Linux Ubuntu On HighPoint

NVMe RAID AIC

Installation Guide

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1 Overview

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

The following is a list of NVMe AICs and systems.

Supported System	Ubuntu 20.04
	Ubuntu 20.04.1
	Ubuntu 20.04.2
	Ubuntu 20.04.3
	Ubuntu 20.04.4
	Ubuntu 20.04.5
	Ubuntu 20.10
	Ubuntu 22.04
	Ubuntu 22.04.1
	Ubuntu 22.10
Supported AIC	SSD7202
	SSD7105
	SSD7505
	SSD7502
	SSD7540
	SSD7580A
	SSD7580B
	SSD7580C
	SSD7749M2
	RocketAIC 7505HW Series
	RocketAIC 7540HW Series
	RocketAIC 7749EW Series

	RocketAIC 7502HW Series
	RocketAIC 7105HW Series
	RocketAIC 7749MW Series

2 Installing Linux Ubuntu on NVMe AIC

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

Step 1 Prepare Your Hardware for Installation

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

Note

NVMe AICs only support EFI boot. If you have other SCSI adapters installed, you must make sure the NVMe AIC EFI will be loaded first. 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's 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 AIC 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 AIC is connected to motherboard CPU1 Slot 2 PCI-E X16, then you should set "CPU1 Slot 2 PCI-E X16 OPROM" to "EFI";
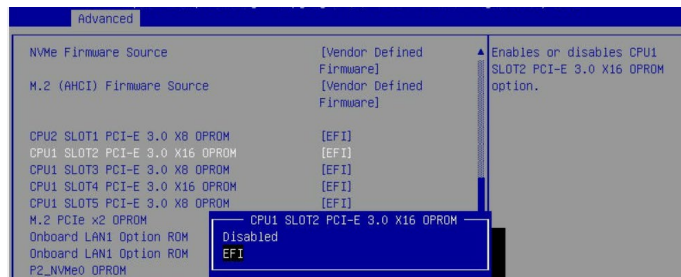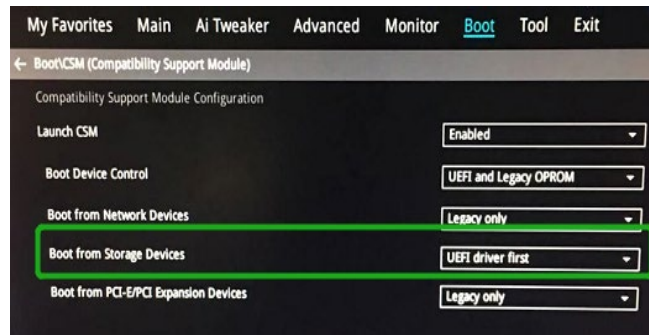
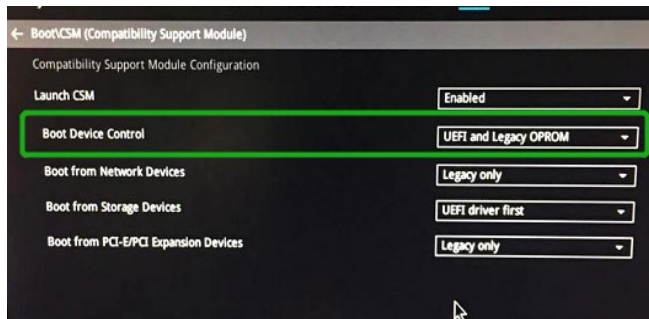b.   Disable "Secure Boot", and set "Attempt Secure Boot" to "Disabled".
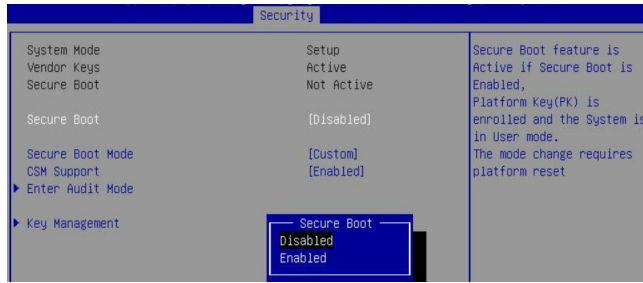
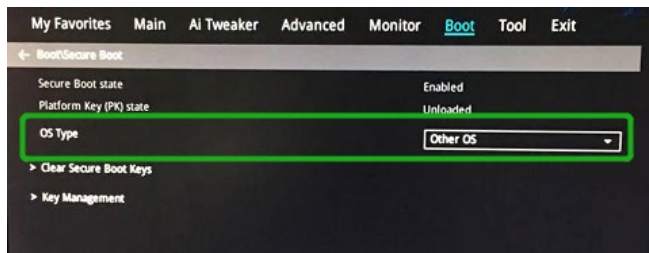2. Configuring the UEFI settings (using an ASUS PRIME X299 -DELUXE motherboard as an example):

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

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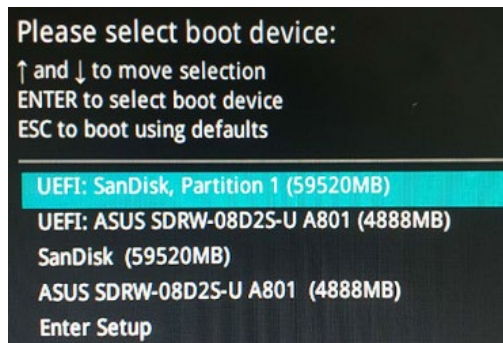

c.   Set "OS Type" to "Other OS".

