



Chelsio Unified Boot

Installation and User Guide



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Chelsio Communications (Headquarters)

735 N Pastoria Avenue,
Sunnyvale, CA 94085
U.S.A

www.chelsio.com

Tel: 408.962.3600
Fax: 408.962.3661

Chelsio (India) Private Limited

Subramanya Arcade, Floor 3, Tower B
No. 12, Bannerghatta Road,
Bangalore-560029
Karnataka,
India

Tel: +91-80-4039-6800

Sales

For all sales inquiries, send an email to sales@chelsio.com

Support

For all support related questions, send an email to support@chelsio.com

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I. Unified Boot

1. Introduction

PXE is short for Preboot execution Environment and is used for booting computers over an Ethernet network using a Network Interface Card (NIC)

This section of the guide explains how to configure and use Chelsio Unified Boot Option ROM which flashes PXE Option ROM onto Chelsio's T7 adapters . It adds functionalities like PXE boot.

1.1. Hardware Requirements

1.1.1. Supported Adapters

Following are the currently shipping Chelsio adapters that are compatible with Chelsio Unified Boot software:

- T7 adapter:
 - T72200-FH

1.2. Software Requirements

The installation of the following Linux distributions is supported

- RHEL 9.5, 5.14.0-503.16.1.el9_5.x86_64
- RHEL 9.6, 5.14.0-570.12.1.el9_6.x86_64
- RHEL 10, 6.12.0-55.9.1.el10_0.x86_64

Other kernel versions have not been tested and are not guaranteed to work.

1.3. Pre-requisites

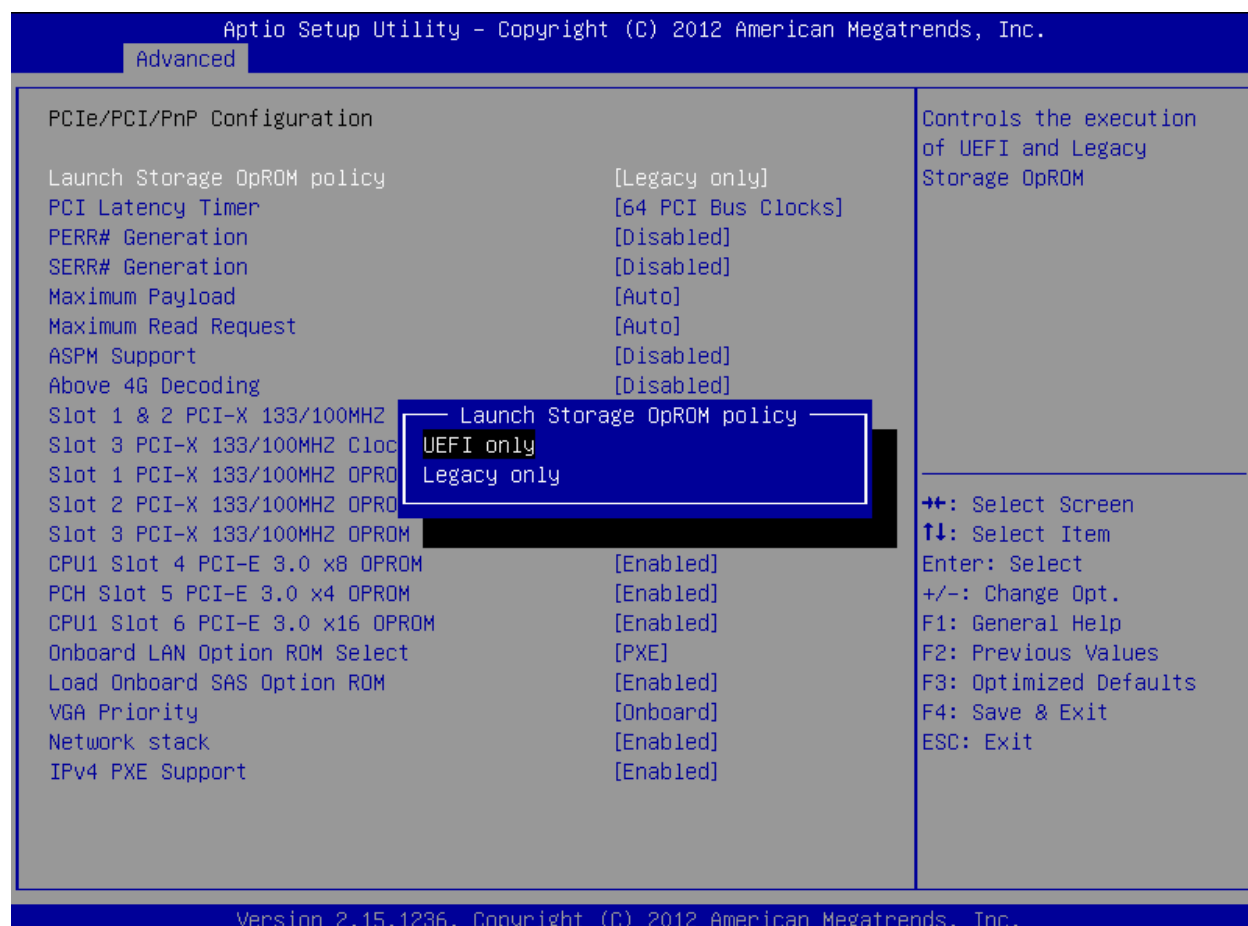
A USB flash drive is required for updating firmware, option ROM, etc.

2. Flashing firmware, option ROM and boot.cfg

Chelsio Unified Boot provides utility to flash firmware, optionROM and boot config onto Chelsio T7 adapters.

2.1. uEFI

- i. Reboot the system and go into BIOS setup.
- ii. Disable Secure Boot.
- iii. Configure the system having Chelsio CNA to boot in uEFI mode.



Note For Supermicro systems, enable **Network Stack** as well before proceeding.

- iv. Boot to **EFI Shell**.

```

UEFI Interactive Shell v2.2
EDK II
UEFI v2.90 (American Megatrends, 0x00050020)
Mapping table
  FS0: Alias(s):HD0c0b:;BLK1:
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)/HD(1,MBR,0x1288D8F8,0x800,0x1D35600)
  FS1: Alias(s):HD1f65535a1:;BLK3:
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(1,GPT,61DA6F6C-C758-4D05-A1C0-1402B7EA1
C57,0x800,0x12C000)
  BLK0: Alias(s):
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)
  BLK2: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)
  BLK4: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(2,GPT,94E7F22E-E0FA-4E10-85A7-74E806D75
DBB,0x12C800,0x200000)
  BLK5: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(3,GPT,728A8E0F-7FBA-489B-A5C3-807CFF67B
1FC,0x32C800,0x1BBF7800)
Press ESC in 5 seconds to skip startup.nsh or any other key to continue.
Shell> fs0:
FS0:\> _

```

v. Enter into pendrive which is **fs0** in this case.

```

UEFI Interactive Shell v2.2
EDK II
UEFI v2.90 (American Megatrends, 0x00050020)
Mapping table
  FS0: Alias(s):HD0c0b:;BLK1:
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)/HD(1,MBR,0x1288D8F8,0x800,0x1D35600)
  FS1: Alias(s):HD1f65535a1:;BLK3:
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(1,GPT,61DA6F6C-C758-4D05-A1C0-1402B7EA1
C57,0x800,0x12C000)
  BLK0: Alias(s):
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)
  BLK2: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)
  BLK4: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(2,GPT,94E7F22E-E0FA-4E10-85A7-74E806D75
DBB,0x12C800,0x200000)
  BLK5: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(3,GPT,728A8E0F-7FBA-489B-A5C3-807CFF67B
1FC,0x32C800,0x1BBF7800)
Press ESC in 5 seconds to skip startup.nsh or any other key to continue.
Shell> fs0:
FS0:\> _

```

- vi. Navigate to the folder where **OptionROM** is copied.

```
UEFI Interactive Shell v2.2
EDK II
UEFI v2.90 (American Megatrends, 0x00050020)
Mapping table
  FS0: Alias(s):HD0c0b:;BLK1:
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)/HD(1,MBR,0x1288D8F8,0x800,0x1D35600)
  FS1: Alias(s):HD1f65535a1:;BLK3:
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(1,GPT,61DA6F6C-C758-4D05-A1C0-1402B7EA1
C57,0x800,0x12C000)
  BLK0: Alias(s):
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)
  BLK2: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)
  BLK4: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(2,GPT,94E7F22E-E0FA-4E10-85A7-74E806D75
DBB,0x12C800,0x200000)
  BLK5: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(3,GPT,728A8E0F-7FBA-489B-A5C3-807CFF67B
1FC,0x32C800,0x1BBF7800)
Press ESC in 5 seconds to skip startup.nsh or any other key to continue.
Shell> fs0:
FS0:\> cd 3002
FS0:\3002\> _
```

- vii. Load the **ChelsioUD.efi** driver.

```
UEFI Interactive Shell v2.2
EDK II
UEFI v2.90 (American Megatrends, 0x00050020)
Mapping table
  FS0: Alias(s):HD0c0b:;BLK1:
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)/HD(1,MBR,0x1288D8F8,0x800,0x1D35600)
  FS1: Alias(s):HD1f65535a1:;BLK3:
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(1,GPT,61DA6F6C-C758-4D05-A1C0-1402B7EA1
C57,0x800,0x12C000)
  BLK0: Alias(s):
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)
  BLK2: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)
  BLK4: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(2,GPT,94E7F22E-E0FA-4E10-85A7-74E806D75
DBB,0x12C800,0x200000)
  BLK5: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(3,GPT,728A8E0F-7FBA-489B-A5C3-807CFF67B
1FC,0x32C800,0x1BBF7800)
Press ESC in 5 seconds to skip startup.nsh or any other key to continue.
Shell> fs0:
FS0:\> cd 3002
FS0:\3002\> load ChelsioUD.efi
Image 'FS0:\3002\ChelsioUD.efi' loaded at 6BA02000 - Success
FS0:\3002\> _
```

