Revision History

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HighPoint RR 640L/620L RAID 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 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";

4.2 (AHCI) Firmware Source SPU2 SLOT1 PCI-E 3.0 X8 OPROM SPU3 SLOT2 PCI-E 3.0 X16 OPROM PU1 SLOT2 PCI-E 3.0 X6 OPROM	Firmware] [Vendor Defined Firmware] [EFI] [EFI]	SLOT2 PCI-E 3.0 X16 OPROM option.
DUA CLOTO DOT E O O VO ODDON		
SPUI SLUIS FUI-E S.V NO UFRUM	[EFI]	
CPU1 SLOT4 PCI-E 3.0 X16 OPROM	(EFI)	
CPU1 SLOTS PCI-E 3.0 X8 OPROM	[EFI]	
Diboard LANI Option ROM Diboard LANI Option ROM P2_NVMe0 OPROM	SLOT2 PCI-E 3.0 X16 OPROM	
22_NVMe1 OPROM	[EFI]	

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		
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 Su	oport Modu	le Configuration						
Launch CSM			Enabled			•		
Boot Device Co			UEFI and Lo	gacy OPR	DM	•		
Boot from Net			Legacy only	1		-		
Boot from Stor	age Device:	:			UEFI driver	first		·
Boot from PCI		[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 -
	4

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 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:

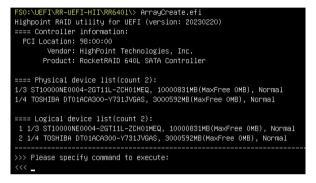
```
FS0:\> go.nsh
FS0:\> load.efi 620luefi.blf /a /f
Load Utility for Flash EPROM v1.1.5
(built at Mar 27 2023 15:19:46)
Set flash size to 256K
Found adapter 0x6411103 at PCI 177:0:0
Offset address 0x0
EPROM Vendor: WINBOND W25X40BV
Erasing .....Succeeded
Flashing ....
Flashing Success (total retry 0)
Verifing ....
Passed !
FS0:\> _
```

Step 4 Create Array

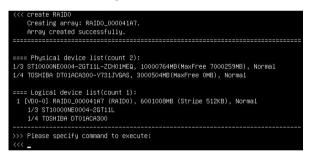
- a. Attach two hard disks to RR640L Controller;
- b. Boot, enter the motherboard's Boot List and select start from UEFI USB flash:



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



d. Command "create RAID0". Create RAID0 array with all disks and with maximum capacity.



- 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_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]# 🗌
hptdd/pci.ids hptdd/pcitable hptdd/rhdd 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 following window appears during the installation process,

:			RED HAT ENTERPRISE LINUX 8.7 IN
WELCOME TO	RED HAT ENTERPRIS	E LINUX 8.7	<i>.</i>
What language would	d you like to use during the ins	tallation proces	s?
		A	English (United States)
العربية		Arabic	English (United Kingdom)
অসমীয়া		Arabic Assamese	English (United Kingdom) English (India)
			English (India)
অসমীয়া	*	Assamese	
অসমীয়া Asturianu	*	Assamese Asturian	English (India) English (Australia)

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/	← 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,



1) 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. **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. **RPM Development Tools** Tools used for building RPMs, such as rpmbuild. **Scientific Support** Tools for mathematical and scientific computations, and parallel computing.
- 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

Device Selection Select the device(s) you'd like to install to. They will be left untouched until you click on the main menu's 'Begin installation' button.	INSTALLATION DESTINATION				E LINUX 8.7 INSTALLATION
Select the device(s) you'd like to install to. They will be left untouched until you click on the main menu's 'Begin Installation' button. Last Second Seco	Durken			🖾 us	rieip
Level Standard Dais	Device Selection				
	Select the device(s) you'd like to instal	I to. They will be left untouched until y	ou click on the main menu's "Begin Installation	n" button.	
Section 4 Attento Data Section 4 Attento Data Section 4 Attento Taba Section 4 Attento Igan a mathematication Control Contr	Local Standard Disks				
secilized & Network Data Secilized & Network Data Add a data Storage Configuration Account and a data data and ages available. Forget my data. Totall set a paragetrase met.					
Addresse. Storage Configuration • Wood bit to make additional upper available. ©regotion • Dorget my data. Toull set a paraphrase met.					
Addresse. Storage Configuration • Wood bit to make additional upper available. ©regotion • Dorget my data. Toull set a paraphrase met.					
Add a didk Storage Configuration Contain Co	Specialized & Network Disks				
A log met s [™] Gaton i wordt list on was aktional space awatetion. Brogeton ⊡ Grorget my data. Toalli set a paraghense met.	Add a disk				
A log met s [™] Gaton i wordt list on was aktional space awatetion. Brogeton ⊡ Grorget my data. Toalli set a paraghense met.	Storage Configuration				
Boropetin Corget my data. Tan'il set a pangabase met.					
Crorget my data. Toolf and a paraghteses met.		able.			
C dide subjected 0.8 supporty C.0.5 cm. Entrack	C Encrype my data. Total set a passienase m	<i>.</i>			
0.60x printed 5.8 capacity 5.8 free. But ach					
D discusses 3.8 sporty 0.8 feet Brites					
C dide selected 3.8 reportsy C.8 from Entrank					
O disks selected: 0 B capacity 0 B free: Buttach					
D disk selected D B capacity C B free Batterin					
C differences 3.8 separate C.8 from Entrank					
O disks selected 0 8 capacity 0 8 free Buttach					
O disks selected; 0 B capacity 0 B free Batacit					
0.60 contexts 0.8 capacity 0.8 feet Balance					
O delas selected O B capacity; O B free Befrach					
O disks selected: O B rapacity: O B free Refresh					
				0 disks selecter	t: 0 B capacity: 0 B free Refresh

then choose your own disk and begin installation.

3) Set Root Password



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

Completed
CentOS Linux is now successfully installed and ready for you to use
Go alread and relocat to start using it
Go alread and relocat to start using it
Relocat

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.e18.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 RR6001_Linux_X86_64_Src_vx.x.x_xx_xx_tar.gz

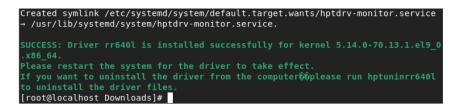
Run the .bin file to install the driver package.

sh rr64xl-linux_x86_64_src_vx.x.x_xx_xx_bin or

```
./rr64xl-linux x86 64 src vx.x.x xx xx xx.bin
```

<pre>[root@localhost Downloads]# ./rr64xl-linux_x86_64_src_v1.7.0_23_03_21.bin</pre>
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.



1. 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

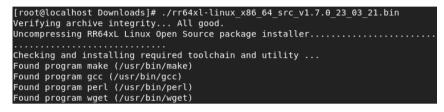
- b. Install Linux Opensource driver.
- c. Linux Opensource driver link, open the following link to enter the "Software Download" page to download:

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

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



sh rr64xl-linux-src_vxx.x.x_xx_xx_sx_bin



e. Follow the prompts to complete the driver installation.



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