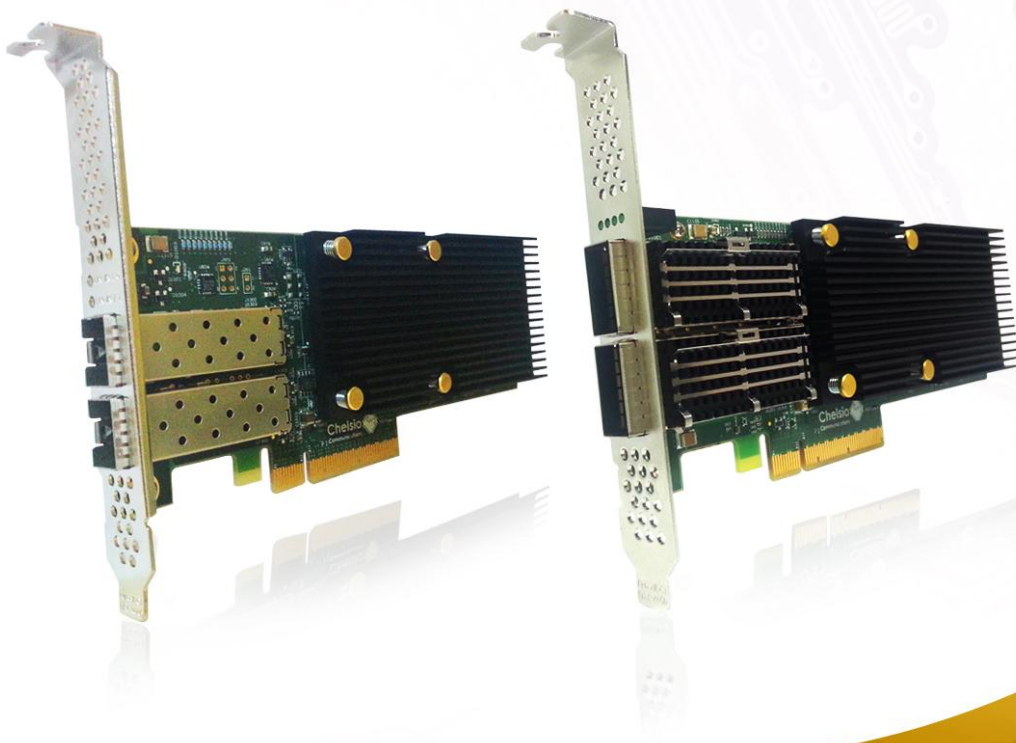




# Chelsio T5/T4 Unified Boot Option ROM for DOS

## Installation and User's Guide



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## Document History

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## 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 T5/T4 Unified Boot Option ROM which flashes PXE Option ROM onto Chelsio's converged network adapters (CNAs). It adds Network boot functionality.

 **Note** *Currently only Legacy PXE supported.*

### 1.1. Hardware Requirements

#### 1.1.1. Supported Adapters

The following are the currently shipping Chelsio Adapters that are compatible with Chelsio Unified Boot Option ROM software:

- T502-BT
- T580-CR
- T580-SO-CR
- T580-LP-CR
- T520-LL-CR
- T520-SO-CR
- T520-CR
- T522-CR
- T540-CR
- T420-CR
- T440-CR
- T422-CR
- T420-SO-CR
- T404-BT
- T420-BCH
- T440-LP-CR
- T420-BT
- T420-LL-CR

### 1.2. Software Requirements

Chelsio Unified Boot Option ROM software requires Disk Operating System to flash PXE ROM onto Chelsio T5 and T4 adapters.

## 1.3. Package Contents

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Chelsio Unified Boot Option ROM software package contains the following:

- Unified Boot Option ROM image (*cwlb4.bin*) and a legacy flash utility (*cfut4.exe*), which can be used to flash Unified Boot Option ROM onto Chelsio's T5 and T4 based Converged Network Adapters (CNAs). It also contains T5 (*t5fw-x.xx.xx.x.bin*) and T4 (*t4fw-x.xx.xx.x.bin*) firmware files.
- **docs:** The docs directory contains support documents - README, Release Notes and User's Guide (this document) for the software package.

