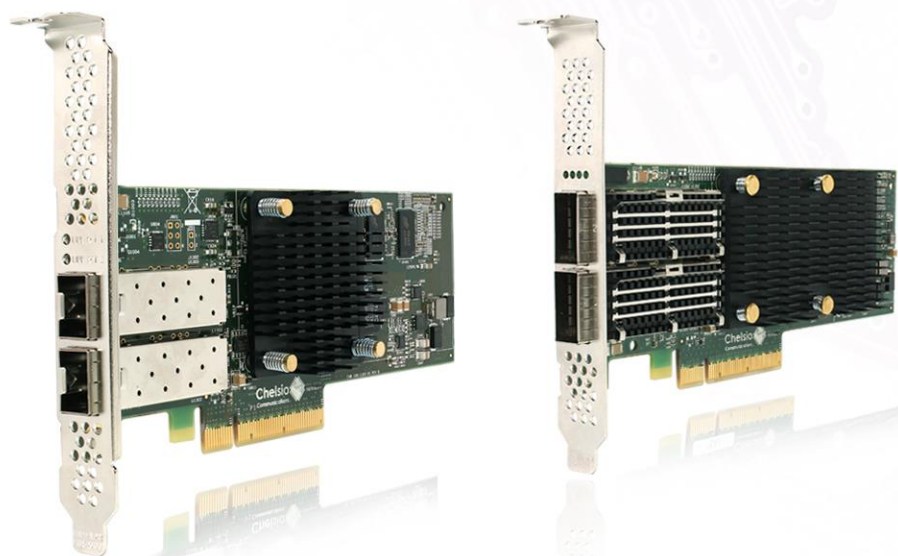




Chelsio T5 Unified Wire for Windows

Installation and User's Guide



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I. Chelsio Unified Wire

1. Introduction

Thank you for choosing Chelsio T5 Unified Wire adapters. These high speed, single chip, single firmware cards provide enterprises and data centers with high performance solutions for various Network and Storage related requirements.

The Terminator 5 (T5) is Chelsio's next generation of highly integrated, hyper-virtualized 10/40GbE controllers. The T5 is built around a programmable protocol-processing engine, with full offload of a complete Unified Wire solution comprising NIC, TOE, iWARP RDMA, iSCSI, FCoE and NAT support. It scales true 40Gb line rate operation from a single TCP connection to thousands of connections, and allows simultaneous low latency and high bandwidth operation thanks to multiple physical channels through the ASIC.

Ideal for all data, storage and high performance clustering applications, the T5 adapters enable a unified fabric over a single wire by simultaneously running all unmodified IP sockets, Fibre Channel and InfiniBand applications over Ethernet at line rate.

Designed for deployment in virtualized data centers, cloud service installations and high performance computing environments, Chelsio T5 adapters bring a new level of performance metrics and functional capabilities to the computer networking industry.

1.1. Features

Chelsio Unified Wire for Windows is an easy to use utility developed to provide installation of 64-bit Windows based drivers and tools for Chelsio's T5 Unified Wire adapters.

It consists of the following components:

- NDIS Function driver (NIC)
- NVGRE Offload
- VXLAN Task Offload
- SMB Direct
- RDMA/NVGRE concurrent (Mode 2)
- iWARP (ND)
- NDIS SR-IOV
- Virtual RSS (vRSS)
- Data Center Bridging (DCB)
- Unified Wire Manager (UM)
- UM for Win PE

1.2. Hardware Requirements

The Chelsio T5 Unified Wire supports all x64 architectures supporting PCIe (x4, x8) slots.

- AMD CPUs, 64-bit (x86_64/amd64)
- Intel CPUs, 64-bit (x86_64)

Note *The Chelsio Unified Wire supports 3.3v PCI bus only. Running an adapter on a PCI x4 slot is not recommended as performance will be significantly reduced by the limitations of PCI.*

Note *T4 family of adapters are not supported on Windows 2016 Server & 10 AU Client versions.*

1.3. Software Requirements

The Chelsio T5 Unified Wire software has been developed to run on Windows based platforms. To know more about the complete list of versions supported by each driver/software, please refer their respective sections.

Note *Drivers are WHQL certified.*

1.4. Package Contents

• Unified Wire Installer

Chelsio T5 Unified Wire comes with an interactive installer and support documentation. The documentation, consisting of README, Release Notes and User's Guide (this document), can be found in the <system_drive>\ChelsioUwire\docs\ directory after installing Chelsio Unified Wire.

• Zip Package

The zip package contains driver files, UM installer, UM for Win PE application, firmware binaries, adapter configuration binaries and support documentation (*docs* folder).

• Nano Server Installer

The Nano Server Installer package contains driver files, firmware binaries, adapter configuration binaries and support documentation (*docs* folder)

2. Hardware Installation

- i. Shutdown/power off your system.
- ii. Power off all remaining peripherals attached to your system.
- iii. Unpack the Chelsio adapter and place it on an anti-static surface.
- iv. Remove the system case cover according to the system manufacturer's instructions.
- v. Remove the PCI filler plate from the slot where you will install the Ethernet adapter.
- vi. For maximum performance, it is highly recommended to install the adapter into a PCIE x8 slot.
- vii. 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.
- viii. Secure the Chelsio adapter with a screw, or other securing mechanism, as described by the system manufacturer's instructions. Replace the case cover.
- ix. 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.
- x. Connect a fiber/twinax cable, multi-mode for short range (SR) optics or single-mode for long range (LR) optics, to the 10/40Gb Ethernet adapter or regular Ethernet cable for the 1Gb Ethernet adapter.
- xi. Power on your system.
- xii. Verify if the adapter was installed successfully. To do so, open **Device Manager** in **Control Panel**.
- xiii. 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 adapters, the physical functions are currently assigned as:

- Physical functions 0 - 3: for the SR-IOV functions
 - Physical function 4: for all NIC functions of the card
 - Physical function 5: for iSCSI
 - Physical function 6: for FCoE
 - Physical function 7: Currently not assigned
- xiv. Once the Unified Wire package is installed, 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 interface. However, for T5 40G 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. Software/Driver Installation

Chelsio Unified Wire can be installed using the Installer or the zip package. Refer the relevant section below depending on the method of installation selected.

3.1. Prerequisites

Please ensure that the following requirements are met, before proceeding with the installation:

3.1.1. Unified Wire Installer

Download and install the latest Microsoft Visual C++ Redistributable Packages for Visual Studio (x86 and x64).

3.1.2. NDIS SR-IOV

Enable SR-IOV in the machine.

3.1.3. Unified Wire Manager (Installer & Zip Package)

The Unified Wire installer has been designed to install Unified Wire Manager (UM) along with driver components by default, hence no separate installation is required. In case of zip package, you will have to manually run the UM installer located in *ChelsioUwire-x.x.x.xx/UM* folder (See [Unified Wire Manager](#) chapter for more information). Based on the Windows version running on the system, the three UM components, i.e. *Management Agent*, *Client* and *Station* will be installed. If an older version of UM exists, the installer will upgrade it to the version provided in the package.

- **Management Agent**

If you wish to install Management Agent, please make sure that **Microsoft .Net Framework 3.5** is installed before proceeding with the installation.

- **Management Station**

If you wish to install Management Station, please make sure that the following requirements are met before proceeding with the installation:

- i. Install **Python 2.6.6 (32-bit)**. (Download from [here](#))
- ii. Ensure that the path to python binary (typically *C:\Python26*), is added to PATH system variable.
- iii. Install **Apache HTTP Server 2.2** with SSL. (Download from [here](#))
- iv. If the Apache Server is running, it should be stopped before starting the installation process.

3.2. Unified Wire Installer

Chelsio Unified Wire Installer provides two methods of installation: **GUI** or **CLI** mode. GUI mode provides an interactive GUI installer with customizable options. Whereas, CLI mode enables unattended installation of Chelsio drivers and software thereby relieving the user from monitoring the installation process and providing input via dialog boxes.

3.2.1. Enabling Test Signing

In case the drivers in the package are not WHQL certified, follow the steps mentioned below to enable test signing on your system:

- i. Goto Start->Run command option, enter "cmd" and press OK. This will open the command prompt utility.
- ii. Run the following command:

```
C:\Users\Administrator> bcdedit /set testsigning on
```

- iii. Reboot the machine for the changes to take effect.

3.2.2. GUI mode (Installer)

- i. Run the **ChelsioUwire-x.x.x.xx.exe** installer application.
- ii. Click **Next** for the Chelsio End User License Agreement Window.

