anaconda root@localhost ~]#
```

And then execute following commands to copy the driver contents:

- # **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 /dev/sda1** ← Unmount the USB flash drive

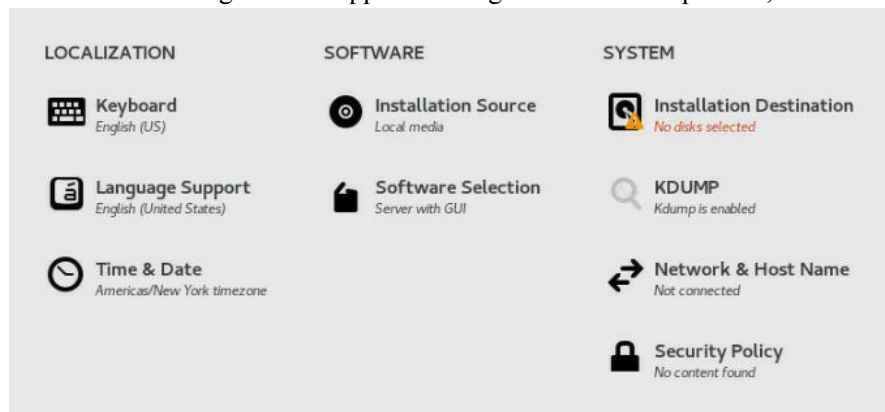
```
[anaconda root@localhost ~]# mkdir /hptdd
[anaconda root@localhost ~]# mount /dev/sda1 /hptdd/
[anaconda root@localhost ~]# cp -a /hptdd/hptdd/ /tmp/
[anaconda root@localhost ~]# umount /dev/sda1
```

When the USB flash drive is unmounted, please unplug the USB flash drive from the mainboard. And then execute following command to install driver to install the Linux CentOS.

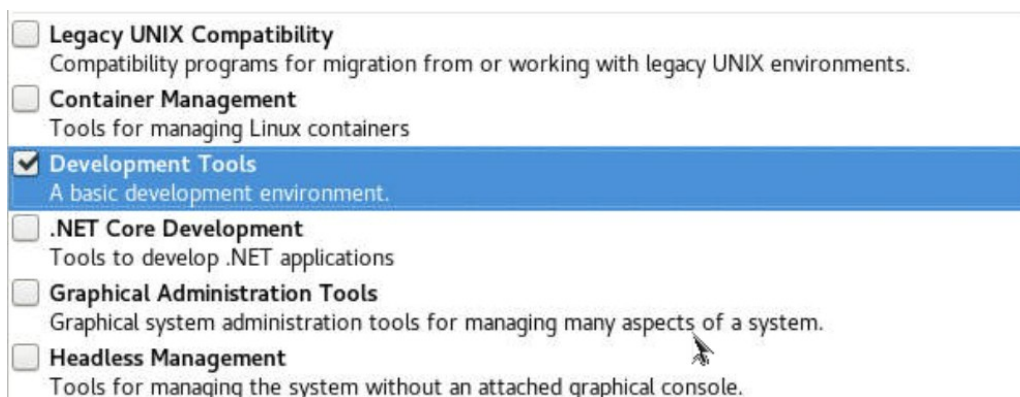
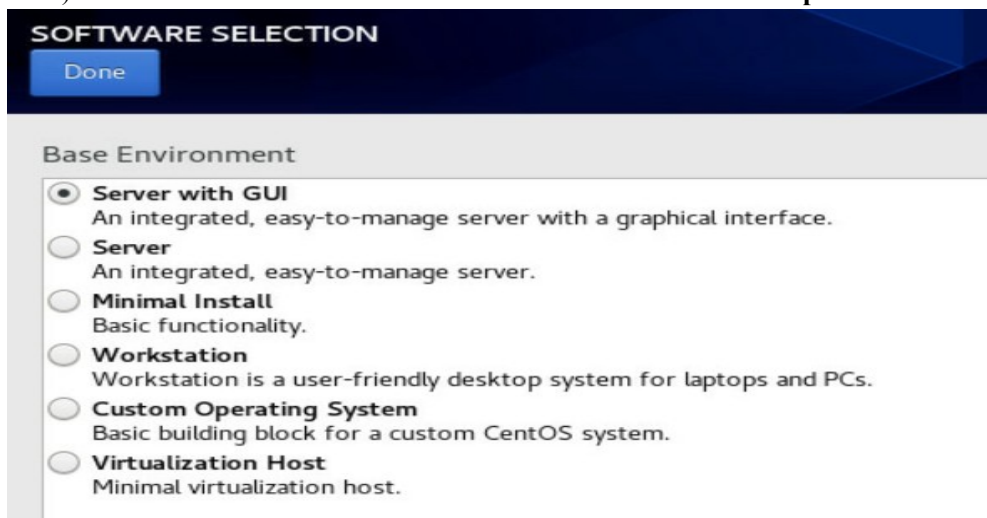
- # **sh /tmp/hptdd/rhel-install-step1.sh** ← Load SSD7000 driver.

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

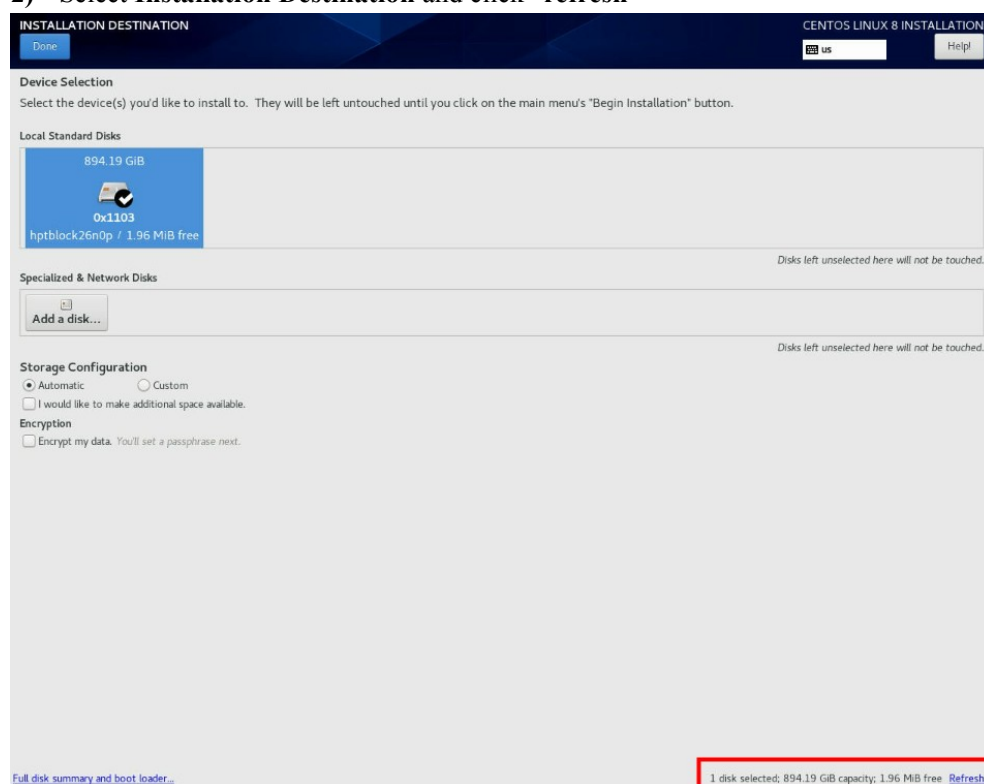