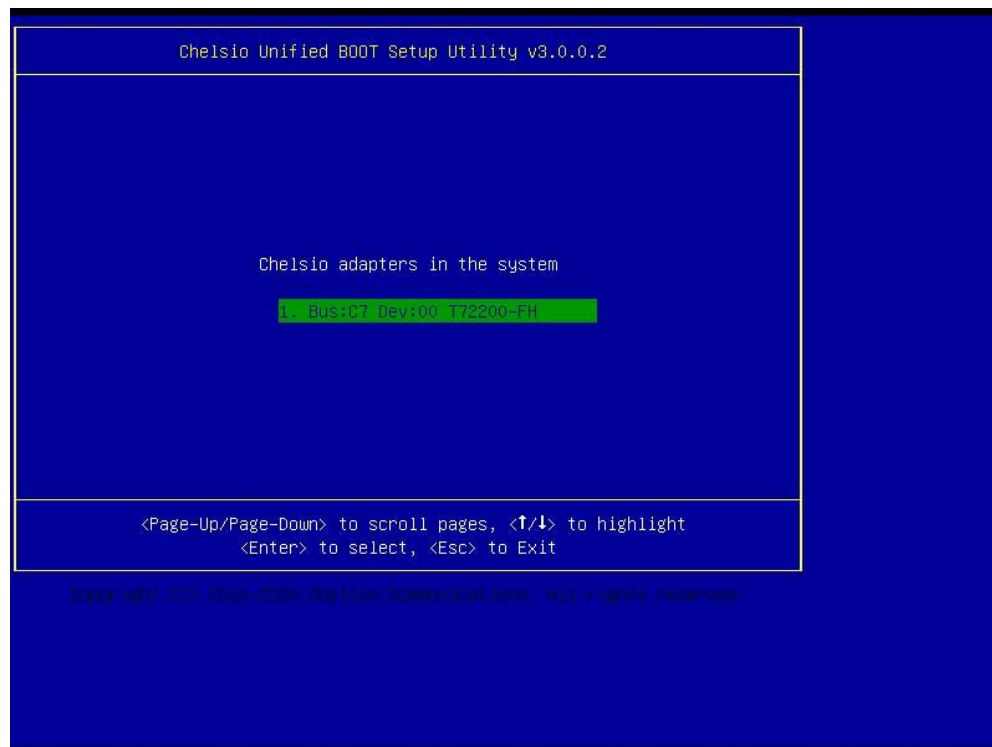
- viii. Invoke the **Driver config** utility using ***drvcfg -s*** command.

```

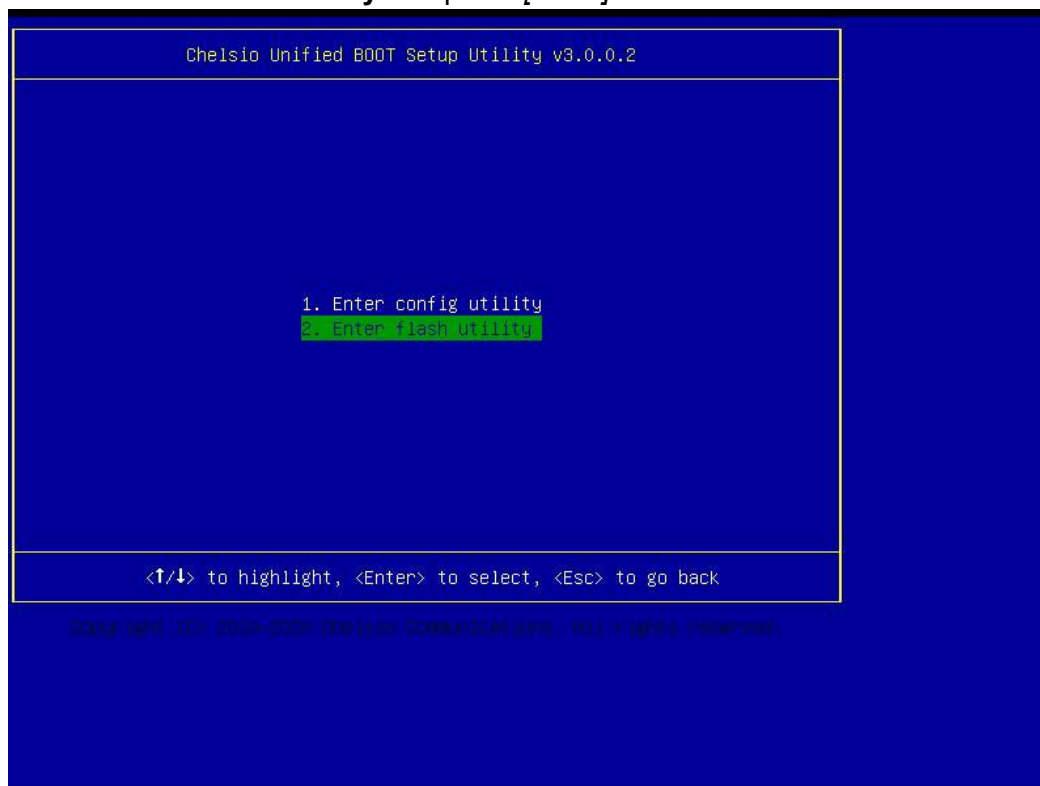
UEFI Interactive Shell v2.2
EDK II
UEFI v2.90 (American Megatrends, 0x00050020)
Mapping table
  FS0: Alias(s):HD0c0b:;BLK1:
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)/HD(1,MBR,0x1288D8F8,0x800,0x1D35600)
  FS1: Alias(s):HD1f65535a1:;BLK3:
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(1,GPT,61DA6F6C-C758-4D05-A1C0-1402B7EA1
C57,0x800,0x12C000)
  BLK0: Alias(s):
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x2,0x0)
  BLK2: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)
  BLK4: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(2,GPT,94E7F22E-E0FA-4E10-85A7-74E806D75
DBB,0x12C800,0x200000)
  BLK5: Alias(s):
        PciRoot(0x0)/Pci(0x17,0x0)/Sata(0x5,0xFFFF,0x0)/HD(3,GPT,728A8E0F-7FBA-489B-A5C3-807CFF67B
1FC,0x32C800,0x1BBF7800)
Press ESC in 5 seconds to skip startup.nsh or any other key to continue.
Shell> fs0:
FS0:\> cd 3002
FS0:\3002> load ChelsioUD.efi
Image 'FS0:\3002\ChelsioUD.efi' loaded at 6BA02000 - Success
FS0:\3002> drvcfg -s_

```

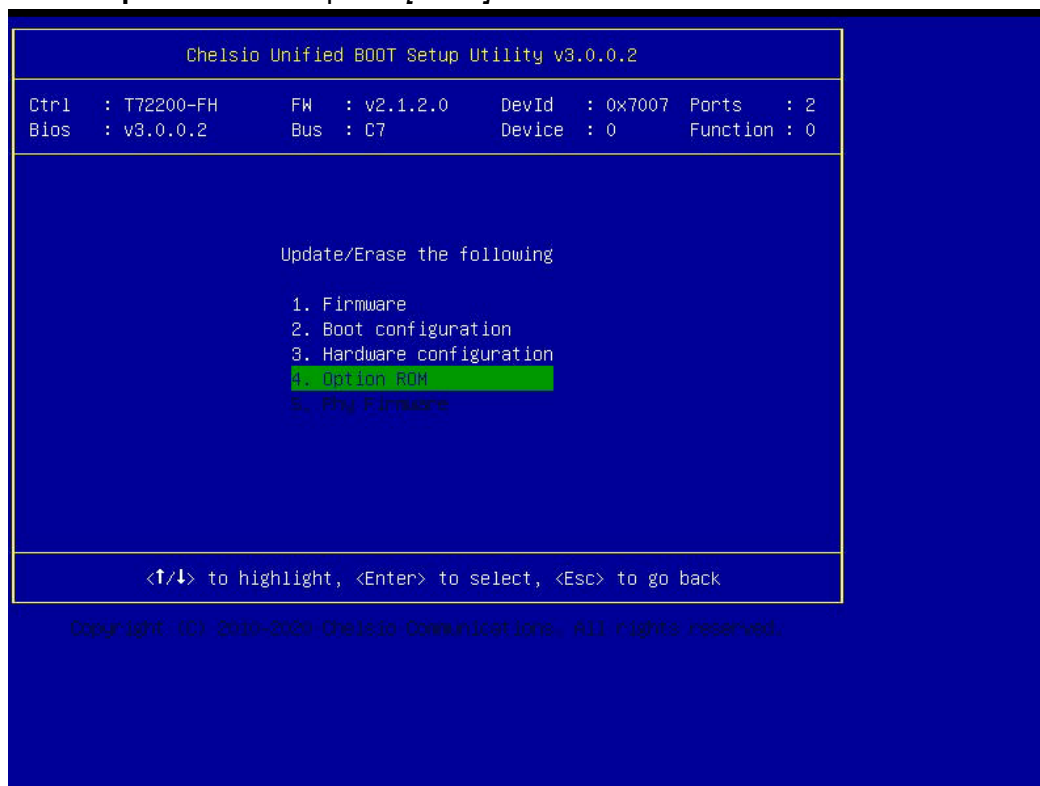
- ix. The following configuration utility window appears. Select **Chelsio T7 Adapter** and press **[Enter]**.



