Revision History

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HighPoint RR 640L/620L

RAID Controller

Linux RHEL

Installation Guide

Last updated on May 8, 2023

Table of Contents

1 Overview

The purpose of this document is to provide clear instructions on how to install Linux RHEL on the RR600L Series RAID controller.

◇   Supported system: RHEL7.2/7.3/7.9/8.3/8.5/8.6/8.7/9.0/9.1

◇   Supported controller: RR640L/RR620L

2 Installing Linux RHEL on RR600L Series RAID controller

If you would like to install Linux RHEL onto drives attached to RR600L Series RAID controller, please perform the following operations:

Step 1 Prepare Your Hardware for Installation

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

Before installation, you must remove all the Hard disks, which are not physically attached to RAID controller, from your system.

Note

RAID Controller support EFI boot. If you have other SCSI adapters installed, you must make sure the RR600L Series 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 RR600L Series 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";
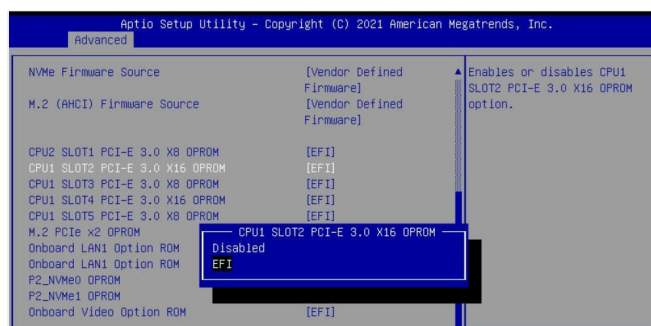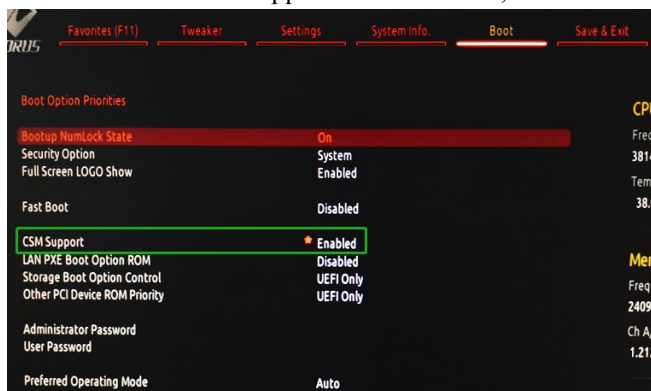
b.   Disable "Secure Boot", set "Attempt Secure Boot" to "Disabled".
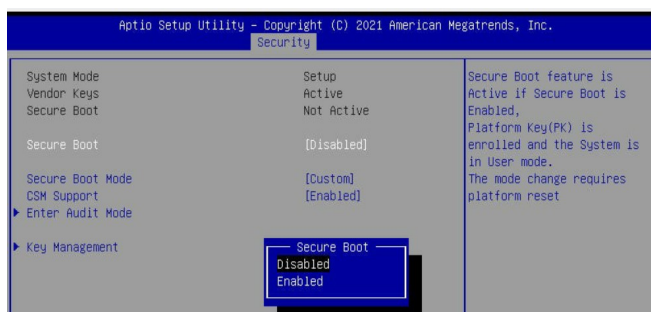
2.   Set UEFI setting with GA-X570 AORUS MASTER motherboard as an example.