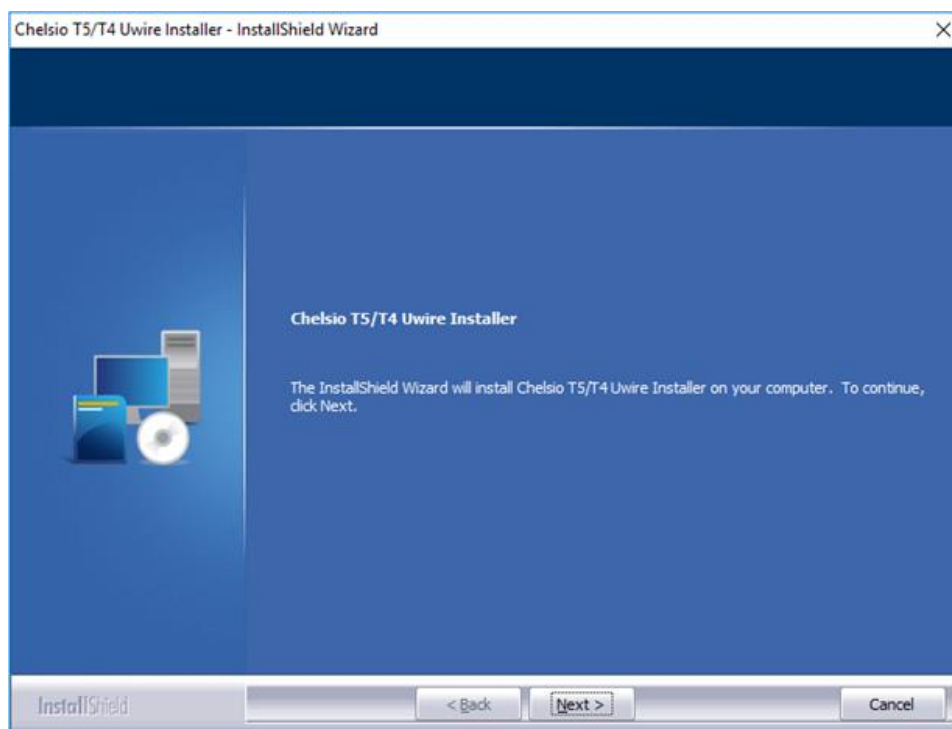


Figure 1 - Unified Wire installer welcome window

- iii. Select the radio button **I accept the terms of the license agreement** and click **Next**.

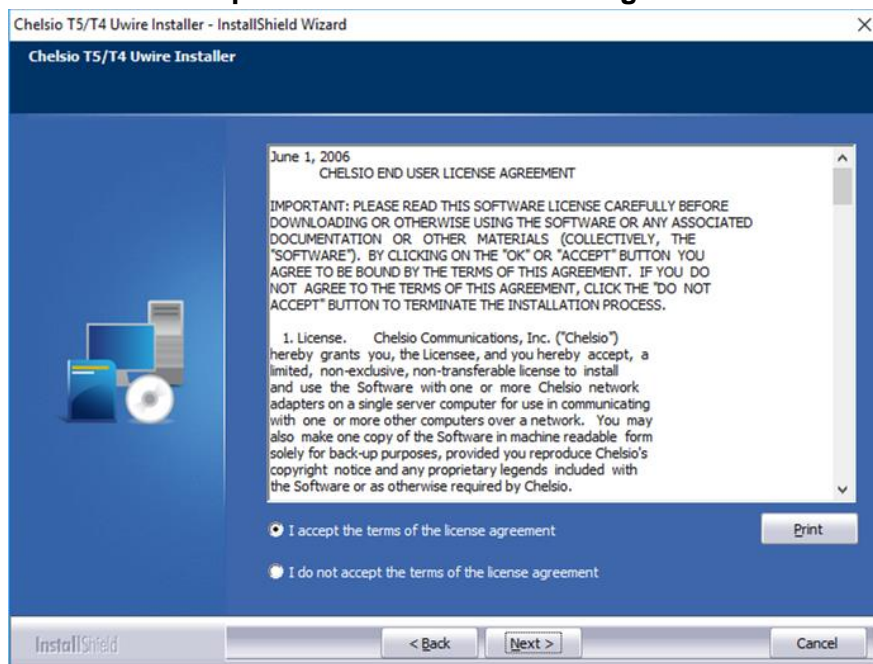


Figure 2 - Chelsio EULA window

- iv. Now, either select **Complete** for complete package installation or else select **Custom** radio button to customize the installation.

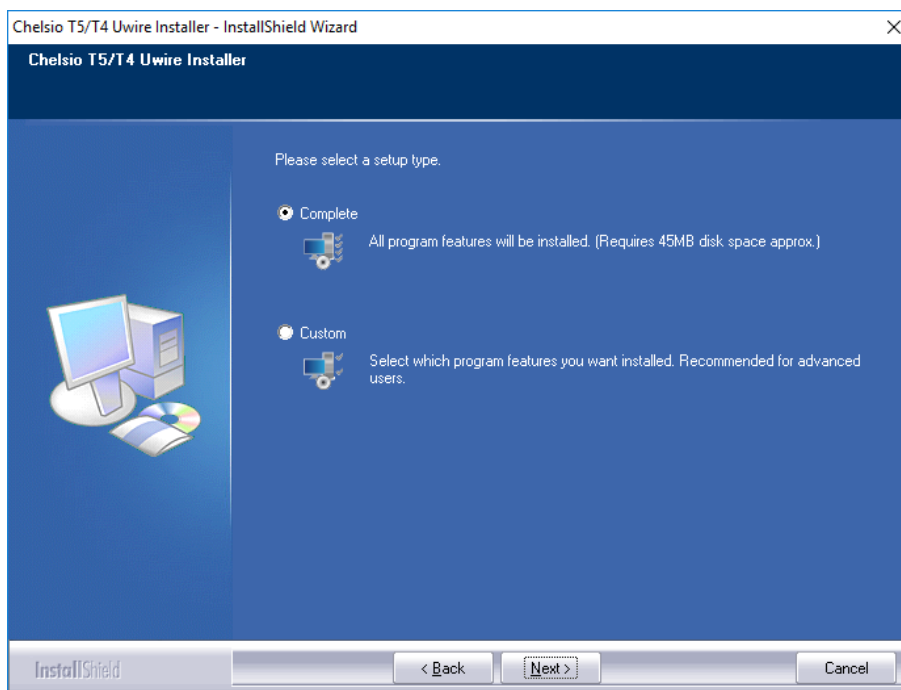


Figure 3 - Select setup (installation) type

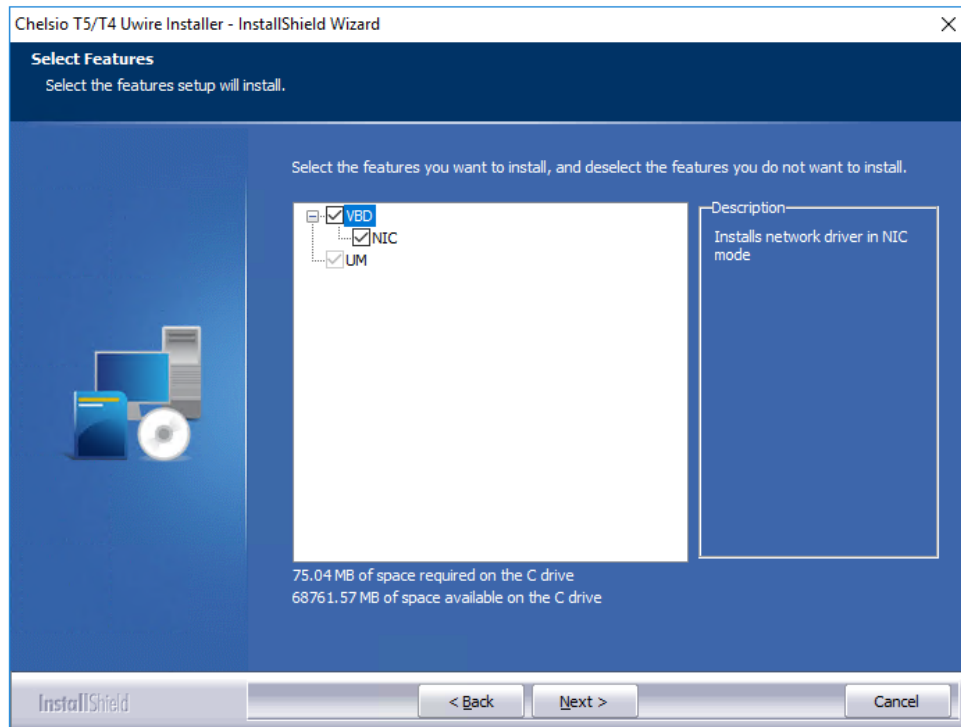


Figure 4 - Customizing the installation

- v. Click **Install** to start the installation.

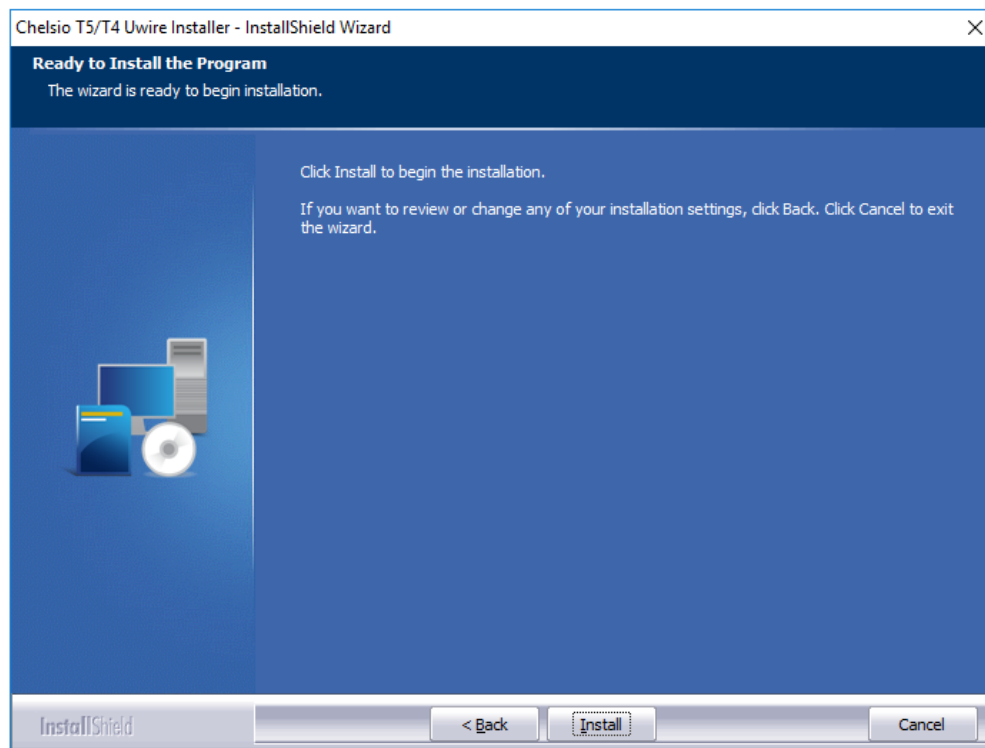


Figure 5 - Start installation

- vi. Selected driver components will now be installed.