## 2. Hardware Installation

1. Shutdown/power off your system.
2. Power off all remaining peripherals attached to your system.
3. Unpack the Chelsio adapter and place it on an anti-static surface.
4. Remove the system case cover according to the system manufacturer's instructions.
5. Remove the PCI filler plate from the slot where you will install the Ethernet adapter.
6. For maximum performance, it is highly recommended to install the adapter into a PCIE x8 slot.
7. Holding the Chelsio adapter by the edges, align the edge connector with the PCI connector on the motherboard. Apply even pressure on both edges until the card is firmly seated. It may be necessary to remove the SFP (transceiver) modules prior to inserting the adapter.
8. Secure the Chelsio adapter with a screw, or other securing mechanism, as described by the system manufacturer's instructions. Replace the case cover.
9. After securing the card, ensure that the card is still fully seated in the PCIE x8 slot as sometimes the process of securing the card causes the card to become unseated.
10. Connect a fiber cable, multi-mode for short range (SR) optics or single-mode for long range (LR) optics, to the 10Gb Ethernet adapter or regular Ethernet cable for the 1Gb Ethernet adapter.
11. Power on your system.
12. On Linux systems, run *update-pciids* command to download the current version of PCI ID list

```
[root@host]# update-pciids
%   Total   %   Received   %   Xferd   Average Speed   Time   Time   Time   Current
                        Dload   Upload   Total   Spent   Left   Speed
100 198k   100   198k       0    0       491k    0 --:--:-- --:--:-- --:--:-- 626k
Done.
```

13. Verify if the adapter was installed successfully:

- On Linux systems, run *lspci* command and you should see a similar output:

```
[root@host]# lspci |grep -i Chelsio
07:00.0 Ethernet controller: Chelsio Communications Inc T520-LL-CR Unified
Wire Ethernet Controller
07:00.1 Ethernet controller: Chelsio Communications Inc T520-LL-CR Unified
Wire Ethernet Controller
07:00.2 Ethernet controller: Chelsio Communications Inc T520-LL-CR Unified
Wire Ethernet Controller
07:00.3 Ethernet controller: Chelsio Communications Inc T520-LL-CR Unified
Wire Ethernet Controller
07:00.4 Ethernet controller: Chelsio Communications Inc T520-LL-CR Unified
Wire Ethernet Controller
07:00.5 SCSI storage controller: Chelsio Communications Inc T520-LL-C
```

## 2. Hardware Installation

```
Unified Wire Storage Controller
07:00.6 Fibre Channel: Chelsio Communications Inc T520-LL-CR Unified Wire
Storage Controller
```

- On Windows systems, follow these steps:
  - i. Open **Device Manager** in **Control Panel**.
  - ii. Under **Other devices** section, Chelsio adapter should be listed as **Ethernet Controller**. If the adapter is not listed, right-click on the system name or click on the **Actions** menu and select **Scan for hardware changes**.

For Chelsio T5/T4 adapters, the physical functions are currently assigned as:

- Physical functions 0 - 3: for the SR-IOV functions of the adapter
- Physical function 4: for all NIC functions of the adapter
- Physical function 5: for iSCSI
- Physical function 6: for FCoE
- Physical function 7: Currently not assigned

14. Based on the operating system, install the appropriate network driver. Install and load *cxgb4* for Linux systems and *VBD* and *NDIS* for Windows systems.

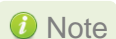
15. Finally, verify if the card is discovered:

- For Linux systems, examine the output of *dmesg* and you should see a similar output:

```
eth2: Chelsio T520-LL rev 0 10GBASE-SFP RNIC PCIe 8 GT/s x8 MSI-X, Offload
capable
0000:07:00.4: S/N: RE12130097, P/N: 11011675004
```

The above outputs indicate the hardware configuration of the adapters as well as the Serial numbers. As observed by the x8, the card is properly installed in an x8 slot on the machine and using MSI-X interrupts.