Step 3 Flash UEFI ROM to NVMe AIC

Example: SSD7505

For other products, please refer to: <u>Update UEFI ROM</u>

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

a. Unzip the 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;

```
Please select boot device:
↑ and ↓ to move selection
ENTER to select boot device
ESC to boot using defaults

UEFI: SanDisk, Partition 1 (59520MB)
UEFI: ASUS SDRW-08D2S-U A801 (4888MB)
SanDisk (59520MB)
ASUS SDRW-08D2S-U A801 (4888MB)
Enter Setup
```

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 .....Suceeded
Flashing ....

Flashing Success (total retry 0)

Verifing ....

Passed !
FS1:\> _
```

d. Use the "exit" command to exit the utility.

Step 4 Create Array

Note: RocketAIC 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 the NVMe AIC.

    b.   Boot, enter the motherboard's Boot List, and select start from UEFI USB flash.

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

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

    e.   Use the "exit" command to exit the utility.
    f.   For additional command lines, refer to Appendix A.
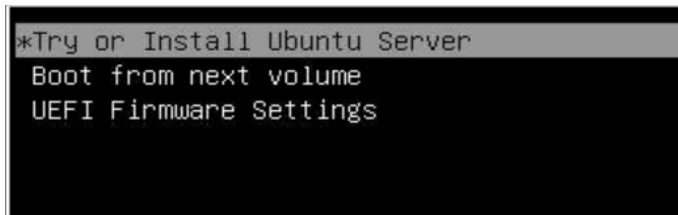
Step 5 Prepare the Driver Diskette

Extract **HighPoint_NVMe_Ubuntuxx.xx_x86_64_vx.x.x_xx_xx_xx.tar.gz** to the top(/) directory of a USB flash drive. It will look like:

```
root@test:/home# tar zxvf HighPoint_NVMe_ubuntu22.10_x86_64_v1.5.1_23_02_27.tar.gz
hptdd/
hptdd/preinst.sh
hptdd/postinst.sh
hptdd/postinst2.sh
hptdd/hptdrv
hptdd/hptblock
hptdd/boot/
hptdd/boot/hptnvme5.19.0-21-genericx86_64.ko.gz
hptdd/60-persistent-storage-hptblock.rules
hptdd/readme.txt
```

Step 6 Install Linux Ubuntu
Example: Ubuntu22.10 server

a. Before starting the installation procedure, verify the status of your network environment. To ensure Ubuntu is successfully installed to the RAID array, we recommend that the system is disconnected from the internet and any local network.

b. Insert the USB flash drive into the target system.

c. Boot the system using a bootable USB drive.

d. When the Installation screen appears, press '**e**' to edit the boot command line option.

```
*Try or Install Ubuntu Server
 Boot from next volume
 UEFI Firmware Settings
```

On the edit command window, move the cursor to the end of the line "linux /install/vmlinuz... ", and append "**modprobe.blacklist=nvme** " (do not include the quotation marks).
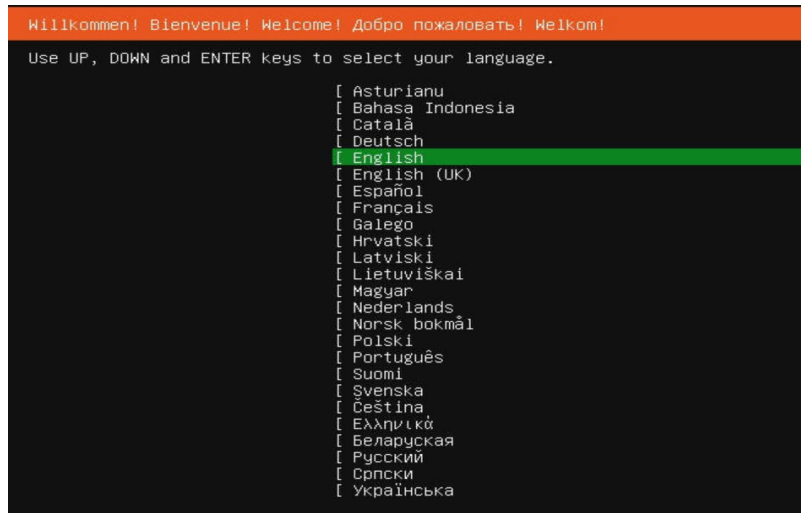
```
setparams 'Try or Install Ubuntu Server'

        set gfxpayload=keep
        linux       /casper/vmlinuz  --- modprobe.blacklist=nvme
        initrd      /casper/initrd
```

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

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

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

If you use Ubuntu Desktop, please press **CTRL+ALT+F3** to switch to the shell on console 2 and press **ENTER** to activate this console.

Ubuntu login: ubuntu

Next, execute the following commands:

 # mkdir /hptdd   ← Create a mount point for the USB flash drive

 # mount /dev/sda1 /hptdd/   ← Mount the USB flash drive to /hptdd

 # cp -a /hptdd/hptdd /tmp/   ← Copy the driver installation file to the system's

temporary directory

 # umount /hptdd   ← Unmount the USB flash drive