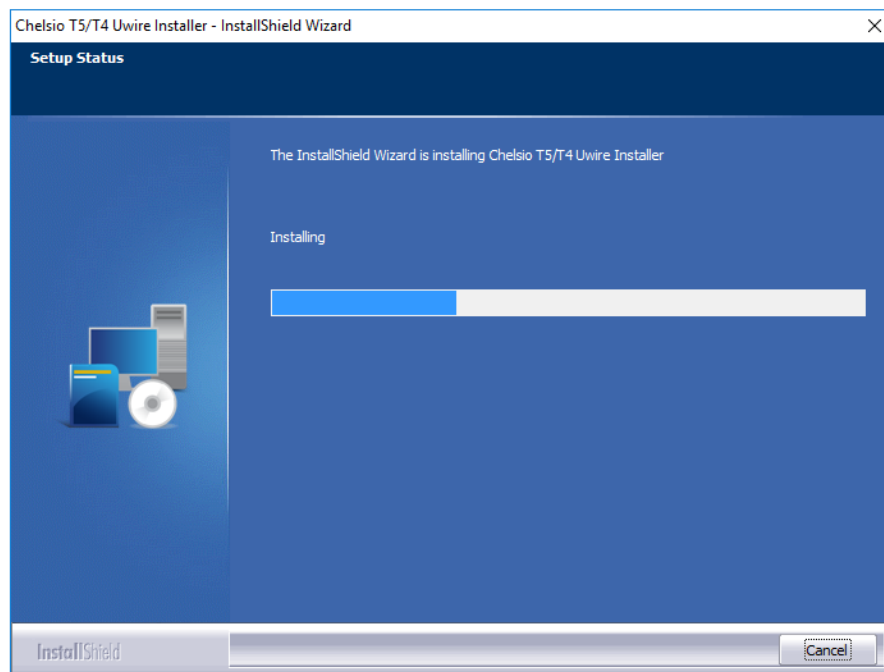


Figure 6 - Installation in progress

- vii. After successful installation of driver(s), the Unified Wire Manager installer will be invoked. Click **Next** for the Chelsio End User License Agreement Window.

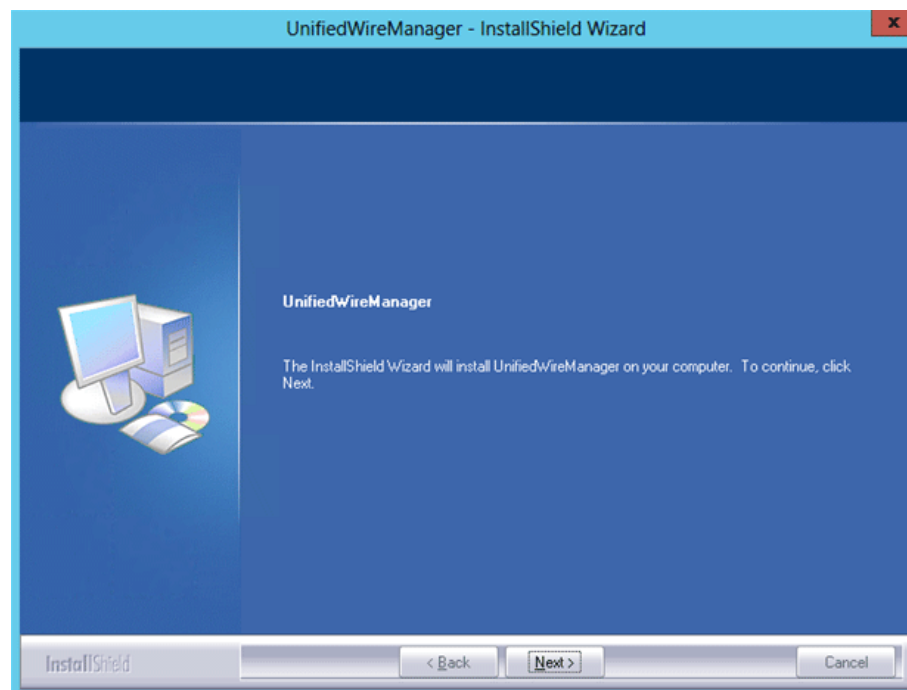


Figure 7 - UM installer welcome window

viii. Select the radio button **I accept the terms of the license agreement** and click **Next**.

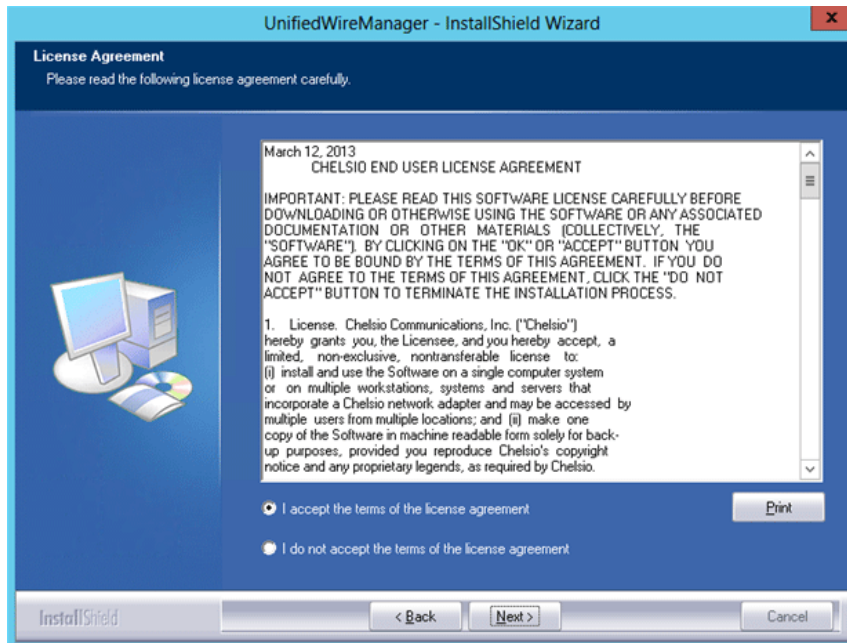


Figure 8 - Chelsio EULA window

ix. The next window will display the prerequisites for various UM components. Ensure that they are met before proceeding. Click **Next**.

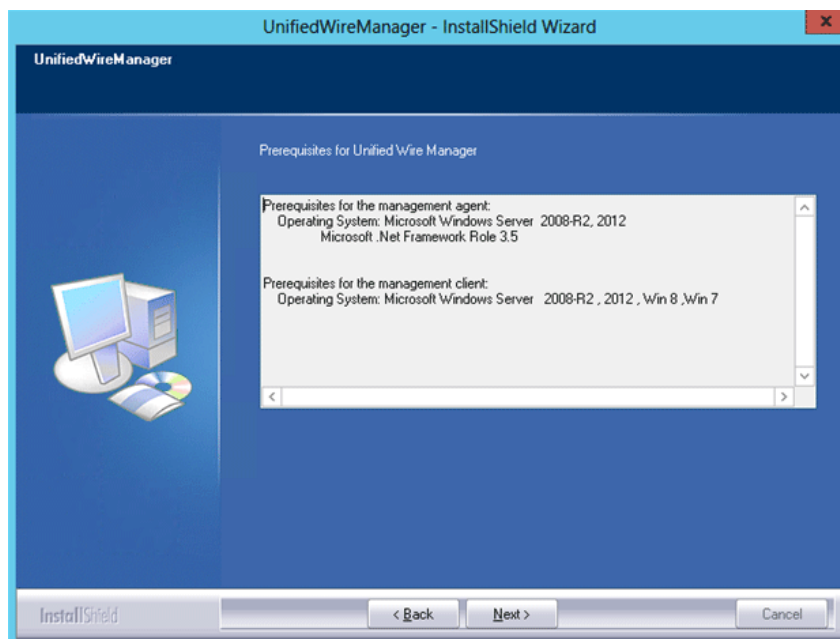


Figure 9 - UM prerequisites window



Note

If prerequisites mentioned are not met, installation of UM will fail. Driver installation will however continue.

- x. Now, either select **Complete** for complete package installation or else select **Custom** radio button to customize the installation. The **Custom** option provides the option to change the installation path and which UM components to install. Click **Next**.