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

b.   And" Boot-> Storage Boot Option Control " to "UEFI Only";
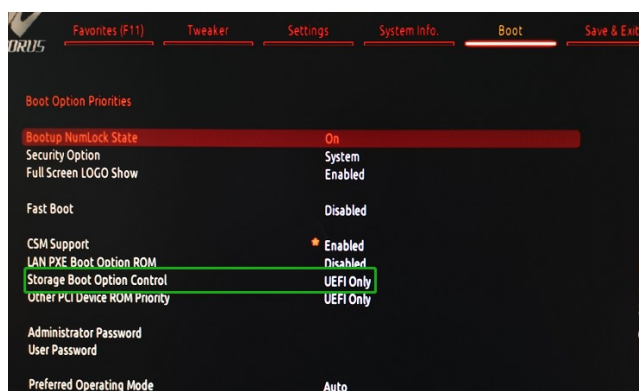
3. Set UEFI setting with ASUS PRIME X299 -DELUXE motherboard as an example:
    a. Set "Boot from Storage Devices" to "UEFI driver first";
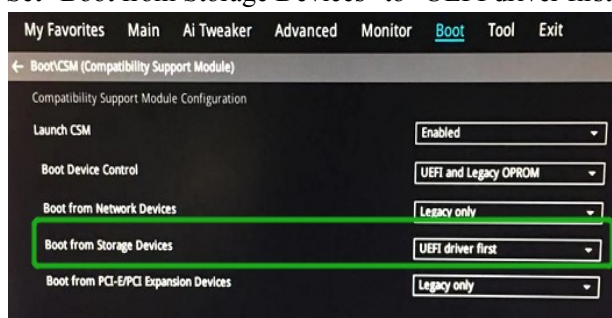
    b. And "Boot Device Control" to "UEFI Only" or "UEFI and Legacy OPROM";
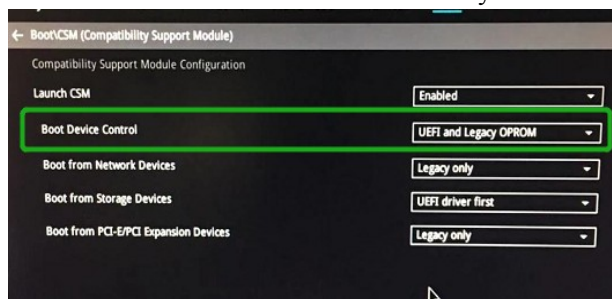
    c. Set "OS Type" to "Other OS".

Step 3 Flash UEFI Rom to RAID Controller

For Example RR640L：

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

    a.   Unzip RR640L 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;

```
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
```
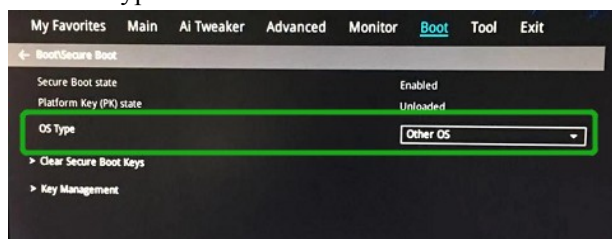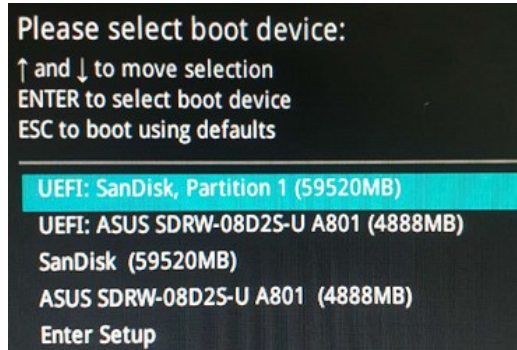
    c.   Command with "go.nsh", flash UEFI rom to RR640L Controller and reboot;

```
FS0:\> go.nsh
FS0:\> load.efi 640luefi.blf /a /f
Load Utility for Flash EPROM v1.1.5
 (built at Mar  6 2023 10:47:10)

Set flash size to 256K
Found adapter 0x6411103 at PCI 177:0:0
Offset address 0x0
EPROM Vendor: WINBOND W25X40BV
Erasing ........Suceeded
Flashing ....

Flashing Success (total retry 0)

Verifing ....

Passed !
FS0:\> _
```

For RR620L:

Command with"go.nsh",flash UEFI rom to RR620L Controller and reboot:

```
FS0:\> go.nsh
FS0:\> load.efi 620luefi.blf /a /f
Load Utility for Flash EPROM v1.1.5
 (built at Mar 27 2023 15:19:46)

Set flash size to 256K
Found adapter 0x6411103 at PCI 177:0:0
Offset address 0x0
EPROM Vendor: WINBOND W25X40BV
Erasing ........Succeeded
Flashing ....

Flashing Success (total retry 0)

Verifing ....

Passed !
FS0:\> _
```