```
root@ubuntu-server:/home/ubuntu-server# mkdir /hptdd
root@ubuntu-server:/home/ubuntu-server# mount /dev/sda1 /hptdd/
root@ubuntu-server:/home/ubuntu-server# cp -a /hptdd/hptdd/ /tmp/
root@ubuntu-server:/home/ubuntu-server# umount /dev/sda1
```

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 Ubuntu.

 # sh /tmp/hptdd/preinst.sh   ← Load NVMe AIC driver.

```
root@ubuntu-server:/home/ubuntu-server# sh /tmp/hptdd/preinst.sh
This step succeeded!
root@ubuntu-server:/home/ubuntu-server#
```

f. Then press **"ALT+F1"** to switch back to the installation screen and continue the installation as usual**.**

g. When the screen shows that "**install complete**".

```
            acquiring and extracting image from cp:///tmp/tmproaz71fu/mount
   executing curtin install curthooks step
     curtin command install
       configuring installed system
         running 'mount --bind /cdrom /target/cdrom'
         running 'curtin in-target -- setupcon --save-only'
           curtin command in-target
         running 'curtin curthooks'
           curtin command curthooks
             configuring apt configuring apt
             installing missing packages
             Installing packages on target system: ['efibootmgr', 'grub-efi-amd64', 'grub-efi-amd64-signed', 'shim-signed']
             configuring iscsi service
             configuring raid (mdadm) service
             installing kernel
             setting up swap
             apply networking config
             writing etc/fstab
             configuring multipath
             updating packages on target system
             configuring pollinate user-agent on target
             updating initramfs configuration
             configuring target system bootloader
             installing grub to target devices
   final system configuration
     configuring cloud-init
     calculating extra packages to install
     restoring apt configuration
   subiquity/Late/run

                                              [ View full log ]
                                              [ Reboot Now   ]
```

press "**ALT+F2**" to the shell and type the following commands:

 # sh /tmp/hptdd/postinst.sh ← Install NVMe AIC driver.

A message will be displayed that the driver has been installed successfully.

```
root@ubuntu-server:/home/ubuntu-server# sh /tmp/hptdd/postinst.sh
W: Possible missing firmware /lib/firmware/ast_dp501_fw.bin for module ast
Sourcing file `/etc/default/grub'
Sourcing file `/etc/default/grub.d/90_iommuoff.cfg'
Sourcing file `/etc/default/grub.d/init-select.cfg'
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-5.19.0-21-generic
Found initrd image: /boot/initrd.img-5.19.0-21-generic
Warning: os-prober will be executed to detect other bootable partitions.
Its output will be used to detect bootable binaries on them and create new boot entries.
Found FreeDOS on /dev/sda1
done
Setdefaultkernel:No change.
We have completed the driver installation.
root@ubuntu-server:/home/ubuntu-server#
```

h. Press **"ALT+F1"** to switch back to the installation screen and finish the installation.

i. If you want to boot from another kernel, please install the NVMe AIC driver after entering the system.

1) use "apt-get update" to retrieve new lists of Ubuntu packages (**please connect to the internet**)

2) Download the appropriate driver from the Software Downloads web page.

3) Extract the driver package:

tar zxvf HighPoint_NVMe_G5_Linux_Src_Src_vx.xx.xx_xx_xx_xx.tar.gz

4) 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

j. Follow the prompts to complete the driver installation.

k. After Ubuntu 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 the 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.

Use the following command to show the 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 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: 5.19.0-21-amd64) and enter the system.
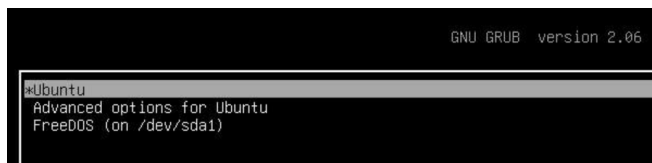
b. Install Linux Opensource driver.
c. Download the appropriate driver from the Software Downloads web page.

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

d. Follow the prompts to complete the driver installation.

e. 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 rebooting.

Please refer to the README file distributed with the NVMe AIC open-source 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 a RAID0 array with all disks and with maximum capacity.

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

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

- **Delete Command**
  Syntax
  delete {array ID}

  Examples
  <<< delete 1
     Delete the first array from the Logical device list.
  <<< delete 2
     Delete the second array from the 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 a help message.