Note

If Management Station is selected, please make sure that all related prerequisites are met before proceeding (See [Prerequisites](#)) or else the component will be skipped during installation.

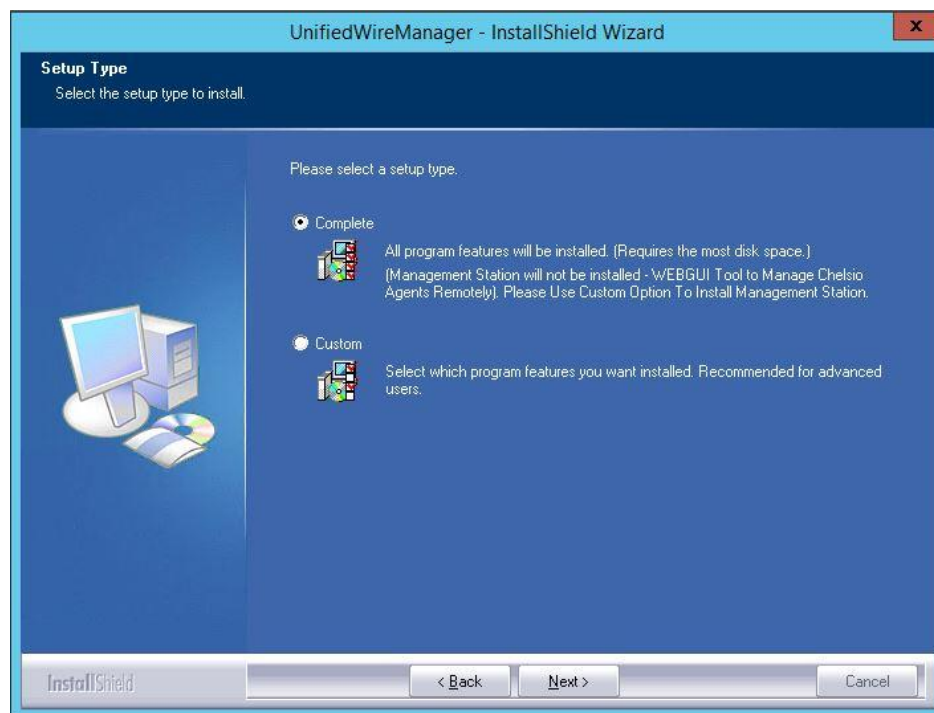


Figure 10 - Select setup (installation) type

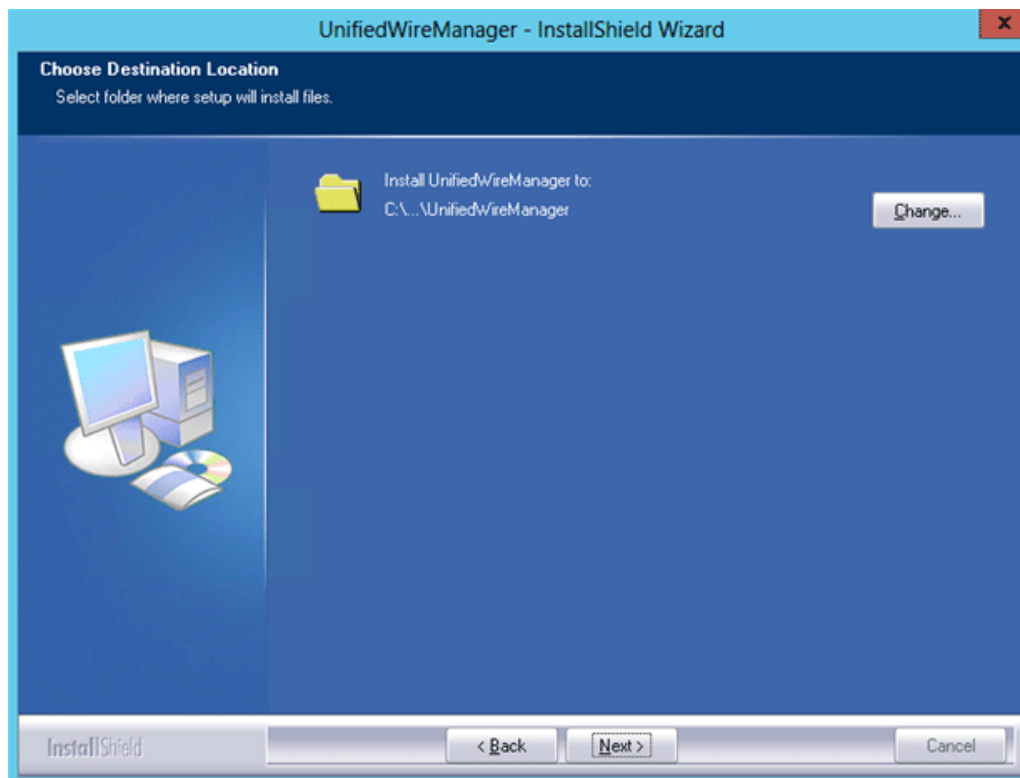


Figure 11 - Changing UM installation path

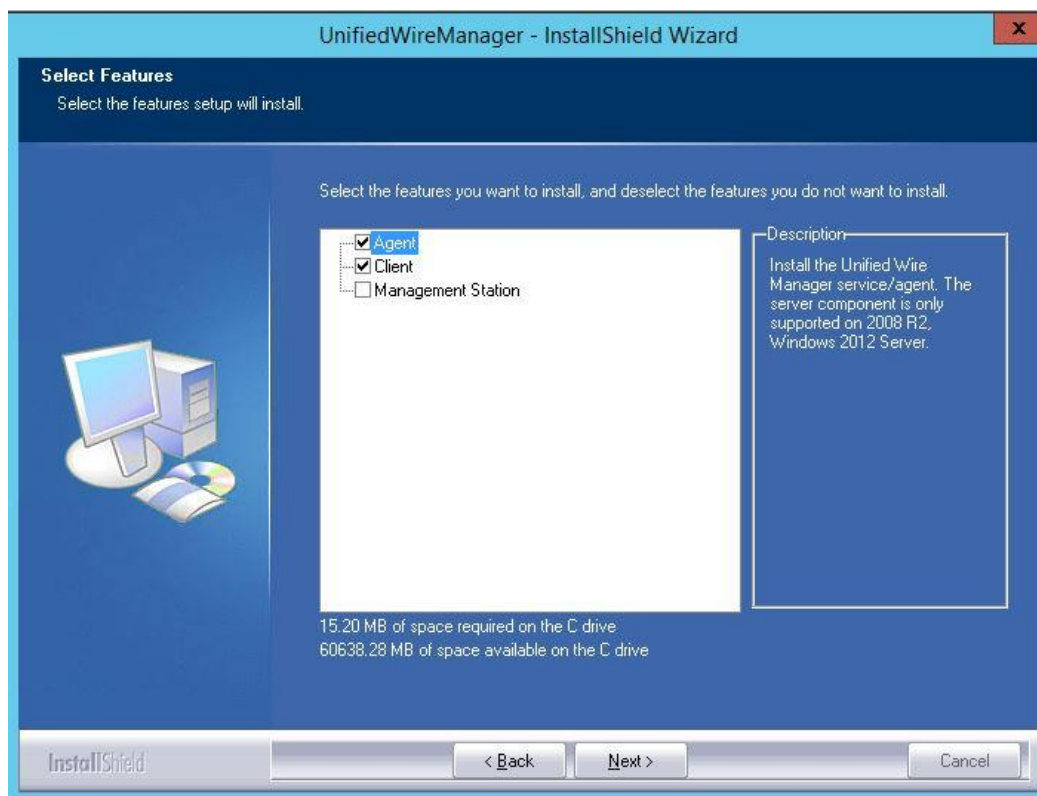


Figure 12 - Selecting UM components to install

- xi. Click **Install** to start the installation. Unified Wire Manager will now be installed with the selected options.

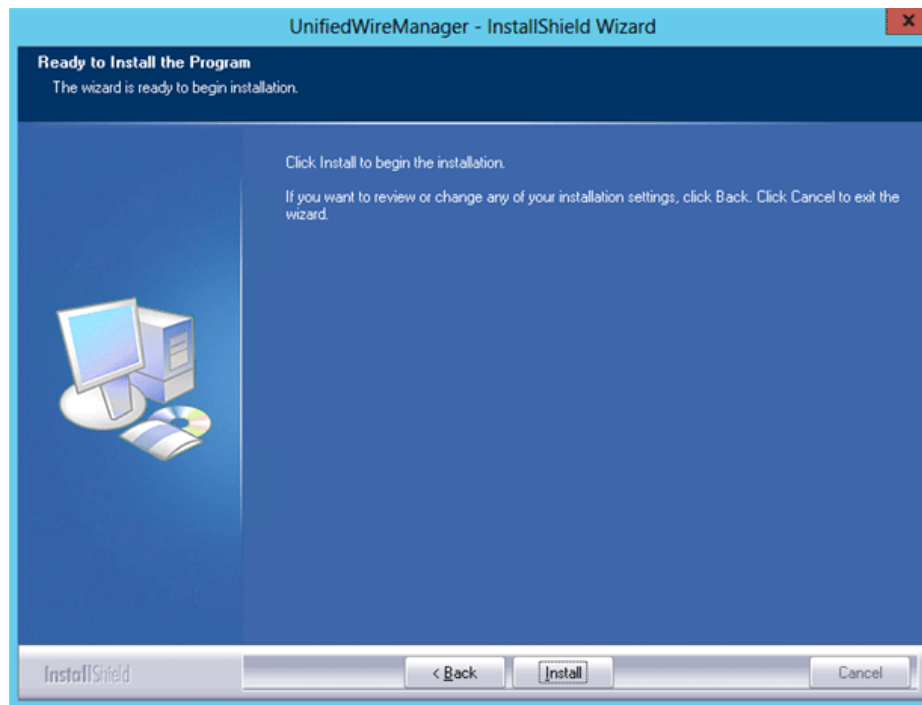


Figure 13 - Starting UM installation

- xii. Click **Finish** to exit from the UM Installer.