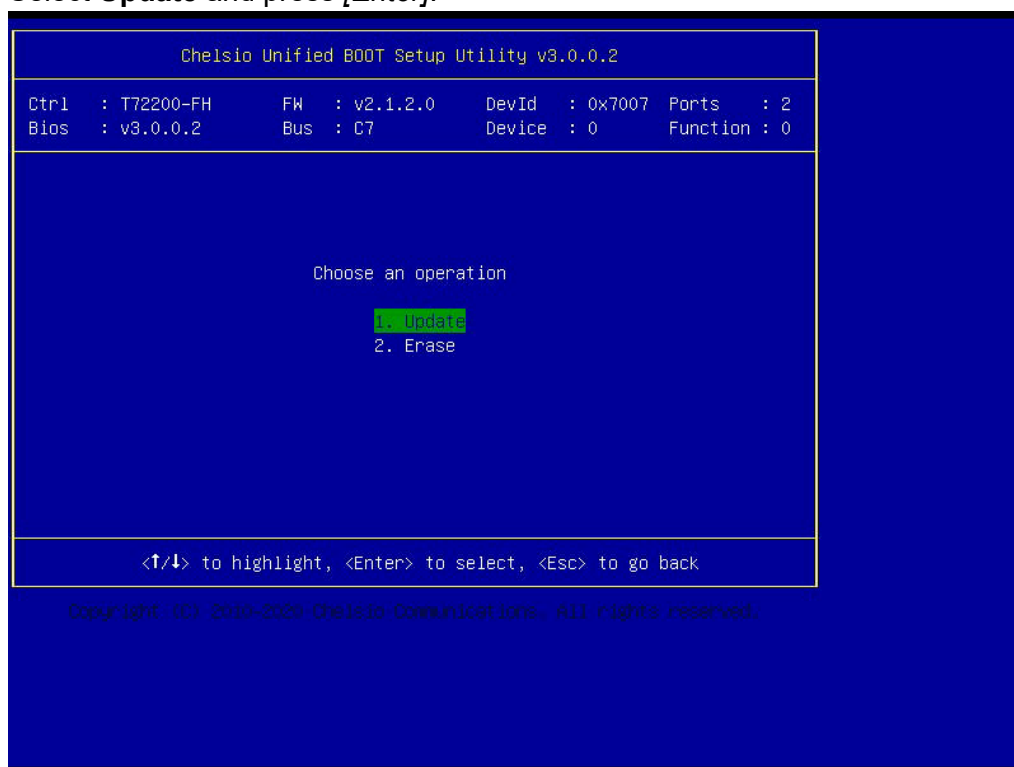
- x. Select **Chelsio Flash Utility** and press *[Enter]*.



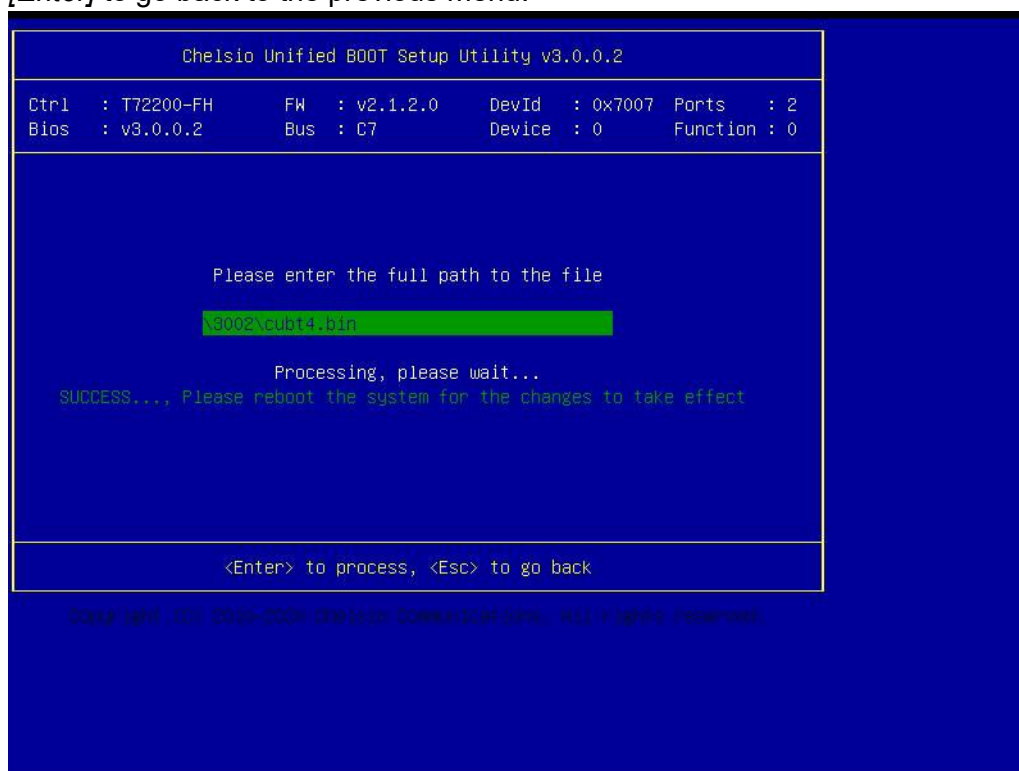
- xi. Select **OptionROM** and press *[Enter]*.



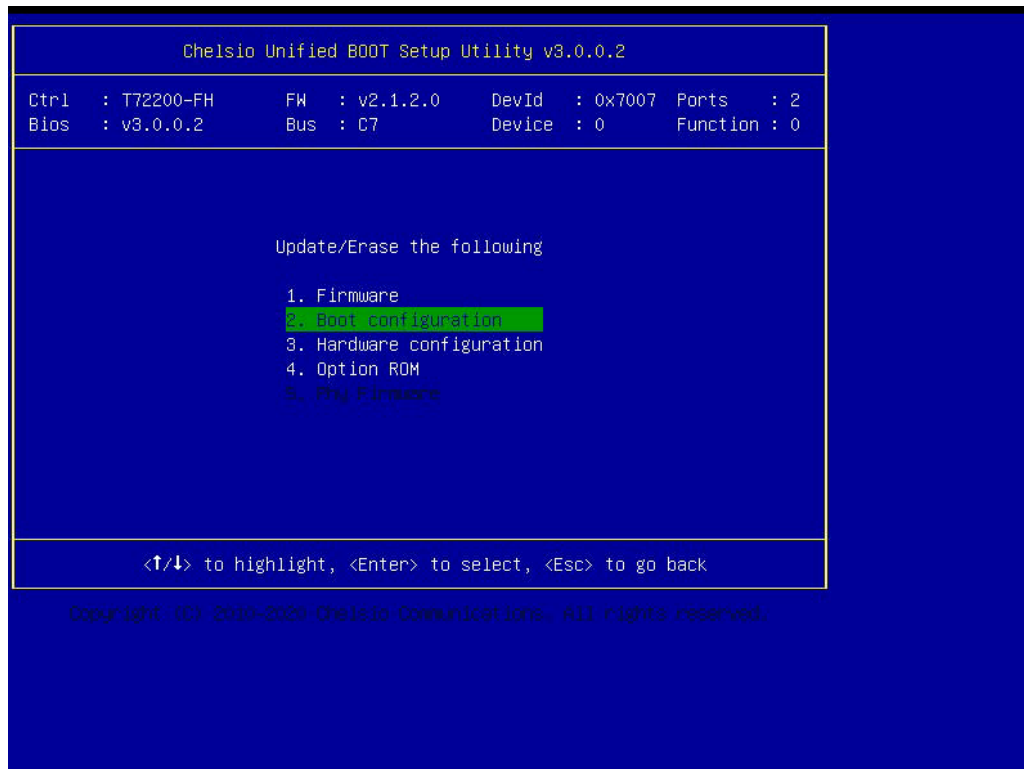
- xii. Select **Update** and press *[Enter]*.



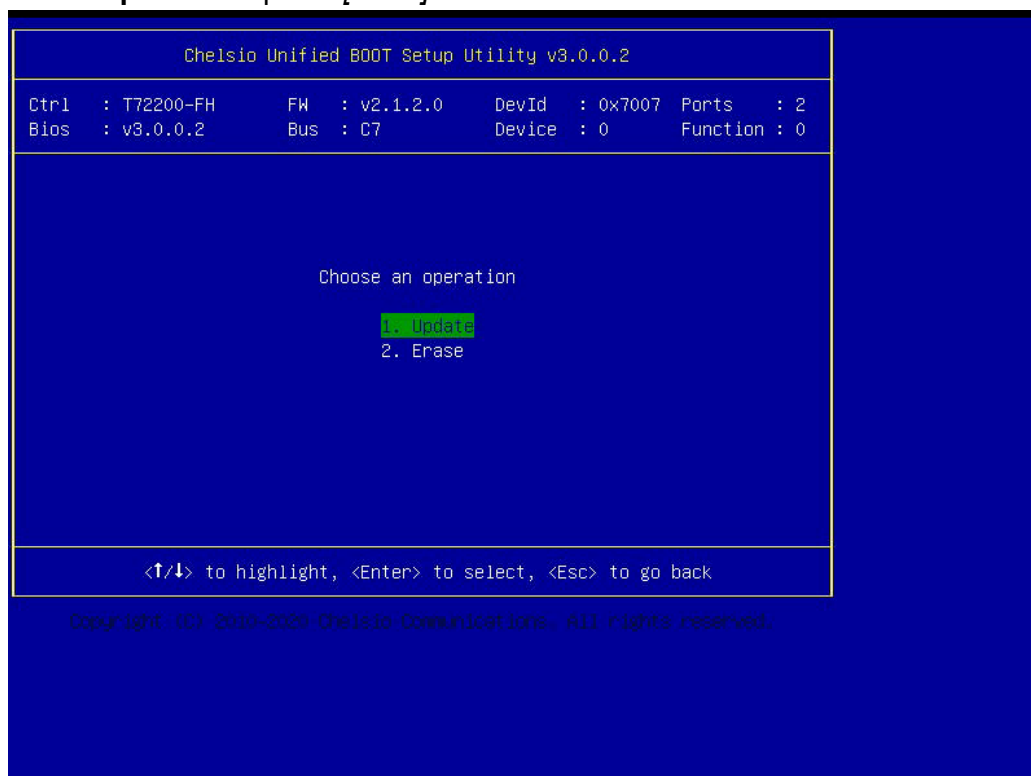
- xiii. Provide the path to OptionROM and press *[Enter]*. Once OptionROM flash completes, press *[Enter]* to go back to the previous menu.