- For Windows systems, open **Device Manager** again. Expand **Network adapters** section and now Chelsio adapter should be listed.



**Note** *Network device names for Chelsio's physical ports are assigned using the following convention: the port farthest from the motherboard will appear as the first Ethernet network interface. However, for T5 40G and T420-BT adapters, the association of physical Ethernet ports and their corresponding network device names is opposite. For these adapters, the port nearest to the motherboard will appear as the first network interface.*



## 3. Flashing firmware and option ROM

Chelsio legacy flash utility (*cfut4.exe*) is used to program the PXE Option ROM image onto the Chelsio CNAs.

**Example # 1:** This example assumes you are using a USB flash drive as a storage media for the necessary files. Follow the steps below:

- i. Create a DOS bootable USB flash drive.
- ii. Create *CHELSIO* folder on the USB flash drive.
- iii. If you haven't done already, download *Chelsio-Uboot-x.x.x.xx.zip* from Chelsio Download Center, [service.chelsio.com](http://service.chelsio.com)
- iv. Unzip the downloaded package.
- v. Copy all the files and place them in the *CHELSIO* folder created on the USB flash drive.
- vi. Plug in the USB flash drive in the system on which the Chelsio CNA is installed.
- vii. Reboot the system and enter the BIOS setup.
- viii. Make the USB flash drive as the primary boot device. Save the changes and exit.
- ix. Once the system boots from the USB flash drive, change your working directory to *CHELSIO* directory:

```
C:\>cd CHELSIO
```

```
C:\>cd CHELSIO_
```

### 3. Flashing firmware and option ROM

---

- x. Run the following command to list all Chelsio CNAs present in the system. The list displays a unique index for each CNA found.

```
C:\CHELSIO>cfut4 -l
```

```
C:\CHELSIO>cfut4 -l

Chelsio T4/T5 Flash Utility v1.5

Index  ChelsioAdapterType  DevId
=====
[0]    T440-LP-CR       400e
```

- xi. Delete any previous version of Option ROM flashed on the CNA:

```
C:\CHELSIO>cfut4 -d <idx> -xb
```

Here, `idx` is the CNA index found in step ix (0 in this case)

```
C:\CHELSIO>cfut4 -d 0 -xb

Chelsio T4/T5 Flash Utility v1.5

Erasing serial flash sector(s) ... Done
Reboot machine for changes to take effect
```

- xii. Delete any previous firmware using the following command:

```
C:\CHELSIO>cfut4 -d <idx> -xh -xf
```

Here, `idx` is the CNA index found in step ix (0 in this case)

```
C:\CHELSIO>cfut4 -d 0 -xh -xf

Chelsio T4/T5 Flash Utility v1.5

Erasing serial flash sector(s) ... Done
Erasing serial flash sector(s) ... Done
Reboot machine for changes to take effect
```

### 3. Flashing firmware and option ROM

---

- xiii. Run the following command to flash the appropriate firmware (*t5fw-x.xx.xx.x.bin* for *T5* adapters; *t4fw-x.xx.xx.x.bin* for *T4* adapters).

```
C:\CHELSIO>cfut4 -d <idx> -uf <firmware_file>.bin
```

Here, *idx* is the CNA index found in step ix (0 in this case) and *firmware\_file* is the firmware image file present in the *CHELSIO* folder.

```
C:\CHELSIO>cfut4 -d 0 -uf t4fw-1~1.bin

Chelsio T4/T5 Flash Utility v1.5

Erasing serial flash sector(s) ... Done
Writing Image at Base 00080000 ... Done
Writing Image at Base 00088000 ... Done
Writing Image at Base 00090000 ... Done
Writing Image at Base 00098000 ... Done
Writing Image at Base 000a0000 ... Done
Writing Image at Base 000a8000 ... Done
Writing Image at Base 000b0000 ... Done
Writing Image at Base 000b8000 ... Done
Writing Image at Base 000c0000 ... Done
Writing Image at Base 000c8000 ... Done
Writing Image at Base 000d0000 ... Done
Writing Image at Base 000d8000 ... Done
Writing Image at Base 000e0000 ... Done
Writing Image at Base 000e8000 ... Done
Writing Image at Base 000f0000 ... Done
Reboot machine for changes to take effect
```