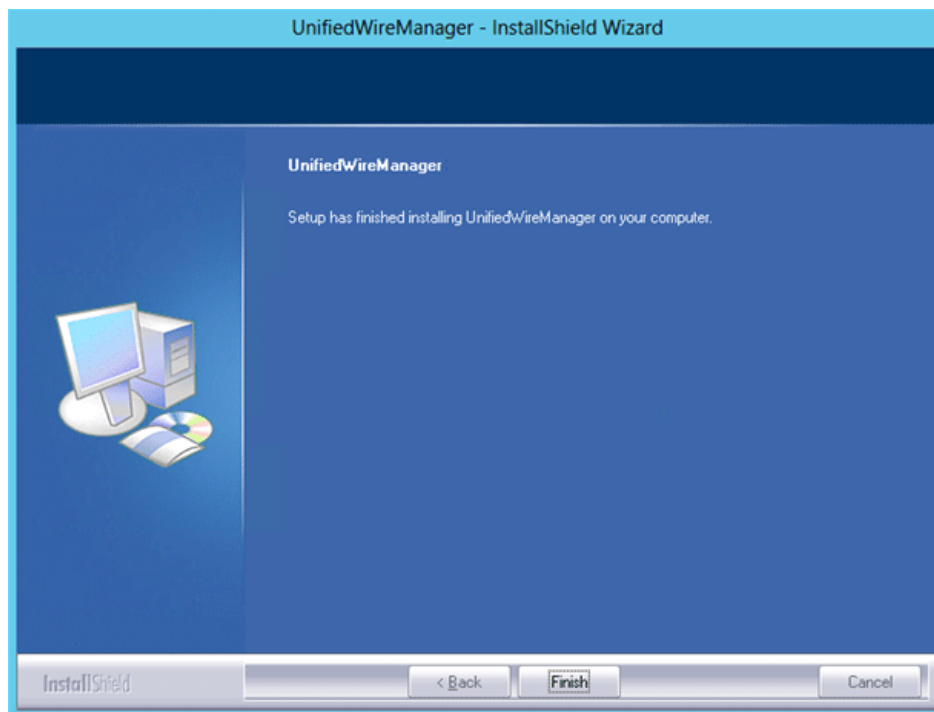


Figure 14 - Finishing UM installation

xiii. Click **Finish** to exit from the Unified Wire Installer.

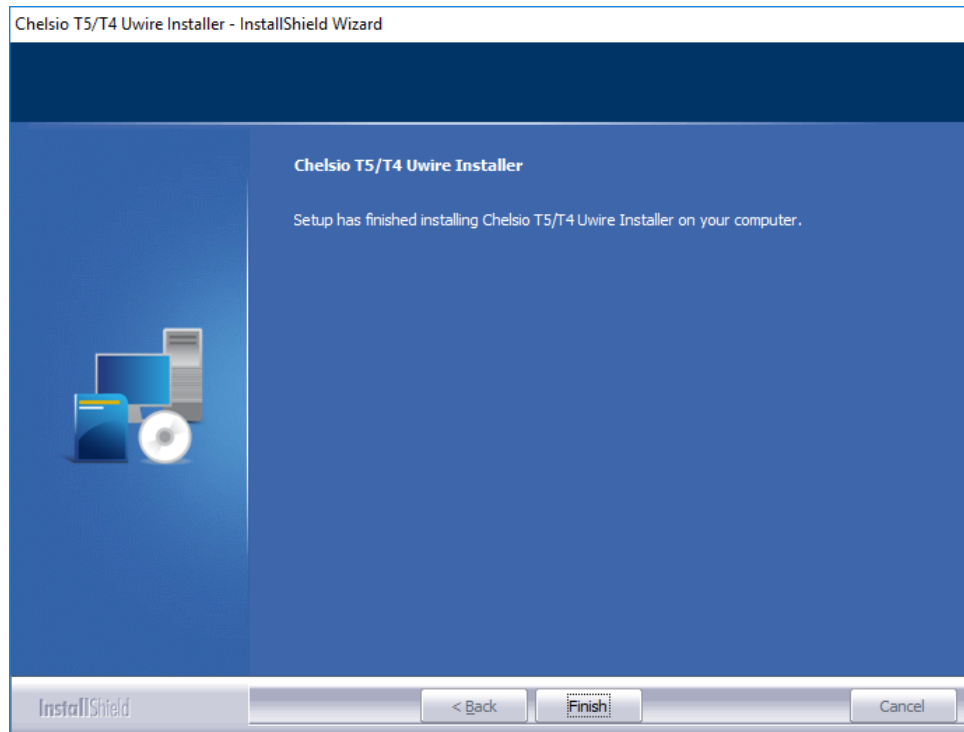


Figure 15 - Finishing Unified Wire installation

3.2.3. CLI mode (Silent Installation)

To install drivers/software using this feature, open **command prompt** and execute the following command:

```
C:\Users\Administrator>ChelsioUwire-x.x.x.xx.exe -in <driver(s)>
```

E.g.:

```
C:\Users\Administrator>ChelsioUwire-x.x.x.xx.exe -in all
```

The above command will install all the drivers and UM Agent.


To add a driver to an existing list of already installed drivers, use the following command:

```
C:\Users\Administrator>ChelsioUwire-x.x.x.x.exe -add <driver(s)>
```

To know more about other parameters and options, execute the following command:

```
C:\Users\Administrator>ChelsioUwire-x.x.x.xx.exe -help
```

The above command will create a help file, *ChelsioUwire-x.x.x.xx_help.txt*, in the present working directory which contains the complete list of command line syntax required for performing all the necessary CLI operations.

 **Note** *A log file, ChelsioUwire-x.x.x.xx.log, is created in the same directory which keeps a record of all the commands executed and their results.*


3.3. Nano Server Installer

Follow the steps mentioned below to install Unified Wire on a Nano Server machine:

- i. Download and unzip the driver package *Chelsio-NANO-installer-x.x.x.xx.zip*
- ii. Connect to Nano Server machine and copy the package contents.
- iii. Open PowerShell with administrative privileges and change your working directory to *Chelsio-NANO-installer-x.x.x.xx*
- iv. Run the installer

```
[nanomachine-ip]: PS D:\Chelsio-NANO-installer-x.x.x.xx> .\install.ps1 -in  
all
```

A log file, *Chelsio-installer.log*, containing installation summary will be created in the same folder.

 **Note** *In case of non-WHQLed drivers, if Nano Server is freshly installed, the installer will enable Test Signing. Reboot the machine and run the installer again.*

To know more about Installer parameters and options, view the help:

```
[nanomachine-ip]: PS D:\Chelsio-NANO-installer-x.x.x.xx> .\install.ps1 -h
```

3.4. Zip Package

Chelsio Unified Wire zip package provides two methods of installation: **Manual** and using **Offline Windows Image**. In Manual method, the driver components will have to be individually installed using the Device Manager. Using the second method, you can add Chelsio driver components to an offline OS image. The image can then be used to install Windows on your system.

3.4.1. Enabling Test Signing

In case the drivers in the package are not WHQL certified, please follow the steps mentioned below to enable test signing before installing Unified Wire:

1. Open command prompt and run the following command to enable test signing:


```
C:\Users\Administrator>bcdedit /set testsigning on
```

2. Change your working directory to *ChelsioUwire-x.x.x.xx/Selfsign/* and run the following commands:

```
C:\ChelsioUwire-x.x.x.xx\Selfsign> .\certmgr.exe -add chelsiocert.cer -s -r localmachine root
C:\ChelsioUwire-x.x.x.xx\Selfsign> .\certmgr.exe -add chelsiocert.cer -s -r localmachine trustedpublisher
```

3. Reboot the machine for the changes to take effect.

3.4.2. Manual

-  **Important**
 - *The driver components need to be installed strictly in the order described here. Using any other order is not supported.*
 - *Before proceeding, open Device Manager and disable NDIS Miniport driver (Network adapters->Chelsio Network Adapter) followed by Virtual Bus Driver (System devices->Chelsio T5 10G/40G Bus Enumerator).*

- **Virtual Bus Driver**

- i. Open **Device Manager** (Control Panel -> System & Security-> System -> Device Manager), click on **System Devices**, right click on **Chelsio T5 10G/40G Enumerator** and select **Update Driver Software**.
- ii. Select **Browse my computer for driver software**.
- iii. Select **Let me pick from a list of device drivers on my computer** and click **Next**.
- iv. Click on **Have Disk** Button and on the next screen browse for **chvbdx64.inf** file and click **Open** and then **OK**.

- v. Click **Next** and driver installation will progress. Click **Finish** once the installation is complete.