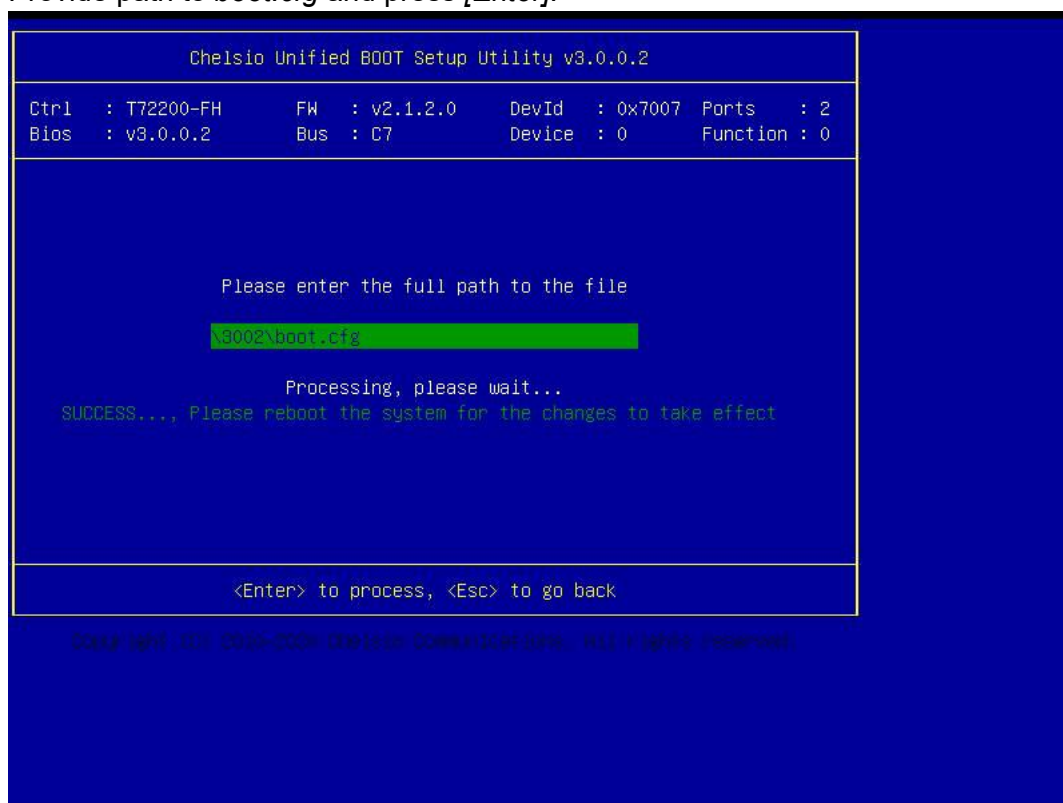
- xiv. Select **Boot Configuration** and press *[Enter]*.



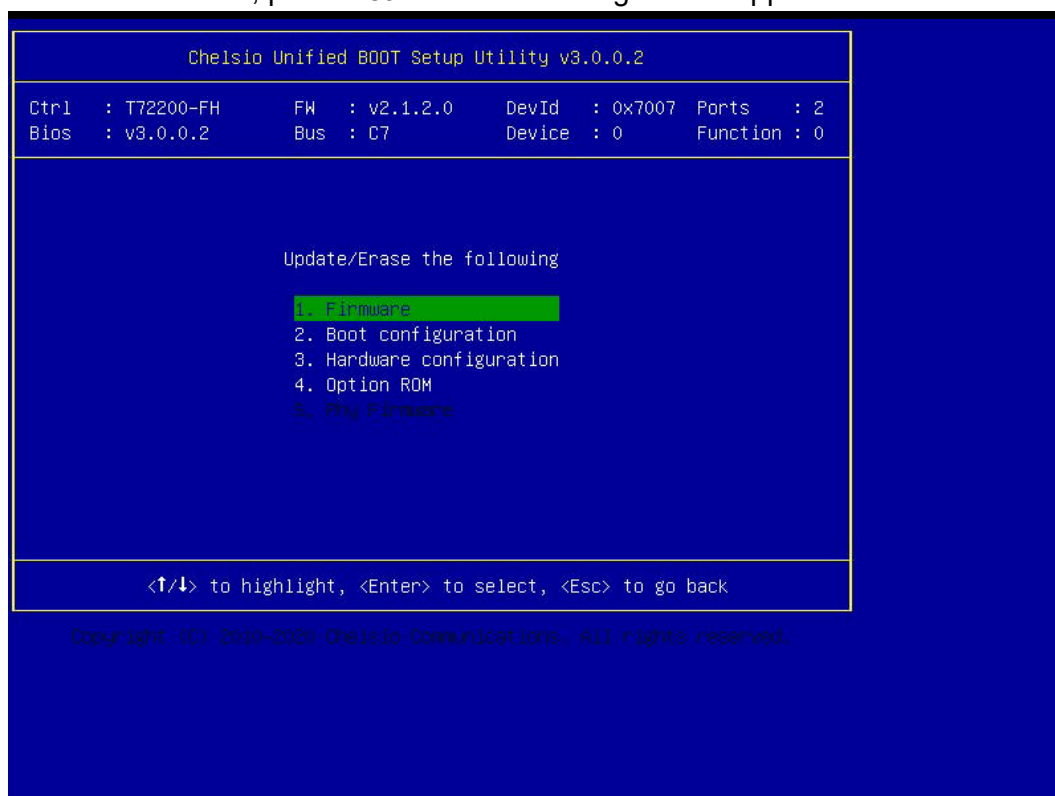
- xv. Select **Update** and press *[Enter]*.



xvi. Provide path to *boot.cfg* and press *[Enter]*.



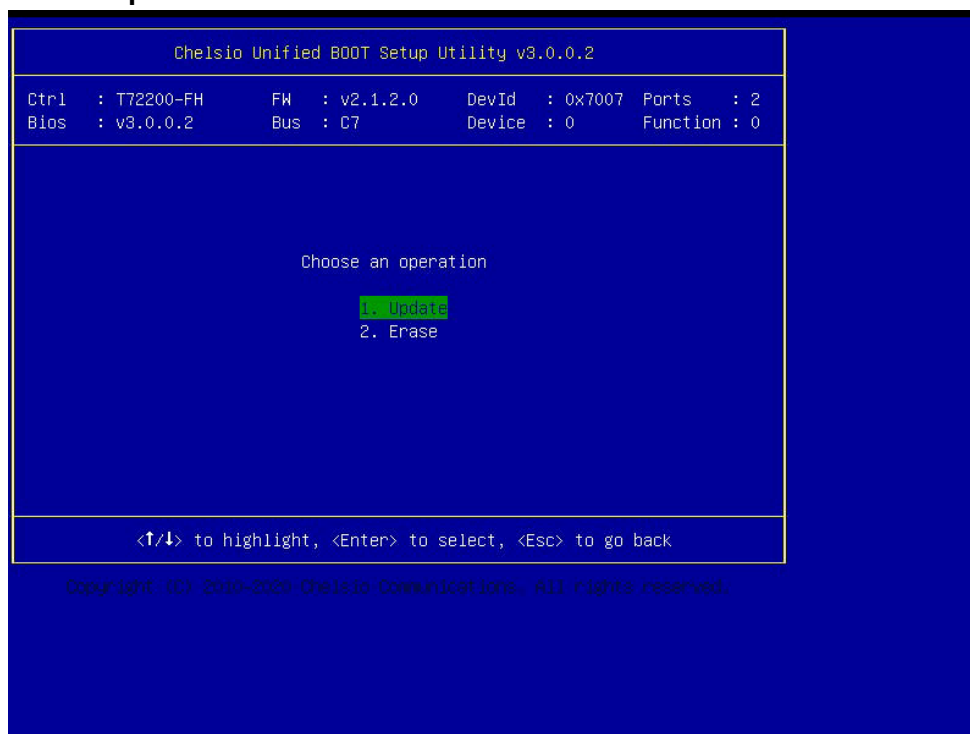
xvii. To flash Firmware, press *Esc* until the following screen appears.