Step 4 Create Array

a. Attach two hard disks to RR640L 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. Command "ArrayCreate.efi" to enter the Utility:

```
FS0:\UEFI\RR-UEFI-HII\RR640l\> ArrayCreate.efi
Highpoint RAID utility for UEFI (version: 20230220)
==== Controller information:
  PCI Location: 98:00:00
        Vendor: HighPoint Technologies, Inc.
        Product: RocketRAID 640L SATA Controller

==== Physical device list(count 2):
1/3 ST10000NE0004-2GT11L-ZCH01MEQ, 10000831MB(MaxFree 0MB), Normal
1/4 TOSHIBA DT01ACA300-Y731JVGAS, 3000592MB(MaxFree 0MB), Normal

==== Logical device list(count 2):
 1 1/3 ST10000NE0004-2GT11L-ZCH01MEQ, 10000831MB(MaxFree 0MB), Normal
 2 1/4 TOSHIBA DT01ACA300-Y731JVGAS, 3000592MB(MaxFree 0MB), Normal
------------------------------------------------------------------------
>>> 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):
1/3 ST10000NE0004-2GT11L-ZCH01MEQ, 10000764MB(MaxFree 7000259MB), Normal
1/4 TOSHIBA DT01ACA300-Y731JVGAS, 3000504MB(MaxFree 0MB), Normal

==== Logical device list(count 1):
 1 [VD0-0] RAID0_000041A7 (RAID0), 6001008MB (Stripe 512KB), Normal
    1/3 ST10000NE0004-2GT11L
    1/4 TOSHIBA DT01ACA300
------------------------------------------------------------------------
>>> Please specify command to execute:
<<< _
```

e. Command "exit"；
f. For more command usages, refer to <u>Appendix A</u>.

Step 5 Prepare the Driver Diskette

The directory named hptdd can be created in the USB flash drive and the driver **RR64xl_ rhel8.7 _x86_64 _ vx.x.x_xx_xx_xx.tgz** can be extracted in the hptdd directory. It will look like:

```
[root@localhost Downloads]# tar zxvf RR64xl_rhel8.7_x86_64_v1.6.7_23_04_13.tar.g
z
hptdd/
hptdd/install.sh
hptdd/modinfo
hptdd/modules.alias
hptdd/modules.cgz
hptdd/modules.dep
hptdd/modules.pcimap
hptdd/pci.ids
hptdd/pcitable
hptdd/rhdd
hptdd/rhel-install-step1.sh
hptdd/rhel-install-step2.sh
hptdd/readme.txt
[root@localhost Downloads]#
```

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 following window appears during the installation process,
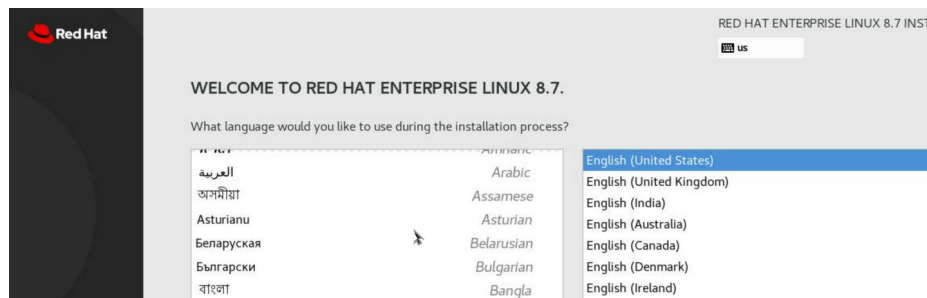
Press **Ctrl+ALT+F2** to switch to the shell on console and press **Enter** to activate this console.

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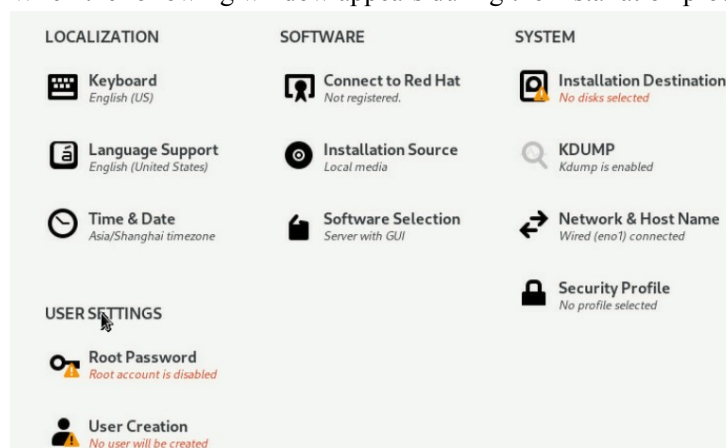
When the USB flash drive is unmounted, please unplug the USB flash drive from the mainboard. And then execute following command to install driver to install the Linux RHEL.