### 3. Flashing firmware and option ROM

---

- xiv. Flash the unified option ROM onto the Chelsio CNA, using the following command:

```
C:\CHELSIO>cfut4 -d <idx> -ub cuwlb4.bin
```

Here, `idx` is the CNA index found in step ix (0 in this case) and `cuwlb4.bin` is the unified option ROM image file.

```
C:\CHELSIO>cfut4 -d 0 -ub cuwlb4.bin

Chelsio T4/T5 Flash Utility v1.5

Erasing serial flash sector(s) ... Done
Writing Image at Base 00000000 ... Done
Writing Image at Base 00008000 ... Done
Writing Image at Base 00010000 ... Done
Writing Image at Base 00018000 ... Done
Writing Image at Base 00020000 ... Done
Writing Image at Base 00028000 ... Done
Writing Image at Base 00030000 ... Done
Writing Image at Base 00038000 ... Done
Writing Image at Base 00040000 ... Done
Writing Image at Base 00048000 ... Done
Writing Image at Base 00050000 ... Done
Writing Image at Base 00058000 ... Done
Writing Image at Base 00060000 ... Done
Writing Image at Base 00068000 ... Done
Writing Image at Base 00070000 ... Done
Reboot machine for changes to take effect
```

- xv. Delete any previous Option ROM settings:

```
C:\CHELSIO>cfut4 -d <idx> -xc
```

Here, `idx` is the CNA index found in step ix (0 in this case)

```
C:\CHELSIO>cfut4 -d 0 -xc

Chelsio T4/T5 Flash Utility v1.5

Erasing serial flash sector(s) ... Done
Reboot machine for changes to take effect
```

- xvi. Reboot the system for changes to take effect.

### 4. Configuring PXE Server

The following components are required to configure a server as PXE Server:

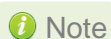
- DHCP Server
- TFTP Server

PXE server configuration steps for Linux can be found on following links:

- [http://linux-sxs.org/internet\\_serving/pxeboot.html](http://linux-sxs.org/internet_serving/pxeboot.html)
- [http://www.howtoforge.com/ubuntu\\_pxe\\_install\\_server](http://www.howtoforge.com/ubuntu_pxe_install_server)

PXE server configuration steps for Windows can be found on following links:

- <http://technet.microsoft.com/en-us/library/cc771670%28WS.10%29.aspx>
- <http://tftpd32.jounin.net/> (Use port # 67, set PXE option and provide bootable file name in settings)
- <http://unattended.sourceforge.net/pxe-win2k.html>



Note

*Chelsio Communications does not take any responsibility regarding contents given in above mentioned links. These are given for example purposes only.*