- f. Then press **ALT+F6** to switch back to installation screen and continue the installation as usual.
- g. When the following window appears during the installation process,



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

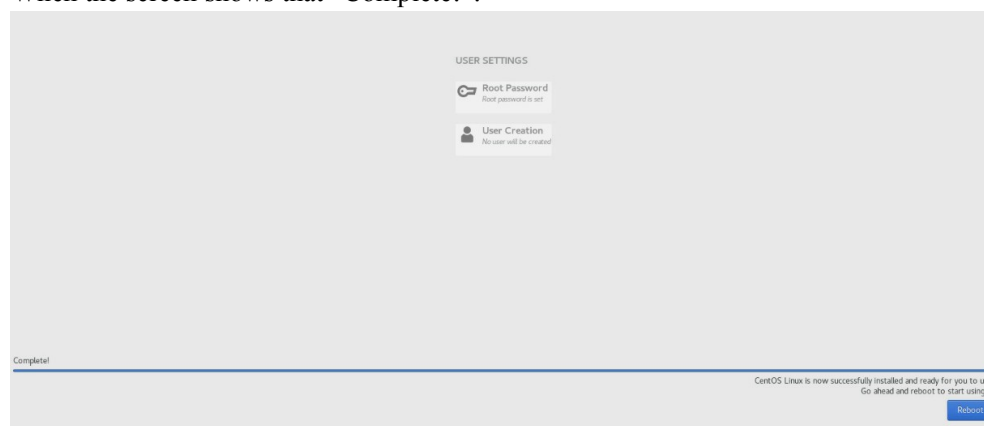


2) Select Installation Destination and click “refresh”



then choose your own disk and **begin installation**.

- h. 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 SSD7000
# chroot /mnt/sysimage ← Switch to the top(/) directory in the SSD7000 system
# sh /tmp/hptdd/rhel-install-step2.sh ← Install SSD7000 driver
# rm -rf /tmp/hptdd ← Delete the driver file in SSD7000
# exit ← Exit the top(/) directory of the SSD7000 system
```

```

[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 4.18.0-147.el8.x86_64...
Driver installation step 2 completed.
[anaconda root@localhost /]# rm -rf /tmp/hptdd/
[anaconda root@localhost /]# exit
exit
[anaconda root@localhost /]# _