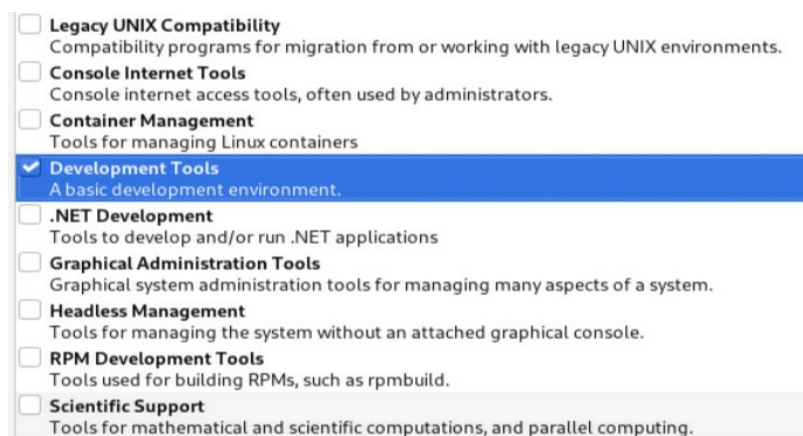**# sh /tmp/hptdd/RHEL-install-step1.sh**   ← Load RR640L driver.

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

e.   Then press **ALT+F6** to switch back to installation screen and Choose language**.**

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

LOCALIZATION

- Keyboard
  English (US)
- Language Support
  English (United States)
- Time & Date
  Asia/Shanghai timezone

SOFTWARE

- Connect to Red Hat
  Not registered.
- Installation Source
  Local media
- Software Selection
  Server with GUI

SYSTEM

- Installation Destination
  No disks selected
- KDUMP
  Kdump is enabled
- Network & Host Name
  Wired (eno1) connected
- Security Profile
  No profile selected

USER SETTINGS

- Root Password
  Root account is disabled
- User Creation
  No user will be created

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

- ● **Server with GUI**
  An integrated, easy-to-manage server with a graphical interface.
- ○ **Server**
  An integrated, easy-to-manage server.
- ○ **Minimal Install**
  Basic functionality.
- ○ **Workstation**
  Workstation is a user-friendly desktop system for laptops and PCs.
- ○ **Custom Operating System**
  Basic building block for a custom RHEL system.
- ○ **Virtualization Host**
  Minimal virtualization host.

2) 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
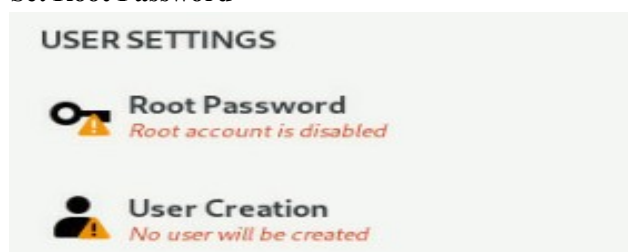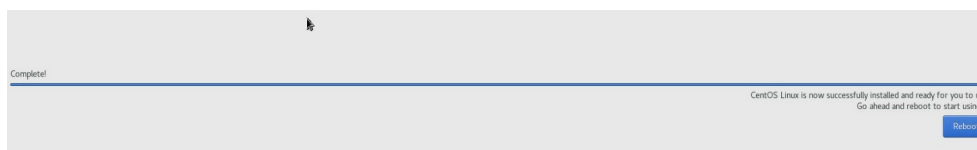
 # restart-anaconda
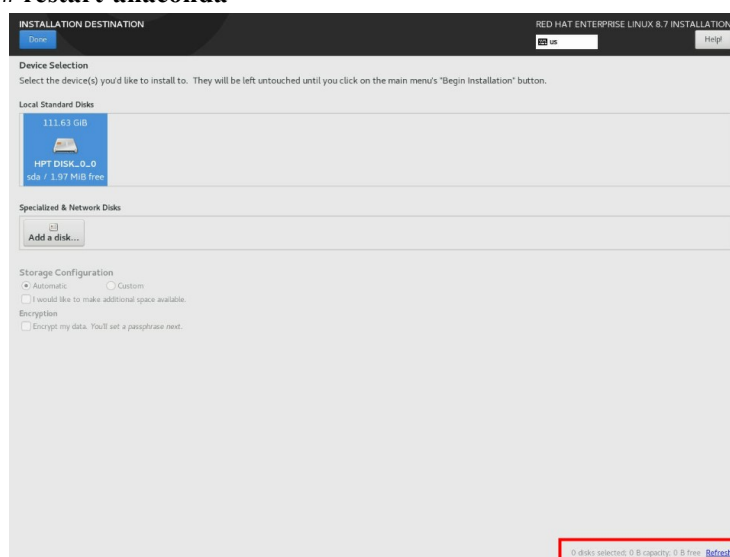
then choose your own disk and begin installation.