## 5. PXE boot process

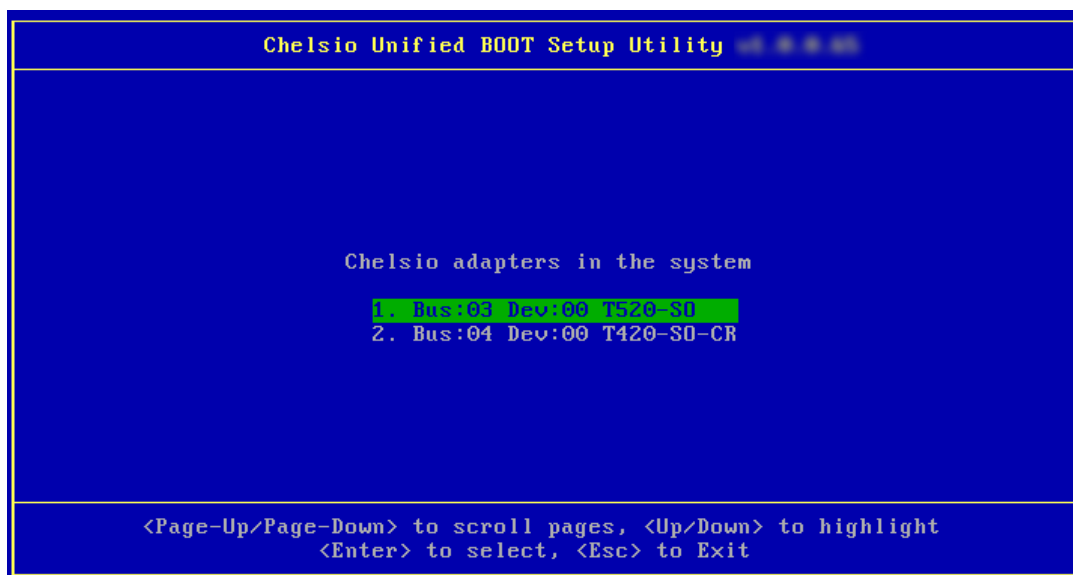
Before proceeding, please ensure that the Chelsio CNA has been flashed with the provided firmware and option ROM (See [Flashing firmware and option ROM](#)).

### 5.1. For Legacy PXE boot

- i. After configuring the PXE server, make sure the PXE server works. Then reboot the client machine.
- ii. Press [Alt+C] when the message *Chelsio Unified Boot BIOS vX.X.X.XX, Copyright (C) 2003-2014 Chelsio Communications Press <Alt-C> to Configure T4/T5 Card(s). Press <Alt-S> to skip BIOS* appears on the screen to enter the configuration utility.

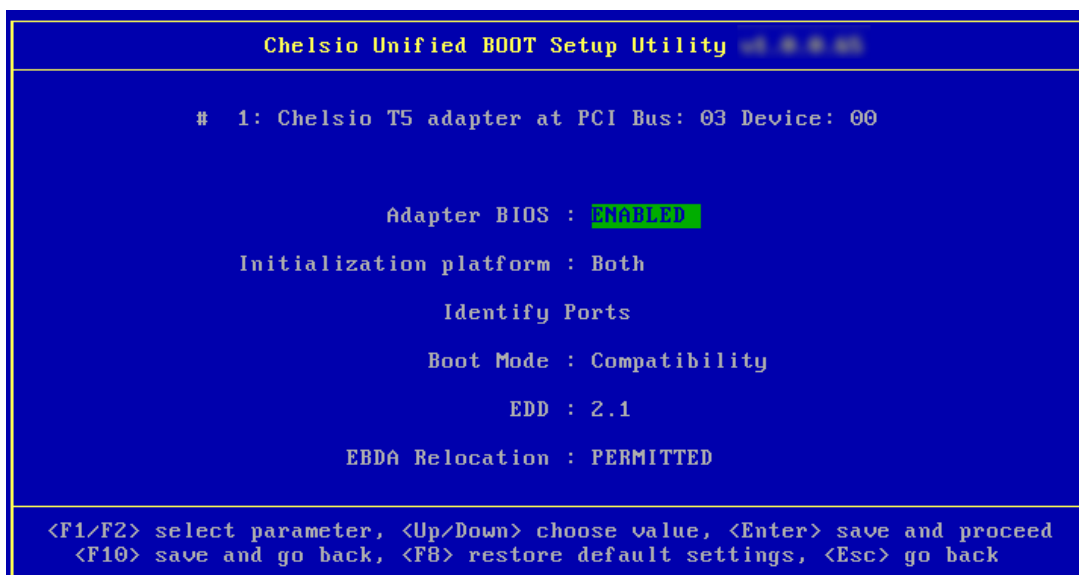
```
Chelsio Unified Boot BIOS v4.0.0.0
Copyright (C) 2003-2014 Chelsio Communications
Press <Alt-C> to Configure T4/T5 Card(s). Press <Alt-S> to skip BIOS.
```

- iii. The configuration utility will appear as below:



- iv. Choose the CNA on which you flashed the option ROM image. Hit [Enter].