- **NDIS Miniport driver**

- i. Open **Device Manager** (Control Panel -> System & Security-> System -> Device Manager), click on **Network Adapters**, right click on the Chelsio network adapter and select **Update Driver Software**.
- ii. Select **Browse my computer for driver software**.
- iii. Select **Let me pick from a list of device drivers on my computer**.
- iv. Click on **Have Disk** Button and on the next screen browse for **chnetx64.inf** file and click **Open** and then **OK**. Click **Next** and driver installation will progress. Click **Finish** once the installation is complete.

Repeat the above steps for the other adapters.

- **Generic Function**

- i. Open **Device Manager** (Control Panel -> System & Security-> System -> Device Manager), click on **Network Adapters**, right click on **Chelsio T5 10G/40G Generic Function** and select **Update Driver Software**.
- ii. Select **Browse my computer for driver software**.
- iii. Select **Let me pick from a list of device drivers on my computer**.
- iv. Click on **Have Disk** Button and on the next screen browse for **chnullx64.inf** file and click **Open** and then **OK**.
- v. Click **Next** and driver installation will progress. Click **Finish** once the installation is complete.

3.4.3. Offline Windows Image

You can use Windows Deployment Image Servicing and Management (DISM) tool to add Chelsio driver components (.inf files) to an offline Windows image. For more information, visit the following links:

- <http://technet.microsoft.com/en-us/library/hh825070.aspx>
- <http://blogs.technet.com/b/heyscriptingguy/archive/2012/09/27/use-the-powershell-dism-cmdlets-to-manage-windows-8.aspx>

3.4.4. Nano Server: Driver Installation

Before installing Nano Server, the Chelsio driver components need to be added to the boot image file. The following steps explain step-by-step procedure to add Chelsio VBD, NDIS and Null drivers to the image file:

- i. Copy *NanoServer.wim* image file from Windows Server 2016 (build>=10586) ISO to a desired folder on your hard drive.
- ii. Open a command prompt with administrative privileges (elevated command prompt).

iii. Determine the index number of image file.

```
C:\Windows\system32>dism /get-wiminfo /wimfile:<path>\NanoServer.wim
```

iv. Mount the image file:

```
C:\Windows\system32>dism /mount-wim /wimfile:<path>\NanoServer.wim  
/index:<index_number> /mountdir:<mount_directory>
```

v. Copy the Microsoft OEM driver set package from *NanoServer\Packages* folder in the ISO to your hard drive and add it to the image file:

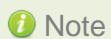
```
C:\Windows\system32>dism /image:<path>\<mount_directory> /add-package  
/packagepath:<path>\Microsoft-NanoServer-OEM-Drivers-Package.cab
```

vi. Add Chelsio drivers to the image file:

```
C:\Windows\system32> dism /image:<path>\<mount_directory> /add-driver  
/driver:<path>\ChelsioUwire-x.x.x.xx\chvbdx64.inf
```

```
C:\Windows\system32> dism /image:<path>\<mount_directory> /add-driver  
/driver:<path>\ChelsioUwire-x.x.x.xx\chnetx64.inf
```

```
C:\Windows\system32> dism /image:<path>\<mount_directory> /add-driver  
/driver:<path>\ChelsioUwire-x.x.x.xx\chnulx64.inf
```




Note *In case of non-WHQLed drivers, run the above commands with the /forceunsigned option. Here's an example for the first command:*

```
C:\Windows\system32> dism /image:<path>\<mount_directory> /add-driver  
/driver:<path>\ChelsioUwire-x.x.x.xx\chvbdx64.inf /forceunsigned
```

vii. Commit and save the image file:

```
C:\Windows\system32>dism /unmount-wim /mountdir:<mount_directory> /commit
```

- viii. Finally, add the image file to WDS server and install Nano Server (with Chelsio drivers) using PXE boot.
- ix. The Nano Server machine will reboot.

 **Note** *In case of non-WHQLed drivers, run the following command to enable test signing and reboot the machine again:*

```
[nanomachine-ip]: PS D:\> bcdedit /set testsigning on
```

4. Configuring Chelsio Network Interfaces

In order to test Chelsio adapters' features, it is required to use at least two machines, each with Chelsio's network adapters. These machines can be connected directly (back-to-back) or with a switch.

4.1. Configuring 40G Adapters

You can use the **chelsio_adapter_config.ps1** script to configure Chelsio T5 40G adapters in any of the following three operational modes:

- **DEFAULT (2X40G)**: This is the default mode of operation where each port functions as 40Gbps link. The port nearest to the motherboard will appear as the first network interface (Port 0).
- **SPIDER (4X10G)**: In this mode, port 0 functions as 4 10Gbps links and port 1 is disabled.
- **QSA (2X10G)**: This mode adds support for QSA (QSFP to SFP+) modules, enabling smooth, cost-effective, connections between 40 Gigabit Ethernet adapters and 1 or 10 Gigabit Ethernet networks using existing SFP+ based cabling. The port farthest from the motherboard will appear as the first network interface (Port 0).

4.1.1. Windows GUI Machine (Installer & Zip Package)

- In case of Installer, the configuration script and cxgbtool.exe will be copied to `<system_drive>\Windows\System32` folder during installation.

If you are using the zip package, copy *cxgbtool.exe* from *ChelsioUwire-x.x.x.xx* folder to `<system_drive>\Windows\System32` and change your working directory to *ChelsioUwire-x.x.x.xx\Adapter Configuration*.

- Open PowerShell with administrative privileges.
- Run the adapter configuration script and select *Windows GUI* (option 1) as the Windows version. Hit [Enter].

Installer:

```
PS C:\Users\Administrator> chelsio_adapter_config.ps1
```

```
PS C:\Users\Administrator> chelsio_adapter_config.ps1
  1. Windows GUI
  2. Windows Nano Server
Input: 1

chelsio_adapter_config Version 2.0

Please stop all the traffic on Chelsio adapters before updating !!
```

Figure 16 - Adapter configuration utility (Installer)

Zip Package:

```
PS D:\ChelsioUwire-x.x.x.xx\Adapter Configuration>
.\chelsio_adapter_config.ps1
```

```
PS D:\ChelsioUwire-x.x.x.xx\Adapter Configuration> .\chelsio_adapter_config.ps1
1. Windows GUI
2. Windows Nano Server
Input: 1

chelsio_adapter_config Version 2.0
Please stop all the traffic on Chelsio adapters before updating !!
```

Figure 17 - Adapter configuration utility (zip package)

- iv. Enter the index of the 40G adapter for which the configuration needs to be updated. Hit [Enter].

```
Select the Adapter
1. T580-S0-CR      S/N:PT39131112
Input : 1
```

Figure 18 - Selecting adapter

- v. Select *Port settings* (option 3) as the configuration type. Hit [Enter].

```
Choose the configuration type:
1. NON-SRIOV (Default)
2. SRIOV
3. Port settings
Input : 3
```

Figure 19 - Port settings

- vi. Select the operation mode and then enter y to confirm.

```
Choose the type:
1. DEFAULT (2 x 40G)
2. SPIDER (4 x 10G)
3. QSA (2 x 10G)
Input : 2
Do you want to continue (y/n): y
Successfully updated the selected configuration type.
Verification: Passed
```

Figure 20 - Operation mode

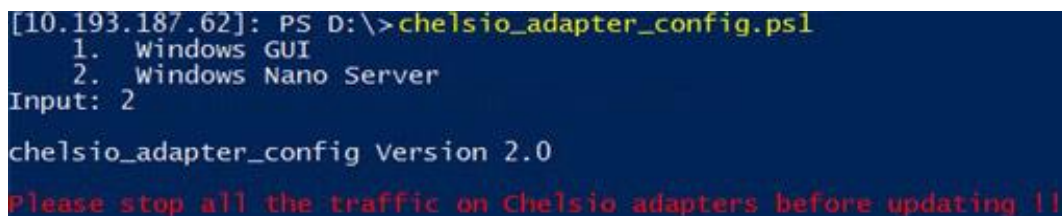
- vii. Open **Device Manager**, click on **System Devices** and right-click on the 40G Chelsio adapter selected in step (iv).
- viii. Select **Disable** and then **Enable** for changes to take effect.

4.1.2. Nano Server Machine (Nano Server Installer & Zip Package)

- i. Connect to Nano Server Machine.
- ii. In case of Nano Server Installer, the configuration script and cxgbnano.exe utility will be copied to <system_drive>\Windows\System32 during installation.
If you are using the zip package, copy *cxgbnano.exe* from *ChelsioUwire-x.x.x.xx* folder to <system_drive>\Windows\System32 and change your working directory to *ChelsioUwire-x.x.x.xx\Adapter Configuration*.
- iii. Run the adapter configuration script and select *Windows Nano Server* (option 2) as the Windows version. Hit [Enter].

