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SSD7000 Controller Linux RHEL Installation Guide

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1 Overview

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

- Supported system: RHEL7.9/8.3/8.5/8.6/8.7
- Supported controller: SSD7580A/7580B/7540/7505/7502/7202/7105

2 Installing Linux RHEL on SSD7000 RAID

controller

If you would like to install Linux RHEL 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

SSD7000 only 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";

NVMe Firmware Source	[Vendor Defined Firmware]	Enables or disables CPU1 SLOT2 PCI-E 3.0 X16 OPROM
M.2 (AHCI) Firmware Source	[Vendor Defined Firmware]	option.
CPU2 SLOT1 PCI-E 3.0 X8 OPROM	[EFI]	
CPU1 SLOT3 PCI-E 3.0 X8 OPROM	[EFI]	
CPU1 SLOT4 PCI-E 3.0 X16 OPROM	[EFI]	
CPU1 SLOTS PCI-E 3.0 X8 OPROM	[EFI]	
M.2 PCIE x2 OPROM Onboard LAN1 Option ROM Dnboard LAN1 Option ROM	1 SLOT2 PCI−E 3.0 X16 OPRO⊬ d	

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

System Mode	Setup	Secure Boot feature is
Vendor Keys	Active	Active if Secure Boot is
Secure Boot	Not Active	Enabled, Platform Key(PK) is
		enrolled and the System is in User mode.
Secure Boot Mode	[Custom]	The mode change requires
CSM Support	[Enabled]	platform reset
Enter Audit Mode		
⊢ Key Management	Secure Boot	

- 2. Set UEFI setting with GA-X570 AORUS MASTER motherboard as an example.
 - a. Set "Boot->CSM Support " to "Enabled";

			-
Favorites (F11)	Tweaker Settings	System Info.	Boot Save & Exit
			CPI
			Free
Security Option	System	n	381-
Full Screen LOGO Show	Enable	ed	Tem
Fast Boot	Disabl	ed	38.
CSM Support	* Enable	ed	
LAN PXE Boot Option ROM	Disable	ed	Mer
Storage Boot Option Control	UEFI O	nly	Freq
Other PCI Device ROM Priority	UEFI O	nly	2409
Administrator Password User Password			Ch A
User Password			1.21
Preferred Operating Mode	Auto		

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

Favorites (F11) Tweaker	Settings System Info.	Boot	Save & Exit
Security Option	System		
Full Screen LOGO Show	Enabled		
Fast Boot	Disabled		
CSM Support	Enabled		
LAN PXE Boot Option ROM	Disabled		
Storage Boot Option Control	UEFI Only		F
Other PCI Device ROM Priority	UEFI Only		
Administrator Password			(
User Password			
Preferred Operating Mode	Auto		

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

My Favorites	Main	Ai Tweaker	Advanced	Monitor	Boot	Tool	Exit	
- Boot\CSM (Comp	atibility Sup	port Module)						-
Compatibility Sup	oport Modu	le Configuration						
Launch CSM					Enabled			•
Boot Device Co			UEFI and Lo	egacy OPR	OM	•		
Boot from Net	work Device	5			Legacy only			•
Boot from Stor			UEFI driver	first		•		
Boot from PCI	-E/PCI Expan	ision Devices		[Legacy only			•

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

 Boot\CSM (Compatibility Support Module) 		
Compatibility Support Module Configuration		
Launch CSM	Enabled	•
Boot Device Control	UEFI and Legacy OPROM	•
Boot from Network Devices	Legacy only	•
Boot from Storage Devices	UEFI driver first	•
Boot from PCI-E/PCI Expansion Devices	Legacy only	•

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

My Favorites	Main	Ai Tweaker	Advanced	Monitor	Boot	Tool	Exit	
Boot\Secure Boot				1. 1. 18 m				
Secure Boot state				E	nabled			
Platform Key (PK)	state			U	nloaded			
OS Type				0	Other OS			•
> Clear Secure Boo	t Keys							
Key Management								