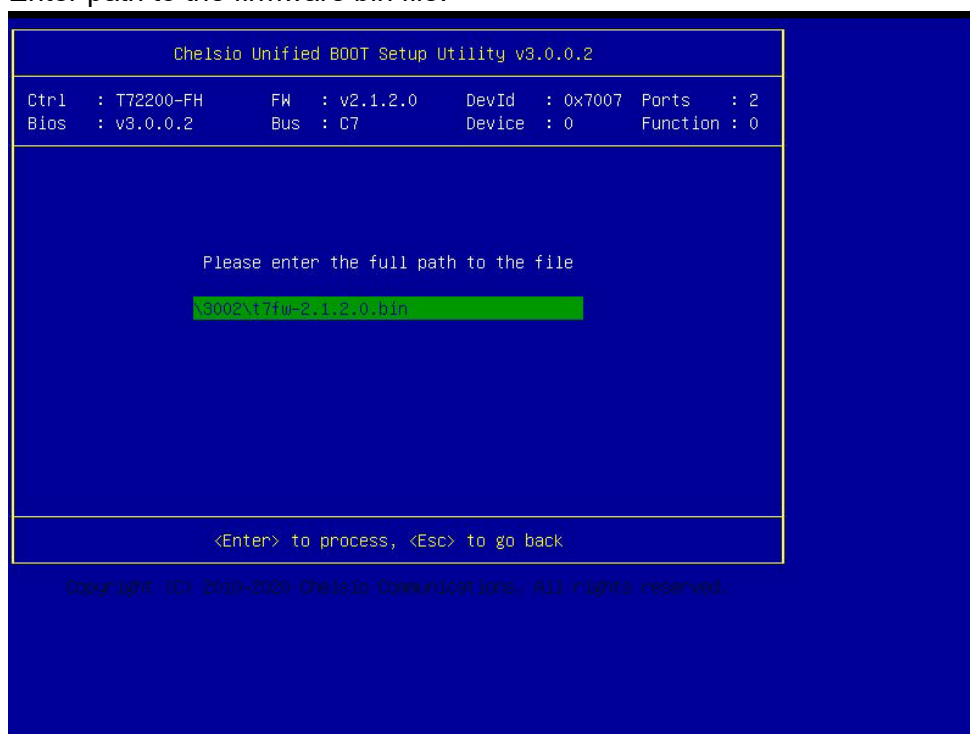


Note If Chelsio T7 is not listed, please ensure that Chelsio uEFI driver is loaded correctly as mentioned [here](#) in the **Flashing Firmware and Option ROM** section.

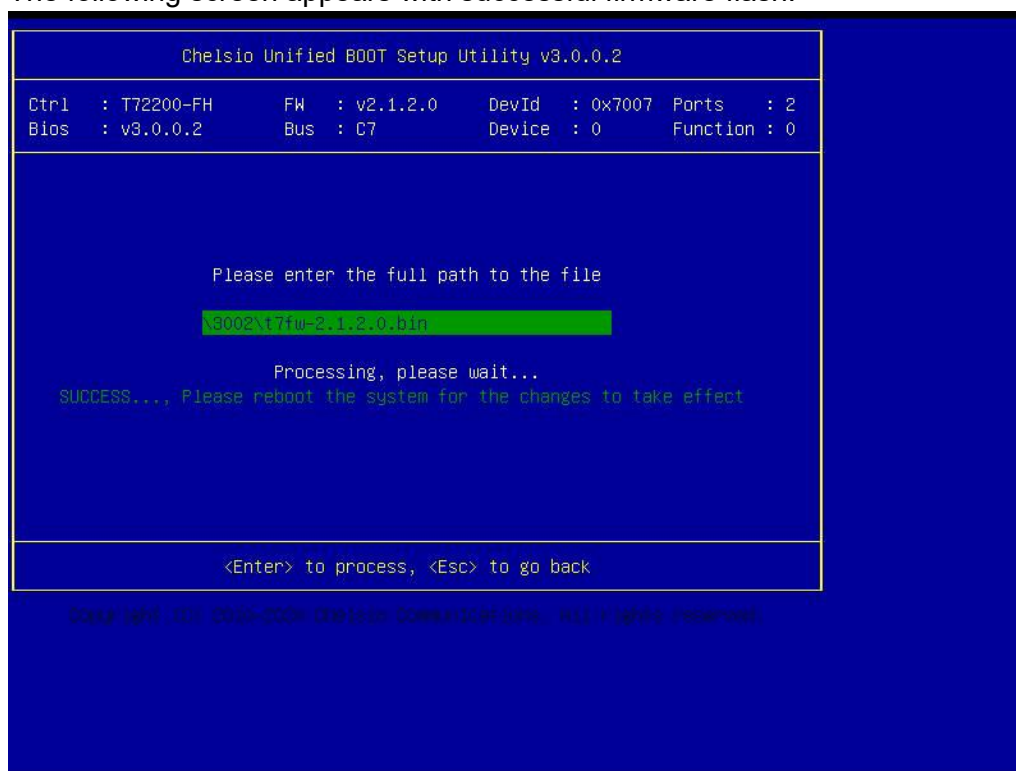
xviii. Select **Update**.



xix. Enter path to the firmware bin file.



xx. The following screen appears with successful firmware flash.



xxi. Reboot the system.

3. Configuring PXE Server

The following components are required to configure a PXE Server:

- DHCP Server
- TFTP Server

PXE server configuration steps for different operating systems can be found on following links:

 **Note** *Chelsio Communications does not take any responsibility regarding contents given in below mentioned links. They are provided for example purposes only.*

Linux

- https://docs.redhat.com/en/documentation/red_hat_enterprise_linux/8/html/automatically_installing_rhel/preparing-for-a-network-install_rhel-installer
- http://www.howtoforge.com/ubuntu_pxe_install_server

3.1. Building custom initrd

Perform the following steps to build initrd file:

- Locate the **initrd.img** file corresponding to the operating system you intend to update. For the purpose of example, RHEL9.6 was used

```
[root@host ~]# mount -o loop,ro RHEL-9.6.0-20250408.20-x86_64-dvd1.iso /mnt
[root@host ~]# cd /mnt/
[root@host mnt]# ls
AppStream BaseOS EFI EULA extra_files.json GPL images isolinux
media.repo RPM-GPG-KEY-redhat-beta RPM-GPG-KEY-redhat-release
[root@host mnt]# find . | grep initrd.img
./images/pxeboot/initrd.img
./isolinux/initrd.img
```

- Create a folder to unzip the **initrd.img** and browse to the following folders:

```
[root@host ~]# mkdir initrd_workdir
```

- Unpack the image into the above created directory using the following command:

```
[[root@host ~]# cd initrd_workdir
[root@host initrd_workdir]# xzcat /mnt/images/pxeboot/initrd.img | cpio -
idmv
```

 **Note** Use *zcat* instead of *xzcat* in case the image is gzip compressed.

- iv. The **cxgb4.ko** driver files for the required OSes are at the following directory inside the package.

 **Note** This package only supports RHEL9.5/9.6, RHEL10

```
[root@host ~]# # ls -R Chelsio-Uboot-3.0.0.0/LinuxDrivers/
Chelsio-Uboot-3.0.0.0/LinuxDrivers/:
RHEL10.0  RHEL9.5  RHEL9.6
Chelsio-Uboot-3.0.0.0/LLinuxDrivers/RHEL10.0:
cxgb4.ko
Chelsio-Uboot-3.0.0.0/LLinuxDrivers/RHEL9.5:
cxgb4.ko
Chelsio-Uboot-3.0.0.0/LLinuxDrivers/RHEL9.6:
cxgb4.ko
```

- v. Replace the driver with your updated **T7 cxgb4.ko** driver. Make sure to replace the kernel version with the kernel version of the target OS:

```
[root@host initrd_workdir]# cp /<path_to_t7_cxgb4.ko_file>/cxgb4.ko
lib/modules/<kernel_version>/kernel/drivers/net/ethernet/chelsio/cxgb4/cxgb4
.ko
```

Example - For RHEL9.5 follow below steps:

```
[root@host initrd_workdir]# cp /<path_to_package>/Chelsio-Uboot-
3.0.0.0/LinuxDrivers/RHEL9.5/cxgb4.ko lib/modules/5.14.0-
503.11.1.el9_5.x86_64 /kernel/drivers/net/ethernet/chelsio/cxgb4/
```

Example - For RHEL9.6 follow below steps:

```
[root@host initrd_workdir]# cp /<path_to_package>/Chelsio-Uboot-
3.0.0.0/LinuxDrivers/RHEL9.6/cxgb4.ko lib/modules/5.14.0-
570.12.1.el9_6.x86_64/kernel/drivers/net/ethernet/chelsio/cxgb4/
```

Example - For RHEL10.0 follow below steps:

```
[root@host initrd_workdir]# cp /<path_to_package>/Chelsio-Uboot-
3.0.0.0/LinuxDrivers/RHEL10.0/cxgb4.ko usr/lib/modules/6.12.0-
55.9.1.el10_0.x86_64/kernel/drivers/net/ethernet/chelsio/cxgb4/
```

 **Note** Make sure to replace the kernel version with the kernel version of the target OS.

- vi. Add **t7fw-2.1.2.0.bin** from the package to the firmware directory and create a symlink:

```
[root@host initrd_workdir]# cp /<path_to_package>/Chelsio-Uboot-3.0.0.0/OptionROM/t7fw-2.1.2.0.bin lib/firmware/cxgb4/
[root@host initrd_workdir]# ln -sf lib/firmware/cxgb4/t7fw-2.1.2.0.bin lib/firmware/cxgb4/t7fw.bin/
```

- vii. Create a modprobe configuration file for iw_cxgb4 as below:

```
[root@host initrd_workdir]# echo "install iw_cxgb4 /bin/true" | tee etc/modprobe.d/iw_cxgb4.conf
```

- viii. Run “depmod” to create the dependencies file for the updated driver:

```
[root@host~]# depmod -a -b . <kernel_version>
```

Example - For RHEL9.5 follow below steps:

```
[root@host initrd_workdir]# depmod -a -b . 5.14.0-503.11.1.el9_5.x86_64
```

Example - For RHEL9.6 follow below steps:

```
[root@host initrd_workdir]# depmod -a -b . 5.14.0-570.12.1.el9_6.x86_64
```

Example - For RHEL10.0 follow below steps:

```
[root@host initrd_workdir]# depmod -a -b . 6.12.0-55.9.1.el10_0.x86_64
```

 **Note** *Make sure to replace the kernel version with the kernel version of the target OS.*

- ix. Re-pack the modified initrd image using the following command:

```
[root@host initrd_workdir]# find . | cpio -o -H newc | gzip > /<path_to_new_initrd_with_t7_change>/t7_initrd.img
```

3.2. PXE Server Configuration

1. Use the previously generated custom initrd image to configure PXE Server.

Below is a sample configuration of grub.cfg for RHEL9.6:

```
menuentry 'Install RHEL 9.6' {  
    linuxefi <tftp_or_http_path>/vmlinuz modprobe.blacklist=iw_cxgb4,cxgb4i inst.repo=<IP of the  
HTTP server> inst.stage2=<IP of HTTP server>  
    initrdefi <tftp_or_http_path>/<generated_initrd_image_name>.img  
}
```

Example:

```
menuentry 'Install RHEL 9.6 (verbose)' {  
    linuxefi RHEL9.6/vmlinuz modprobe.blacklist=iw_cxgb4,cxgb4i  
    inst.repo=http://102.50.50.33/RHEL9.6/ inst.stage2=http://102.50.50.33/RHEL9.6/  
    initrdefi RHEL9.6/t7_initrd.img.img  
}
```

4. PXE Boot Process

Before proceeding, please ensure that the Chelsio T7 Adapter has been flashed with the provided firmware and option ROM and boot.cfg (See [Flashing Firmware and option ROM](#)).