3) Set **Root Password**

g. 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**
>
> **# chroot /mnt/sysimage**
>
> **# sh /tmp/hptdd/RHEL-install-step2.sh**
>
> **# rm -rf /tmp/hptdd**
>
> **# exit**

```
[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 /]#
```

h. Press **ALT+F6** and press **Reboot System.**

i. If you want to boot from another kernel, please install the RR Series opensource driver after entering the system.

j. 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:

RR600L Series: https://www.highpoint-tech.com/rr600-overview

Extract driver package:

tar RR600l_Linux_X86_64_Src_vx.x.x_xx_xx_xx.tar.gz

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

sh rr64xl-linux_x86_64_src_vx.x.x_xx_xx_xx.bin or

./rr64xl-linux_x86_64_src_vx.x.x_xx_xx_xx.bin

```
[root@localhost Downloads]# ./rr64xl-linux_x86_64_src_v1.7.0_23_03_21.bin
Verifying archive integrity... All good.
Uncompressing RR64XL 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)
```

k. 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 rr640l is installed successfully for kernel 5.14.0-70.13.1.el9_0
.x86_64.
Please restart the system for the driver to take effect.
If you want to uninstall the driver from the computer,please run hptuninrr640l
to uninstall the driver files.
[root@localhost Downloads]#
```

l.   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/ rr640l. 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/ rr640l /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 RR600L Series 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)"** and enter the system

```
Red Hat Enterprise Linux (4.18.0-425.3.1.el8.x86_64) 8.7 (Ootpa)
Red Hat Enterprise Linux (0-rescue-646248983b6442378a833800d2a0081b) 8.7▶
System setup
```

b. Install Linux Opensource driver.

c. Linux Opensource driver link, open the following link to enter the "Software Download" page to download:

RR600L Series: https://www.highpoint-tech.com/rr600-overview

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

    ./rr64xl-linux-src_vxx.x.x_xx_xx_xx.bin or

    sh rr64xl-linux-src_vxx.x.x_xx_xx_xx.bin

```
[root@localhost Downloads]# ./rr64xl-linux_x86_64_src_v1.7.0_23_03_21.bin
Verifying archive integrity... All good.
Uncompressing RR64xL 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.

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

SUCCESS: Driver rr640l is installed successfully for kernel 5.14.0-70.13.1.el9_0
.x86_64.
Please restart the system for the driver to take effect.
If you want to uninstall the driver from the computer,please run hptuninrr640l
to uninstall the driver files.
[root@localhost Downloads]#
```

6 Rebuilding Driver Module for System Update

When the system updates the kernel packages, the driver module rr640l.ko should be built and installed manually before reboot.

Please refer to the README file distributed with HighPoint RR600L Series 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 (RAID0/1/10/5) Member Disk list (1/1, 1/2|*) Capacity
  (100|*)

  Note:

  The RR640L controllers can support RAID0/1/10/5

  The RR620L controllers can support RAID0/1

  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 array with all disks and with maximum capacity.

  <<< create RAID5 *

  Create RAID5 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