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 ....Suceeded
Flashing ....
Flashing Success (total retry 0)
Verifing ....
Passed !
FS1:\> _
```

Step 4 Create Array

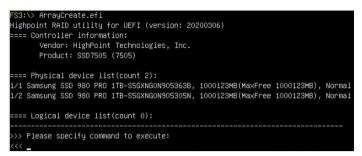
- a. Attach two NVMe SSD to SSD7000 Controller;
- b. Boot, in the presence of the motherboard Log screen, there will be NVMe SSD information :

	= Physica	al de	evice	e lis	st(count 2):			
1/1	Samsung	SSD	980	PRO	1TB-SSGXNGON905363B,	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:							

c. Enter the motherboard's Boot List and select start from UEFI USB flash:

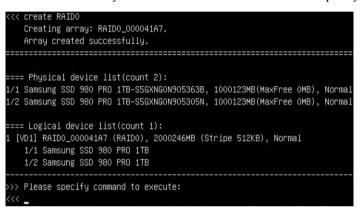


d. Command "ArrayCreate.efi" to enter the Utility:



e. Command "create RAID0".

Create RAID0 array with all disks and with maximum capacity.



- f. Command "exit";
- g. For more command usages, refer to Appendix A.

Step 5 Prepare the Driver Diskette

Extract HighPoint_NVMe_RHELxx.xx.x_x86_64_vx.xx.xx_xx_xx_xx_tar.gz to top(/)

directory of an USB flash drive. It will look like:

```
[root@localhost home]# tar zxvf HighPoint_NVMe_rhel8.7_x86_64_v1.5.1_23_04_18.tar.gz
hptdd/
hptdd/rhdd
hptdd/pcitable
hptdd/pcitable
hptdd/modules.pcimap
hptdd/modules.dep
hptdd/modules.dep
hptdd/modules.alias
hptdd/modules.alias
hptdd/install.sh
hptdd/install.sh
hptdd/facut-hptdrv.sh
hptdd/facut-hptdrv.sh
hptdd/rhel-install-step1.sh
hptdd/rhel-install-step2.sh
hptdd/readme.txt
```

Step 6 Install RHEL For Example : RHEL8.7

- a. 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.
- b. Insert the USB flash drive to the target system.
- c. Booting from Bootable USB drive (EFI mode).
- d. When the Installation screen appears, press 'e' to edit boot command line option.

Install Red Hat Enterprise Linux 8.7 Test this media & install Red Hat Enterprise Linux 8.7 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).



Press CTRL+X or F10 to start the system.

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

		RED HAT ENTERPRISE LINUX 8.7 IN: III us
WELCOME TO RED	HAT ENTERPRISE LINUX 8.7.	
What language would you English	like to use during the installation process? English	? English (United States)
Afrikaans	Afrikaans	English (United Kingdom)
አማርኛ	Amharic	English (India)
		English (Australia)
العربية	Arabic	
العربية অসমীয়া	Arabic Assamese	English (Canada)
		English (Canada) English (Denmark) English (Ireland)

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



And then execute following commands to copy the driver contents:

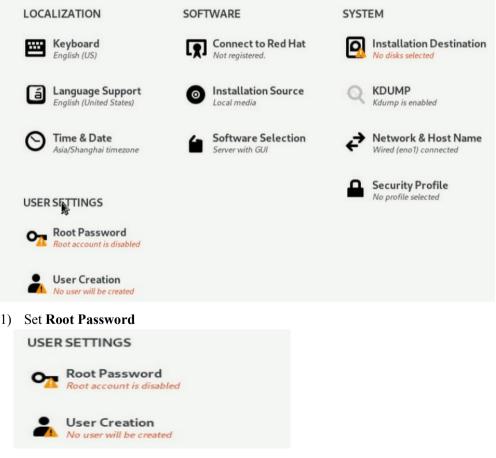
# mkdir /hptdd	\leftarrow Create mount point for USB flash drive
# mount /dev/sda1 /hptdd/	\leftarrow Mount the USB flash drive to /hptdd
# cp -a /hptdd/hptdd /tmp/	$\leftarrow Copy \text{ driver installation file to system temporary}$

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 RHEL.