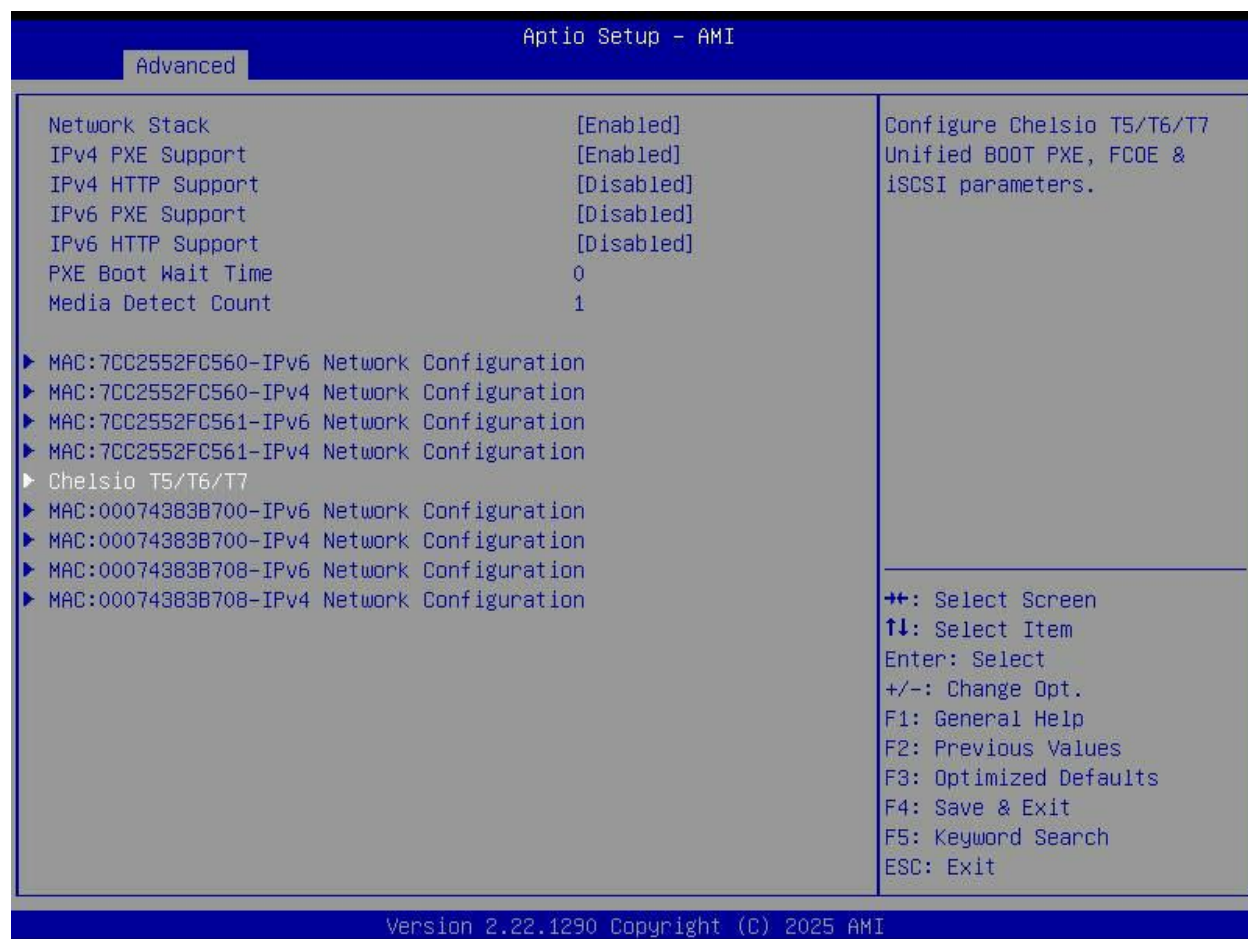
4.1. PXE Boot

Important

- Only uEFI v2.3.1 and above are supported.
- Any other uEFI version is NOT SUPPORTED and may render your system unusable.

This section describes the method to configure and use Chelsio uEFI PXE interfaces.

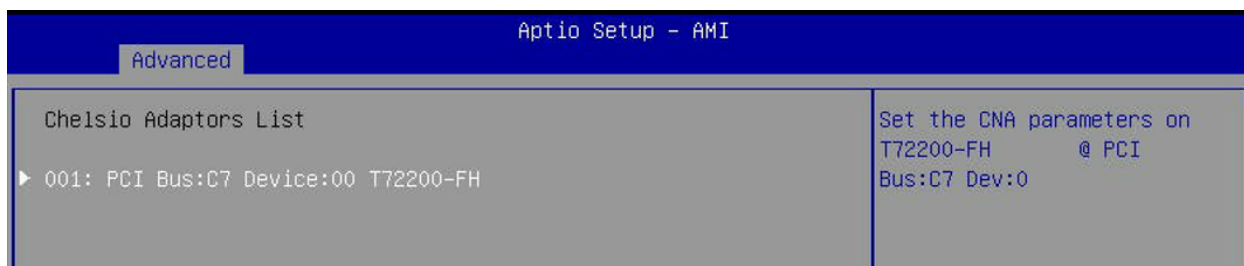
- Reboot the system and go into the BIOS setup.
- Disable Secure Boot, if not already done.
- Chelsio HII should be listed as **Chelsio T7**. Highlight it and press *[Enter]*.



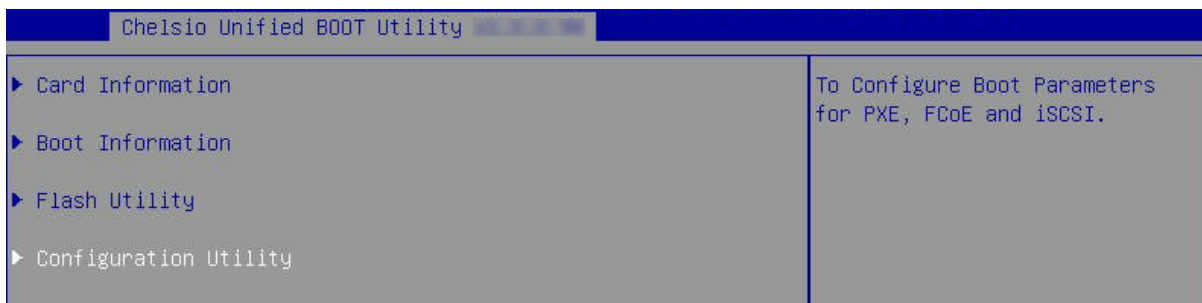
Note

If Chelsio T7 is not listed, please ensure that Chelsio uEFI driver is loaded correctly as mentioned [here](#) in the **Flashing Firmware and Option ROM** section.