```

- i. Press **ALT+F6** to switch back to installation screen and finish the installation.
- j. If you want to boot from another kernel, please install the SSD7000 Series opensource driver after entering the system.
- k. Restart to enter the system, **please connect to the internet:**

Linux opensource driver link, open the following link to enter the "Software Download" page to download:

<https://www.highpoint-tech.com/nvme-3/ssd7540>

<https://www.highpoint-tech.com/nvme-2/ssd7505>

<https://www.highpoint-tech.com/nvme-2/ssd7502>

<https://www.highpoint-tech.com/nvme-2/ssd7105>

<https://www.highpoint-tech.com/nvme-2/ssd7202>

<https://www.highpoint-tech.com/nvme-3/ssd7580b>

<https://www.highpoint-tech.com/nvme-2/ssd7580a>

Extract driver package:

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

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 installer
.....
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)

```

1. Follow the prompts to complete the driver installation.

```
Synchronizing state of hptdrv-monitor.service with SysV service script with /usr/lib/sy
stemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable hptdrv-monitor

SUCCESS: Driver hptnvme is installed successfully for kernel 4.18.0-147.el8.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 un
install the driver files.
[root@localhost home]#
```

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

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 RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to SSD7000 RAID controller. Installation of the management software is optional but recommended.

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

5 Troubleshooting

1. 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. Choose “CentOS Linux(4.18.0-147.el8.x86_64) 8” and press enter the system

```
CentOS Linux (4.18.0-147.el8.x86_64) 8 (Core)
CentOS Linux (0-rescue-c0173ef4647b4ba69d65f739a4d72fc0) 8 (Core)
FreeDOS (on /dev/sda1)
System setup
```

- b. Install Linux Opensource driver.
- c. Linux Opensource driver link, open the following link to enter the "Software

Download" page to download:

<https://www.highpoint-tech.com/nvme-3/ssd7540>

<https://www.highpoint-tech.com/nvme-2/ssd7505>

<https://www.highpoint-tech.com/nvme-2/ssd7502>

<https://www.highpoint-tech.com/nvme-2/ssd7105>

<https://www.highpoint-tech.com/nvme-2/ssd7202>

<https://www.highpoint-tech.com/nvme-3/ssd7580b>

<https://www.highpoint-tech.com/nvme-2/ssd7580a>

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 installer
.....
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.

```
Synchronizing state of hptdrv-monitor.service with SysV service script with /usr/lib/sy
stemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable hptdrv-monitor

SUCCESS: Driver hptnvme is installed successfully for kernel 4.18.0-147.el8.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 uni
install the driver files.
[root@localhost home]#
```

- f. After the installation is complete, you can perform system update operations.
2. If you encounter error : some building tools are missing or toolchain to built the driver is incomplete
- a. **The system is not connected to a network (internet connection)**

solution:

- Double check the system's internet connection
- Once confirmed, reinstall the driver.

b. This problem can be caused by a lack of dependency packages

solution:

- Make sure that your system can install software from the network.

For example : yum install vim

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 HighPoint SSD7000 RAID 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.