```
# sh /tmp/hptdd/RHEL-install-step1.sh ← Load SSD7000 driver.
```



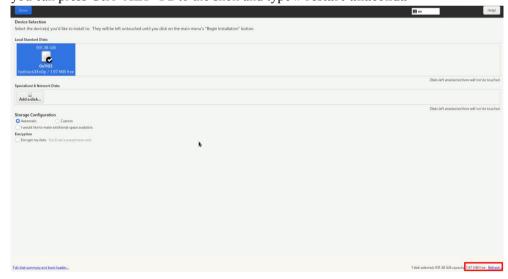
- f. Then press "ALT+F6" to switch back to installation screen and Choose language.
- g. When the following window appears during the installation process,



2) Set Software Selection and choose Server with GUI→Development Tools

0	Server with GUI
	An integrated, easy-to-manage server with a graphical interface.
0	Server
	An integrated, easy-to-manage server.
0	Minimal Install
	Basic functionality.
0	Workstation
	Workstation is a user-friendly desktop system for laptops and PCs.
0	Custom Operating System
	Basic building block for a custom RHEL system.
0	Virtualization Host
	Minimal virtualization host.
	Legacy UNIX Compatibility
-	Compatibility programs for migration from or working with legacy UNIX environments.
-	Container Management Tools for managing Linux containers
~	Development Tools
	A basic development environment.
C	.NET Core Development
	Tools to develop .NET and .NET Core 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.

3) Select Installation Destination and click "**refresh**", but if you didn't find this option, you can press **Ctrl+ALT+F2** to the shell and type **# restart-anaconda**



then choose your own disk and begin installation.

h. If the following information is displayed during the installation, select "Yes".

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

i. When the screen shows that "Complete!".

Complete!		
	R;	
		Red Hat Enterprise 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 SSD7000				
# chroot /mnt/sysimage	\leftarrow Switch to the top(/) directory in the SSD7000 system				
# sh /tmp/hptdd/RHEL-install-step2.sh ← Install SSD7000 driver					
# rm -rf /tmp/hptdd	\leftarrow Delete the driver file in SSD7000				
# exit	\leftarrow 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 4.18.0-425.3.1.el8.x86_64 Driver installation step 2 completed. [anaconda root@localhost /]# rm -rf /tmp/hptdd/ [anaconda root@localhost /]# exit exit [anaconda root@localhost /]#					

- j. Press ALT+F6 to switch back to installation screen and finish the installation.
- k. If you want to boot from another kernel, please install the SSD7000 driver after entering the system.
- 1. 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

Please execute the following command before installing the driver, **please connect to the internet:**

1) Log in to your Redhat account password

subscription-manager register --username xxx --password=xxx --auto-attach

2) 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_bin or

./hptnvme_g5_linux_src_vxx.x.x_xx_xx_st.bin



m. Follow the prompts to complete the driver installation.

SUCCESS: Driver hptnyme is	installed succes	sfully for kernel	4.18.0-425.3.1.el8	x86 64
Please restart the system t	or the driver to	take effect.		
If you want to uninstall th	e driver from th	ne computer, please	run hptuninhptnvme	to uni
nstall the driver files.				
[root@localhost home]#				

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

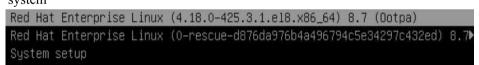
HighPoint RAID Management Software is used to configure and keep track of your hard disks and RAID arrays attached to SSD7000 RAID controller. Installation of the management software is optional but recommended.

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

5 Troubleshooting

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 "Red Hat Enterprise Linux (4.18.0-425.3.1.el8.x86_64)8.7." and enter the system



- 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_sbin or
```

```
./hptnvme_g5_linux_src_vxx.x.x_xx_xx_st.bin
```



e. Follow the prompts to complete the driver installation.

	<pre>installed successfully for kernel 4.18.0-425.3.1.el8.x86_6 for the driver to take effect.</pre>	4.
	he driver from the computer, please run hptuninhptnvme to u	ni
[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 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 *
</</pre>
```

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

٠

Syntax H/h/help This is help message.