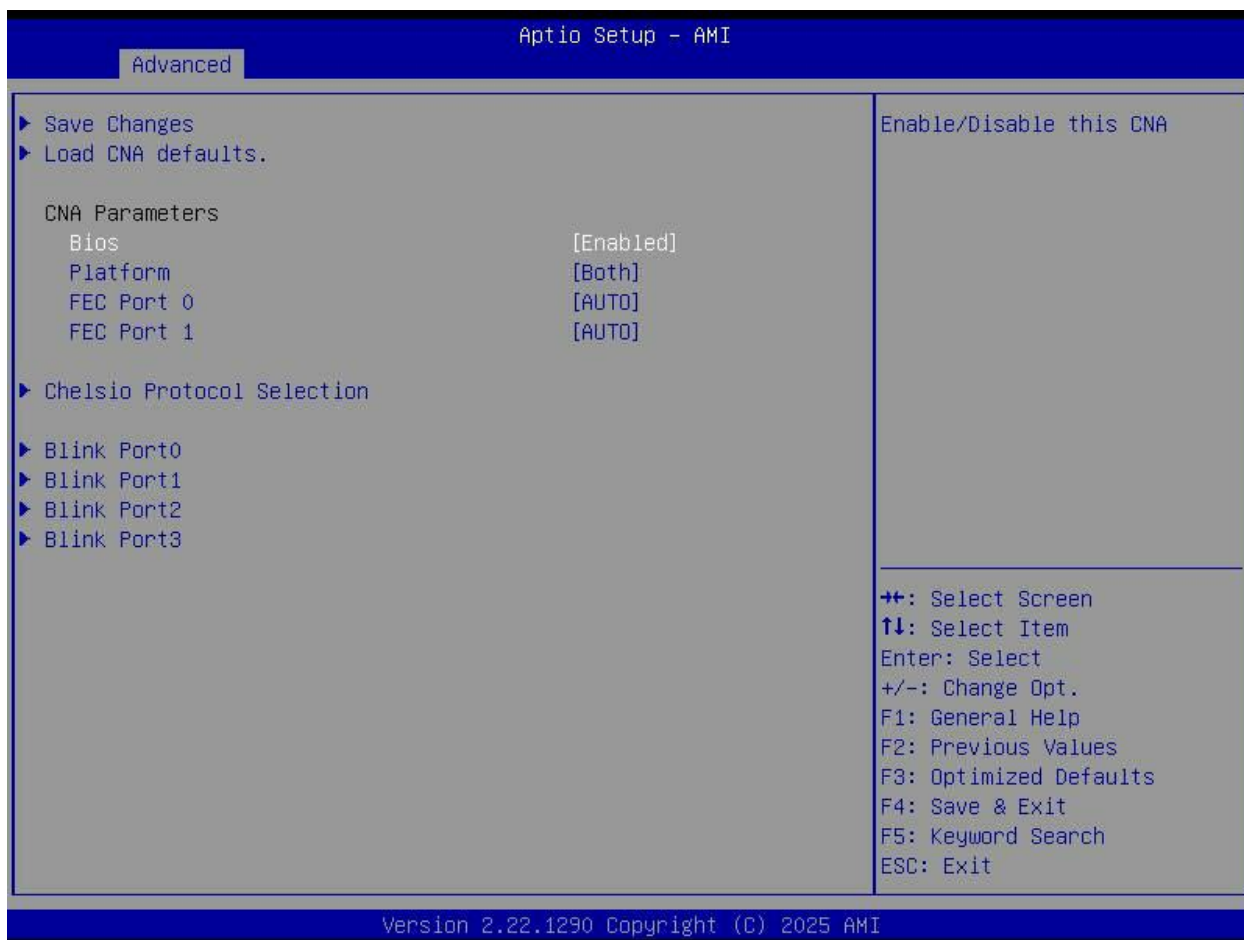
- iv. Select the Chelsio adapter to be configured and press *[Enter]*.



- v. Select **Configuration Utility** and press *[Enter]*.

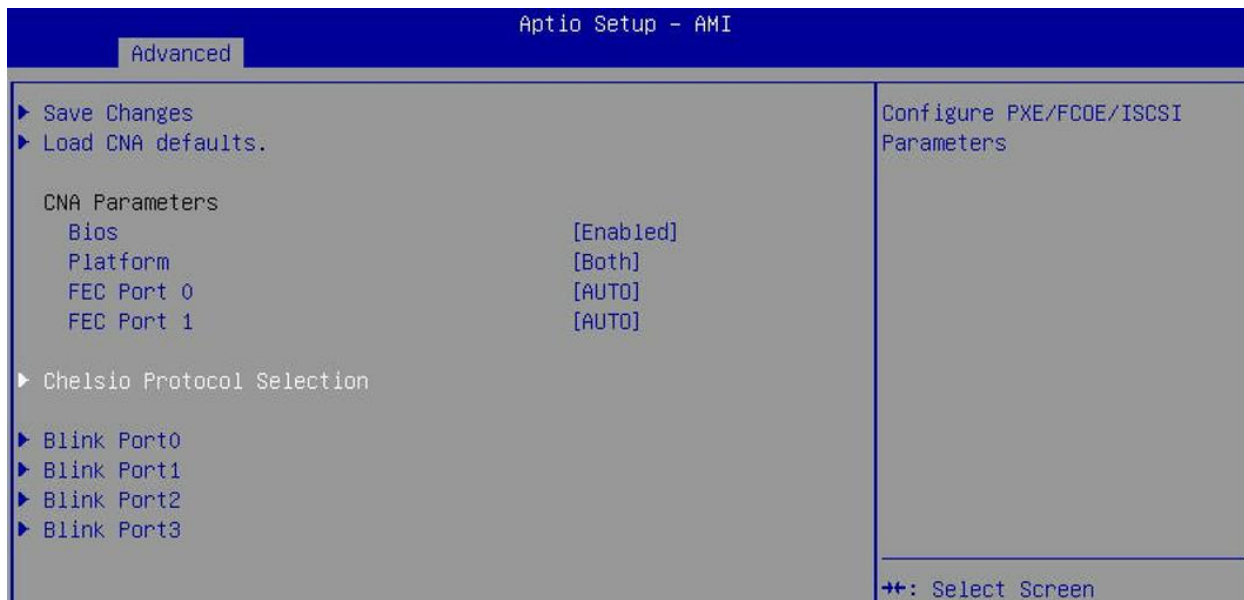


- vi. Enable adapter BIOS if not already enabled.

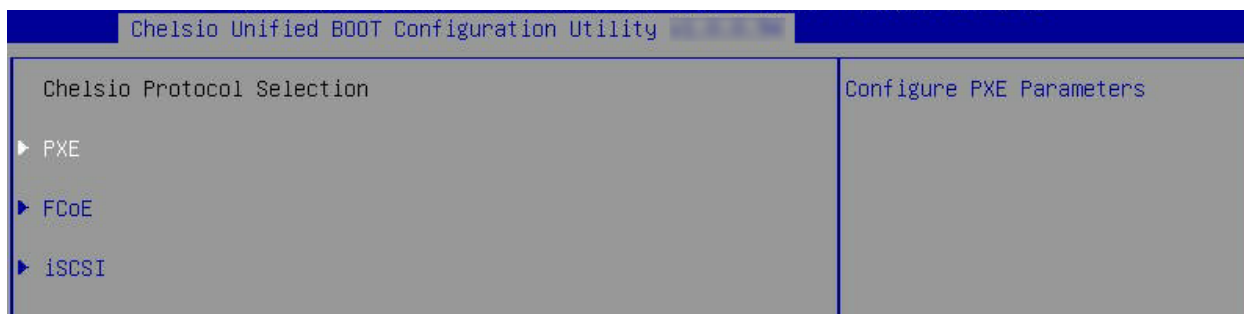


Note *It is highly recommended that you use the **Save Changes** option every time a parameter/option is changed.*

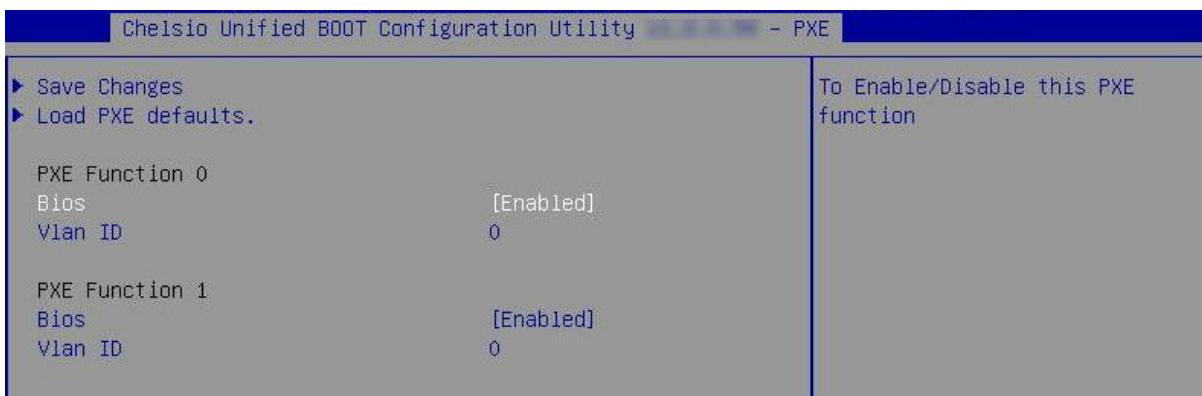
vii. Select **Chelsio Protocol Selection** and press **[Enter]**.



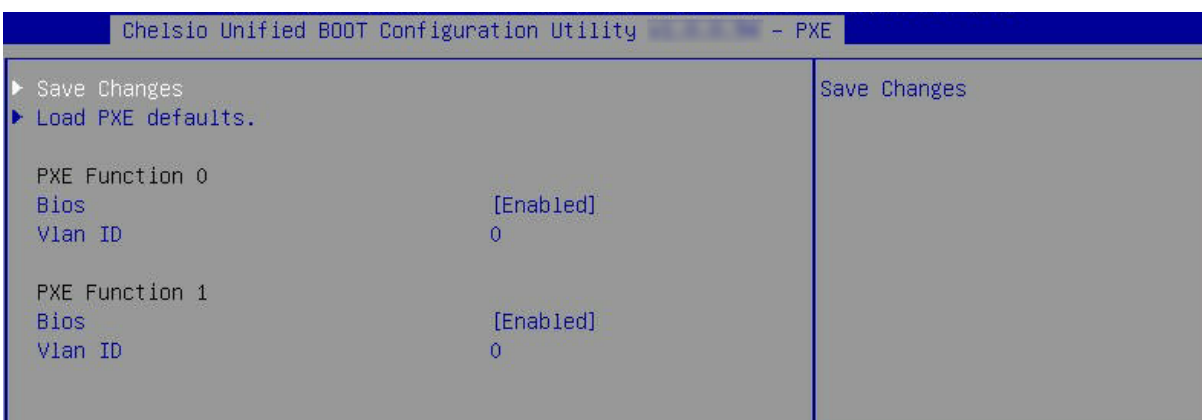
viii. Select **PXE** and press **[Enter]**.



ix. Choose the boot port to try PXE boot. It is recommended to enable only those functions and ports which are going to be used. Please note that enabling PXE Function 0 will enable port 0 for PXE, enabling PXE Function 1 will enable port 1 and so on, for NIC function.