- v. Enable the Adapter BIOS using arrow keys if not already enabled. Hit [ENTER].

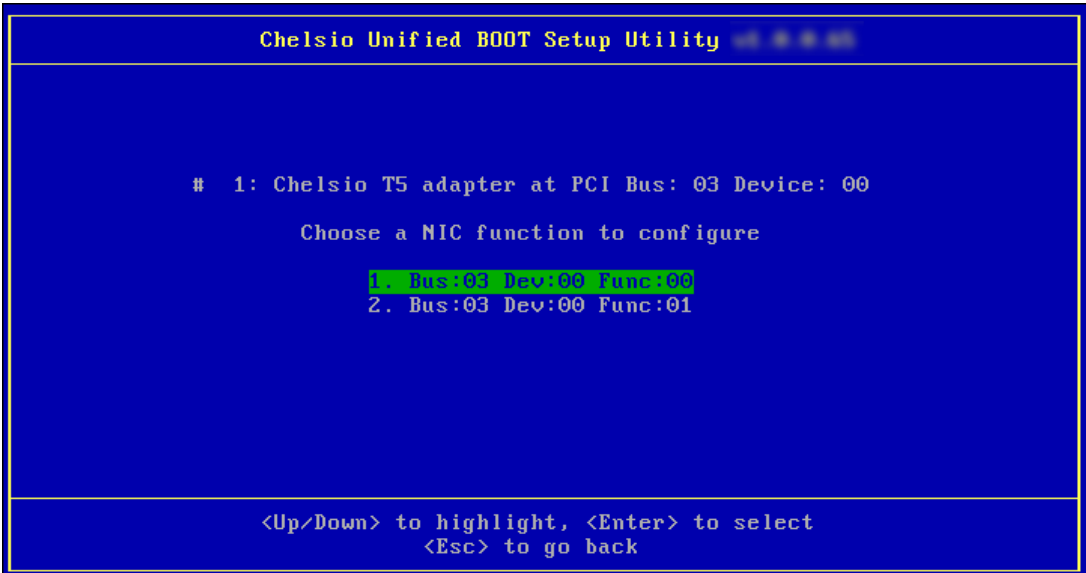


**Note** Use the default values for Boot Mode, EDD and EBDA Relocation parameters, unless instructed otherwise.

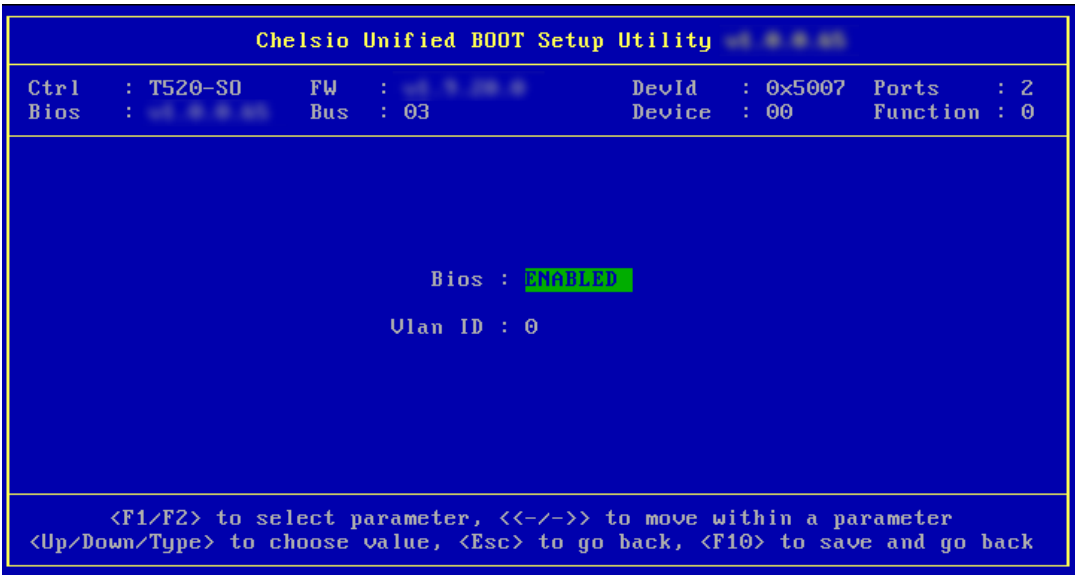
- vi. Choose PXE from the list to configure. Hit [Enter].