Nano Server Installer:

```
[nanomachine-ip]: PS D:\> chelsio_adapter_config.ps1
```



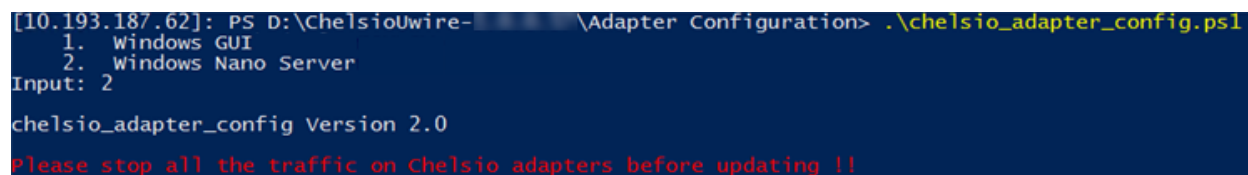
```
[10.193.187.62]: PS D:\>chelsio_adapter_config.ps1
  1.  Windows GUI
  2.  Windows Nano Server
Input: 2

chelsio_adapter_config Version 2.0
Please stop all the traffic on Chelsio adapters before updating !!
```

Figure 21 - Adapter configuration utility (Nano Server Installer)

Zip Package:

```
[nanomachine-ip]: PS D:\ChelsioUwire-x.x.x.xx\Adapter Configuration>
.\chelsio_adapter_config.ps1
```

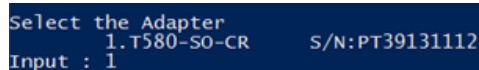


```
[10.193.187.62]: PS D:\ChelsioUwire-x.x.x.xx\Adapter Configuration> .\chelsio_adapter_config.ps1
  1.  Windows GUI
  2.  Windows Nano Server
Input: 2

chelsio_adapter_config Version 2.0
Please stop all the traffic on Chelsio adapters before updating !!
```

Figure 22 - Adapter configuration utility (zip package)

- iv. Enter the index of the 40G adapter for which the configuration needs to be updated



```
Select the Adapter
  1. T580-S0-CR      S/N:PT39131112
Input : 1
```

Figure 23 - Selecting adapter

- v. Select *Port settings* (option 3) as the configuration type. Hit [Enter].

```
Choose the configuration type:
  1. NON-SRIOV (Default)
  2. SRIOV
  3. Port settings
Input : 3
```

Figure 24 - Port settings

- vi. Select the operation mode and then enter y to confirm.

```
Choose the type:
  1. DEFAULT (2 x 40G)
  2. SPIDER (4 x 10G)
  3. QSA (2 x 10G)
Input : 2
Do you want to continue (y/n): y
Successfully updated the selected configuration type.
Verification: Passed
```

Figure 25 - Operation mode

- vii. Determine the Instance ID of the adapter using the *Get-PnpDevice* command:

```
[10.193.187.132]: PS D:\ChelsioWire-... \Adapter Configuration> Get-PnpDevice (Where-Object {$_.FriendlyName -like "Chelsio*"} | select name, InstanceId, status)

name                                     InstanceId                                     status
----
Chelsio T580-CR 40G Generic function    PCI\VEN_1425&DEV_5500&SUBSYS_00001425&REV_00\4&110E1C6D&0A00508 OK
Chelsio T580-CR 40G Generic function    PCI\VEN_1425&DEV_5000&SUBSYS_00001425&REV_00\4&110E1C6D&0A00008 OK
Chelsio T580-CR 40G Generic function    PCI\VEN_1425&DEV_5000&SUBSYS_00001425&REV_00\4&110E1C6D&0A00108 OK
Chelsio T580-CR 40G Generic function    PCI\VEN_1425&DEV_5000&SUBSYS_00001425&REV_00\4&110E1C6D&0A00208 OK
Chelsio T580-CR 40G Generic function    PCI\VEN_1425&DEV_5000&SUBSYS_00001425&REV_00\4&110E1C6D&0A00308 OK
Chelsio T580-CR 40G Generic function    PCI\VEN_1425&DEV_5600&SUBSYS_00001425&REV_00\4&110E1C6D&0A00608 OK
Chelsio T580-CR 40G Bus Enumerator      PCI\VEN_1425&DEV_5400&SUBSYS_00001425&REV_00\4&110E1C6D&0A00408 OK
Chelsio Network Adapter #5              CHT5BUS\CHNET\5&1501FB91&0A00000 OK
Chelsio Network Adapter #6              CHT5BUS\CHNET\5&1501FB91&0A00001 OK
```

Figure 26 - Adapter instance IDs

- viii. Use the Instance ID obtained from the previous step to disable and enable the adapter for changes to take effect.

```
[10.193.187.132]: PS D:\ChelsioWire-... \Adapter Configuration> disable-PnpDevice "PCI\VEN_1425&DEV_5400&SUBSYS_00001425&REV_00\4&110E1C6D&0A00408"

Confirm
Are you sure you want to perform this action?
Performing the operation "Disable" on target "Win32_PnPEntity: Chelsio T580-CR 40G Bus Enumerator (DeviceID = "PCI\VEN_1425&DEV_5400&SUBSYS_00001425&REV_00\4&110E1C6D&0A00408")".
[Y] Yes [A] Yes to All [N] No [L] No to All [?] Help (default is "Y"): Y
[10.193.187.132]: PS D:\ChelsioWire-5.0.0.51\Adapter Configuration> enable-PnpDevice "PCI\VEN_1425&DEV_5400&SUBSYS_00001425&REV_00\4&110E1C6D&0A00408"

Confirm
Are you sure you want to perform this action?
Performing the operation "Enable" on target "Win32_PnPEntity: Chelsio T580-CR 40G Bus Enumerator (DeviceID = "PCI\VEN_1425&DEV_5400&SUBSYS_00001425&REV_00\4&110E1C6D&0A00408")".
[Y] Yes [A] Yes to All [N] No [L] No to All [?] Help (default is "Y"): Y
[10.193.187.132]: PS D:\ChelsioWire-... \Adapter Configuration>
```

Figure 27 - Committing changes

4.2. Assigning IP address

- Double click on the Network Connections icon and choose the Chelsio card entry and double click it.
- Click on the Properties button from the Local Area Connection X Status.
- Select "Internet Protocol (TCP/IP)" from the list and click on Properties button below it.

- iv. From the Internet Protocol (TCP/IP) Properties window, assign an IP Address (e.g. 192.169.1.10) and subnet mask (e.g. 255.255.255.0).
- v. Click on Ok and close on the other window.
- vi. Check to see if you can ping to some other address on this subnet.

5. Mass Deployment (Installer)

Using Unified Wire Installer's **Mass Deployment** feature, you can flash or erase Option ROM on multiple systems (nodes) simultaneously. The Installer utilizes **Unified Wire Manager's** Agent and Client components to implement this feature. The Client component has to be installed on the host machine and the Agent component on the remote nodes.

5.1. Pre-deployment Configuration

A configuration file containing directives is required by the Installer during installation, flashing and erasing option ROM. Follow the steps mentioned below to generate and configure the file:

- i. Copy the Unified Wire Installer (ChelsioUwire-x.x.x.xx.exe) to a shared location accessible to all the nodes.
- ii. Open Windows PowerShell with administrative privileges (*right-click and select Run as Administrator*) and run the following command:

```
PS C:\Users\Administrator> .\ChelsioUwire-x.x.x.xx.exe -sampleconfig
```

The above command will generate a sample configuration file, *RemoteMachineconfig.txt*. It contains the following directives:

```
StartShareMachineInfo
ExecutablePath:\\<Machine-IP>\<Shared directory>\ChelsioUwire-x.x.x.xx.exe
User:<user>
Password:<password>
EndShareMachineInfo

StartOfCluster
<user>:<Password>
<IPAddress1>
<IPAddress2>
<IPAddress3>
<IPAddressN>
EndOfCluster
```

```

StartOfNonCluster
<IPAddress1>:<user1>:<Password1>
<IPAddress2>:<user2>:<Password2>
<IPAddress3>:<user3>:<Password3>
<IPAddressN>:<userN>:<PasswordN>
EndOfNonCluster

```

- iii. Open the configuration file and provide the following values:
 - a. Enter absolute path of the shared location where installer is copied to, for the *ExecutablePath* parameter.
 - b. Provide user credentials for the *User* and *Password* parameters of the machine where Installer was copied to.
 - c. Provide IP addresses of remote nodes between the *StartOfCluster* and *EndOfCluster* tags. Enter each node's IP address per line. If same user credentials are set for all the nodes, enter them after the *StartOfCluster* tag, separated by a colon.

E.g.:

```

StartOfCluster
admin:pass123
10.193.184.63
10.193.184.62
.
.
EndOfCluster

```

For machines with different user credentials, enter each node's IP address and corresponding user credentials per line between the *StartOfNonCluster* and *EndOfNonCluster* tags in the following format.

E.g.:

```

10.193.184.76:admin:pass789
10.193.184.78:admin:pass_456

```

- iv. Save the file to a desired location.



Note For successful deployment of UM components and flashing/erasing option ROM, please ensure that the host machine and remote nodes are in the same domain.

5.2. Flashing Option ROM

Important

Unified Wire Installer will flash Option ROM onto the first Chelsio adapter present in remote node (adapter with index 0. See [Configuring using UM CLI](#) to determine adapter index). Hence, ensure that you either use a non-Chelsio adapter for corporate/private network or ensure that the Chelsio adapter used is not installed as first on remote nodes.

Option ROM can be flashed using two methods. Both methods involve deployment of UM components.

- **Deploying components and Flashing Option ROM together.**
- **Deploying components and Flashing Option ROM separately.**

Note

- *Both methods mentioned above will flash option ROM only onto the first Chelsio adapter present in the remote node. If you plan to flash more adapters in the same node or add new nodes to the cluster, they will have to be added as members to a group and flashed using UM's CLI component. See [Configuring using UM CLI](#) for instructions.*
- *Flashing option ROM on remote nodes with inbox NDIS drivers will fail. Hence, please ensure that all nodes are updated to the latest version using the Unified Wire Installer.*

5.2.1. Deploying UM components and Flashing Option ROM together

- i. Run the following command to invoke the UM installer.

```
PS C:\Users\Administrator> .\ChelsioUwire-x.x.x.xx.exe -action  
flashoptionrom -config <config_file.txt>
```

- ii. Click the **Next** button for the Chelsio End User License Agreement Window.