- x. Select **Save Changes** and press **[Enter]**.

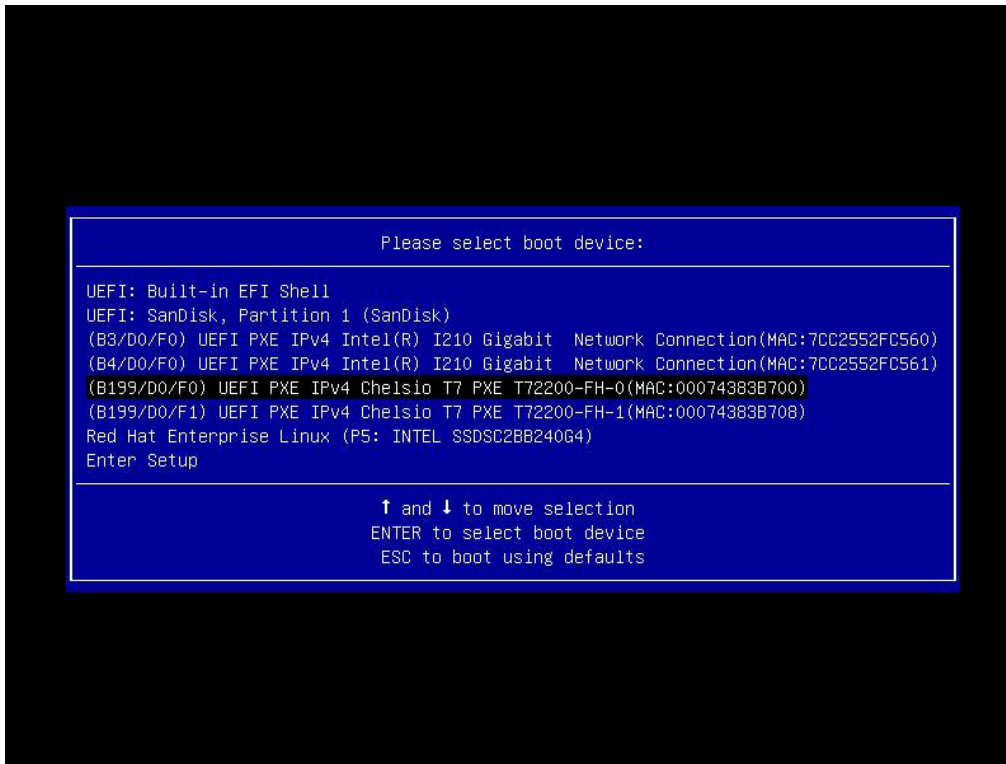


- xi. Reboot the system and press **F11** to go to boot manager, choose any of the available Chelsio PXE devices for PXE boot.

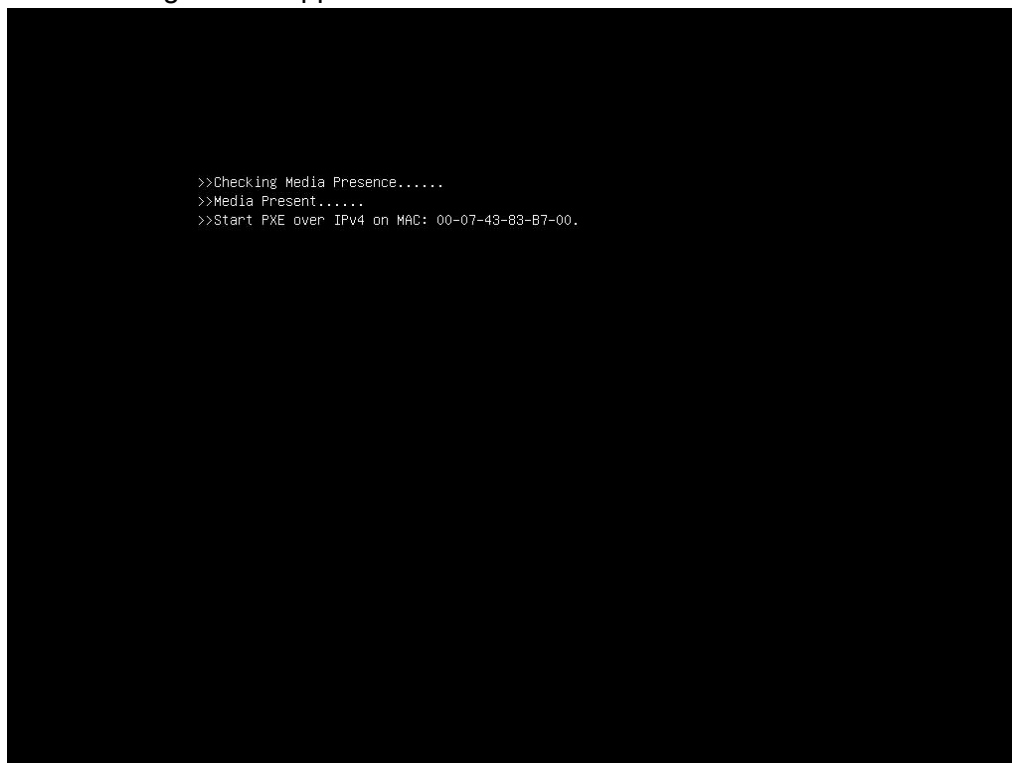


5. OS Installation

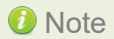
1. Reboot the host, press **F11** and select Chelsio Adapter T7 as the boot option.



2. The following screen appears.



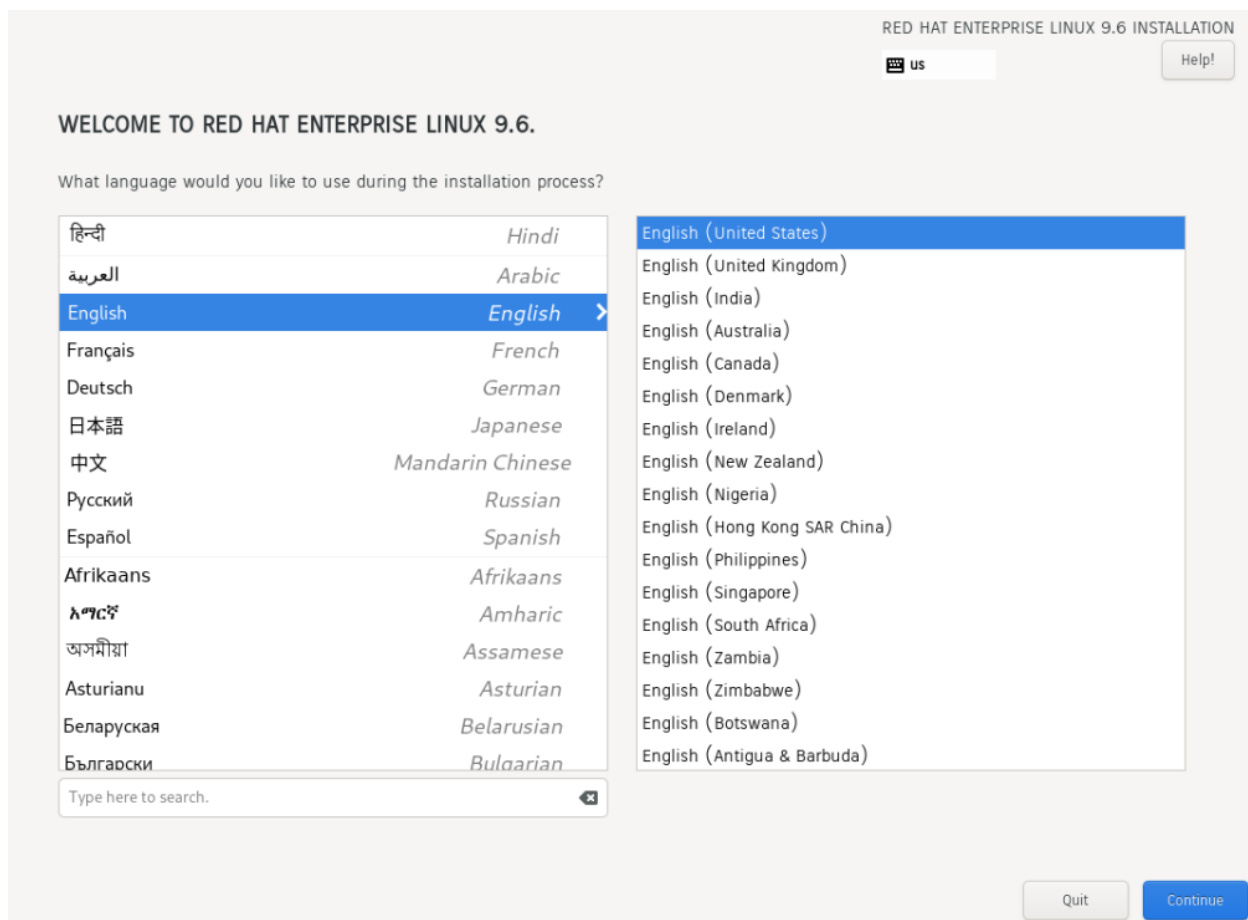
3. In the following screen, PXE boot begins and a OS menu is listed, select an OS for installation.



Note *For the purpose of this document RHEL9.6 installation is shown.*



4. Installation of OS begins. Select the installation language and click **Continue**.



5. Follow the onscreen instructions and proceed with the installation.
6. After installation reboot the host.

II. Appendix

1. Limitations

The following is the limitation in this release:

- PXE boot is not supported on port1 of Chelsio T7 Adapter for this release.

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Chelsio Communications, Inc.
735 N Pastoria Avenue,
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