- vii. Use the arrow keys to highlight the appropriate function among the supported NIC functions and hit [Enter] to select.



- viii. Enable NIC function bios if not already enabled.



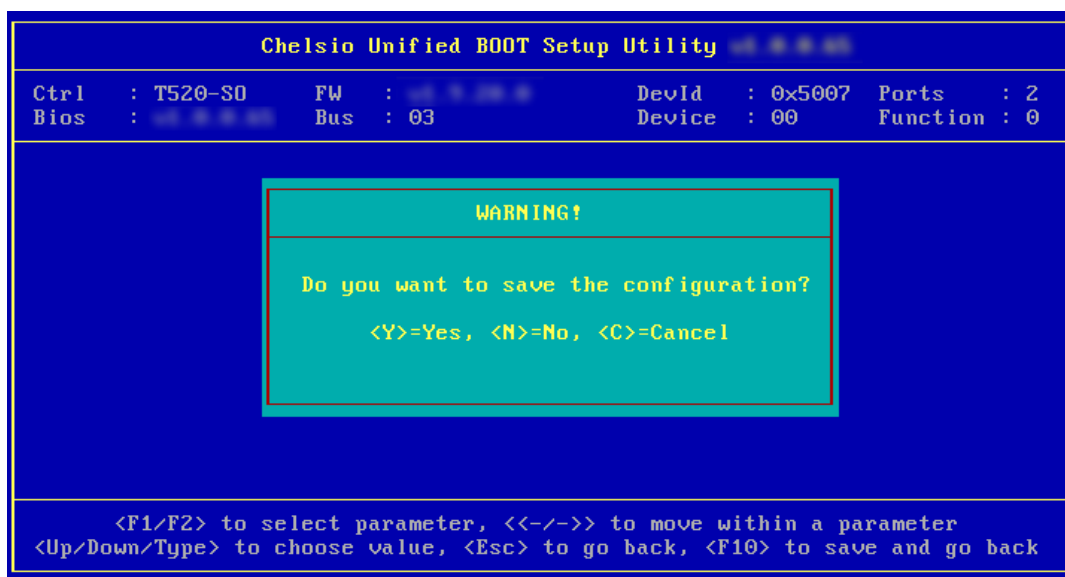
- ix. Choose the boot port to try the PXE boot. It is recommended to only enable functions and ports which are going to be used. Please note that enabling NIC Func 00 will enable port 0 for PXE, enabling NIC Func 01 will enable port 1 and so on for NIC function. Please refer the table below:



## 5. PXE boot process

NIC Function enabled	Ports enabled
NIC Func00	00
NIC Func01	01
NIC Func02	02
NIC Func03	03

- x. Hit [F10] or [Esc] and then [Y] to save configuration changes.

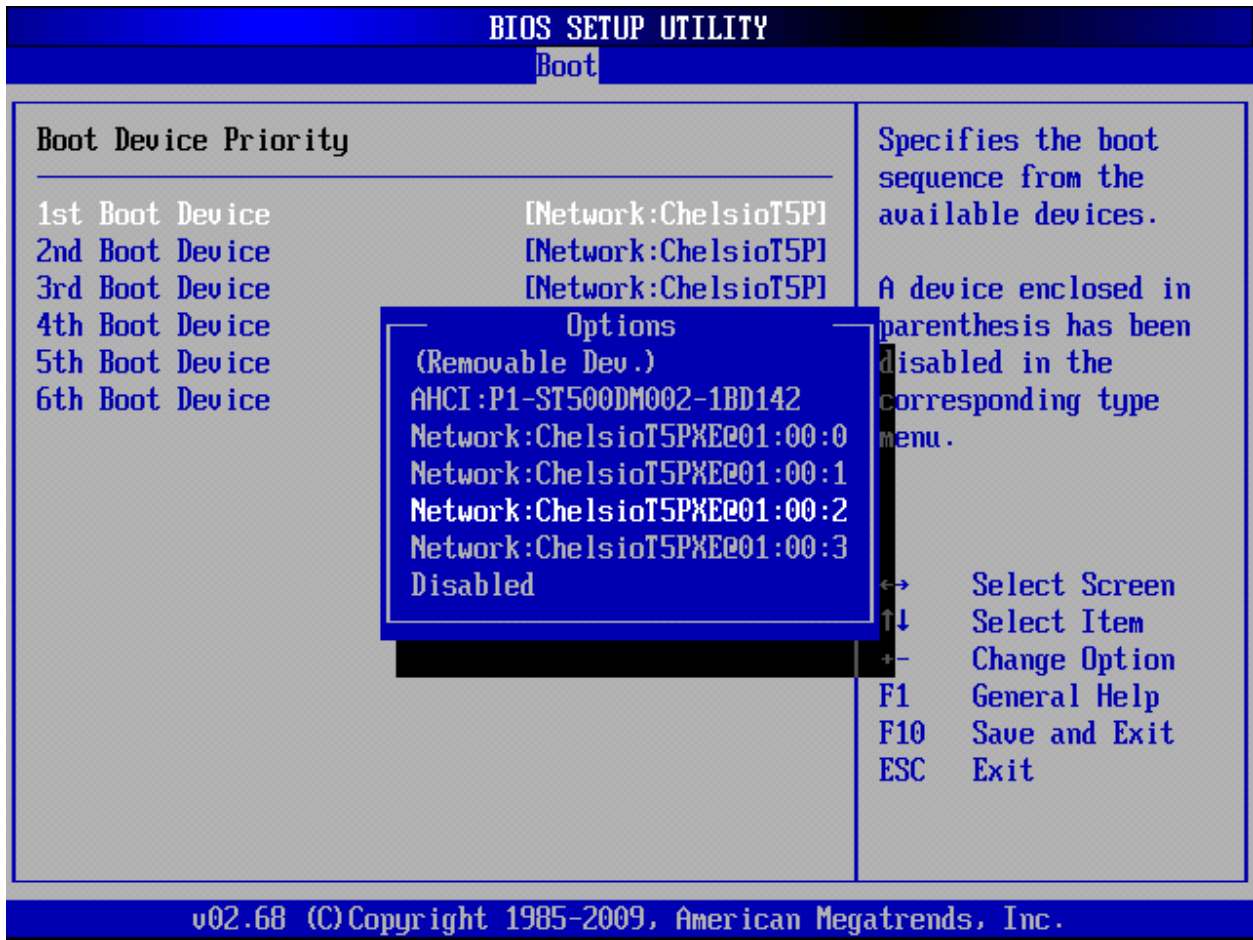


- xi. Reboot the system.
- xii. Hit [F2] or [DEL] or any other key as mentioned during system startup to enter the system setup.
- xiii. Allow the Chelsio option ROM to initialize and setup PXE devices. DO NOT PRESS ALT-S to skip Chelsio option ROM.

```
Chelsio Unified Boot BIOS
Copyright (C) 2003-2014 Chelsio Communications
Press <Alt-C> to Configure T4/T5 Card(s). Press <Alt-S> to skip BIOS.

Loading Chelsio PXE BIOS
PCI Bios: v3.0 PCI FW: v2.1 PnP BIOS: YES PMM Entry is passed by BIOS
PXE BIOS Loaded Successfully!
1: ChelsioT5PXE003:00:0
2: ChelsioT5PXE003:00:1
```

xiv. In the system setup, choose any of the Chelsio PXE devices as the first boot device.



xv. Reboot. DO NOT PRESS ALT-S to skip Chelsio option ROM, during POST.

xvi. Hit [F12] key when prompted to start PXE boot.

## 6. Appendix

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## 6. Appendix

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## 6. Appendix

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