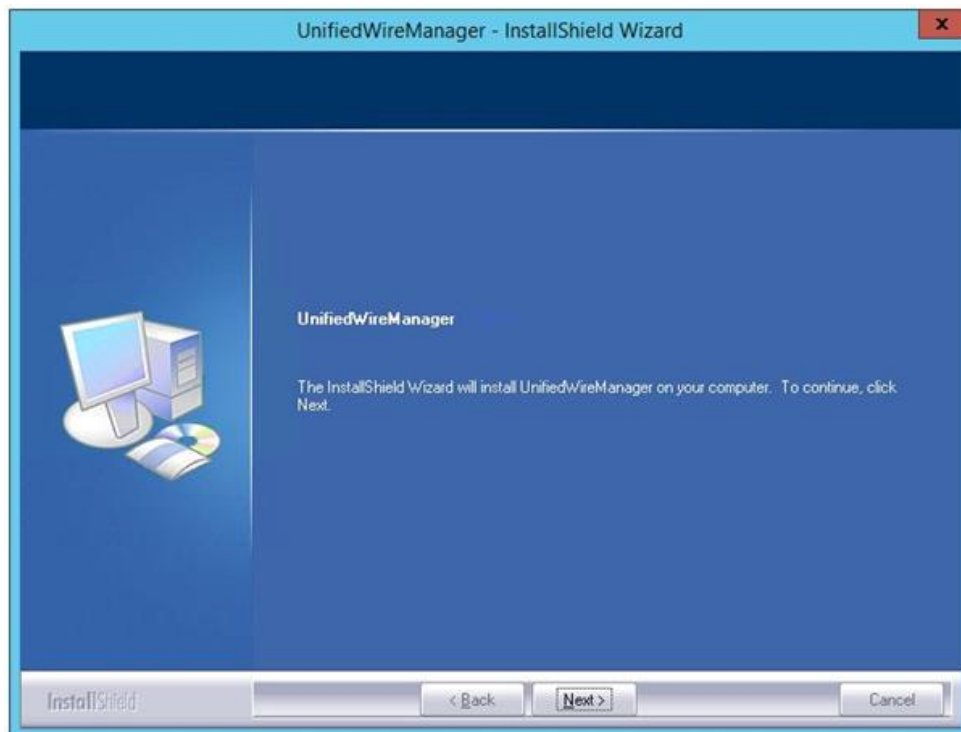


Figure 28 - UM Installer welcome window

- iii. Select the radio button **I accept the terms of the license agreement** and click **Next**.

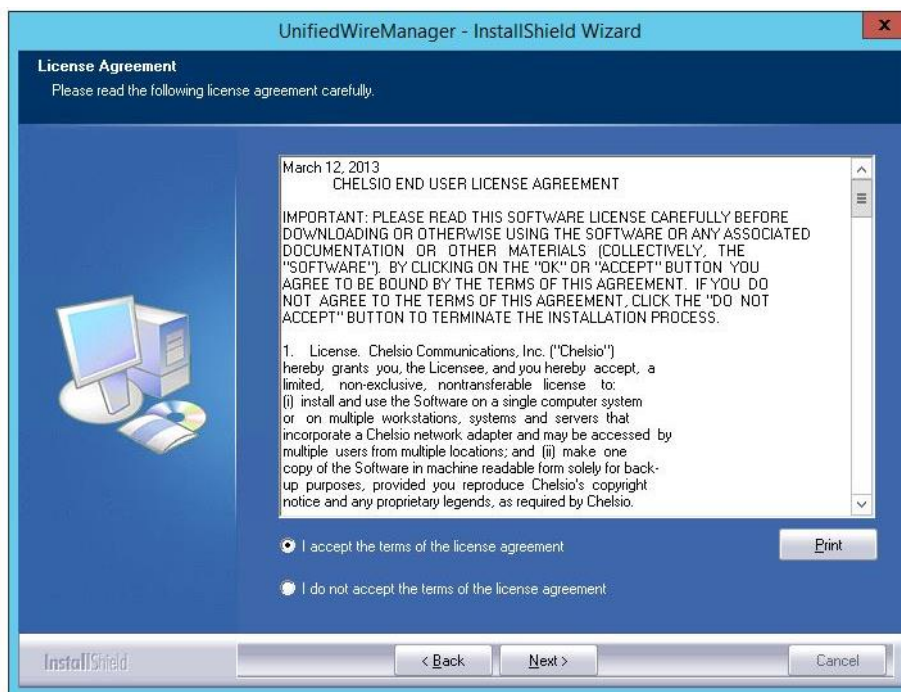


Figure 29 - Chelsio EULA window

- iv. The next window will display the pre-requisites for various UM components. Ensure that they are met before proceeding. Click **Next**.

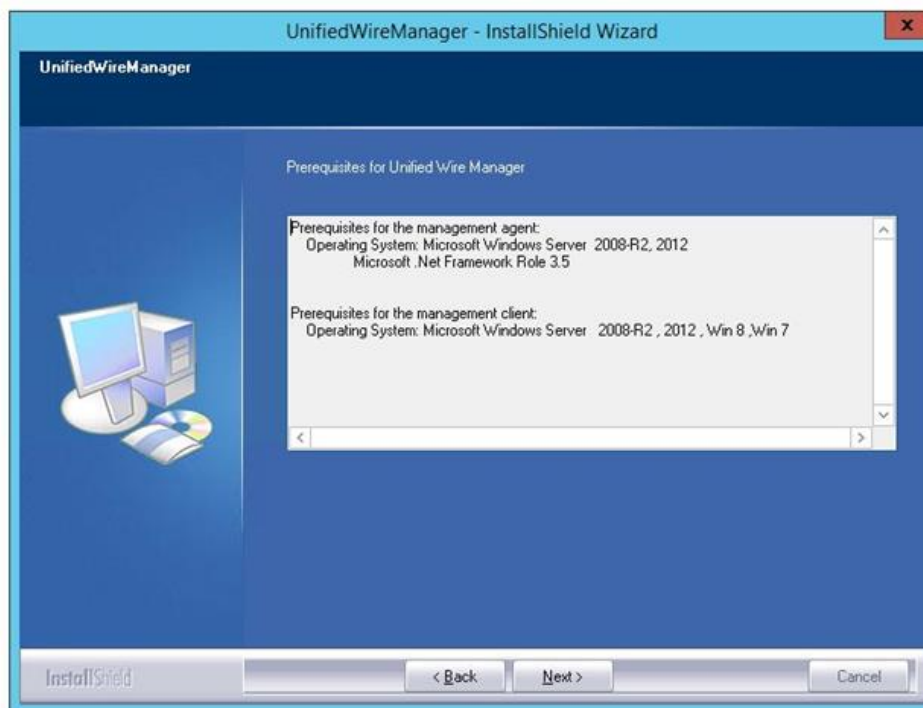


Figure 30 - UM prerequisites window

- v. Now, select **Custom** radio button to customize the installation. Click **Next**.

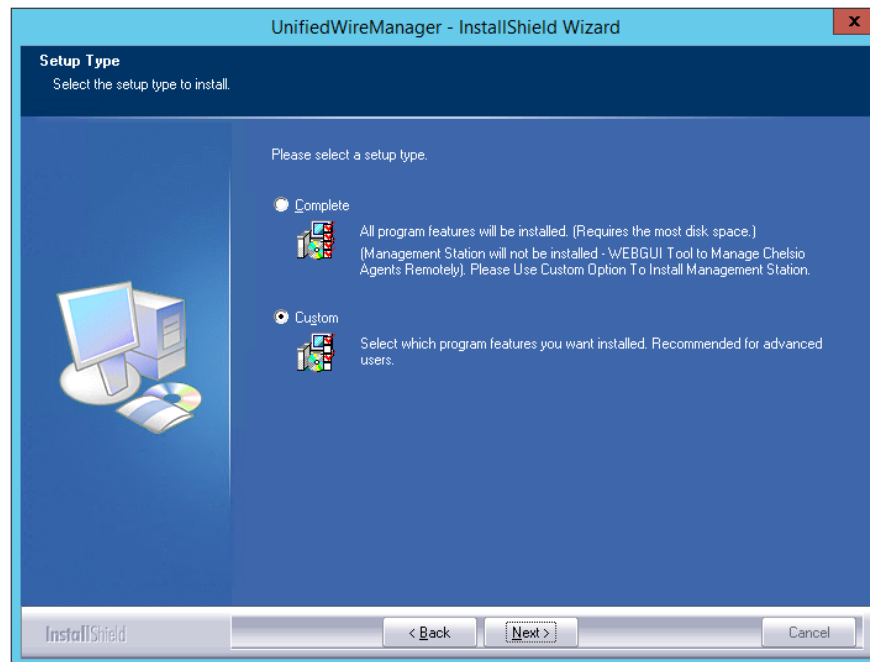


Figure 31 - UM prerequisites window

- vi. The next window will display the location where UM will be installed by default. You can change the location by using the **Change** button or click **Next** to continue with the default path.

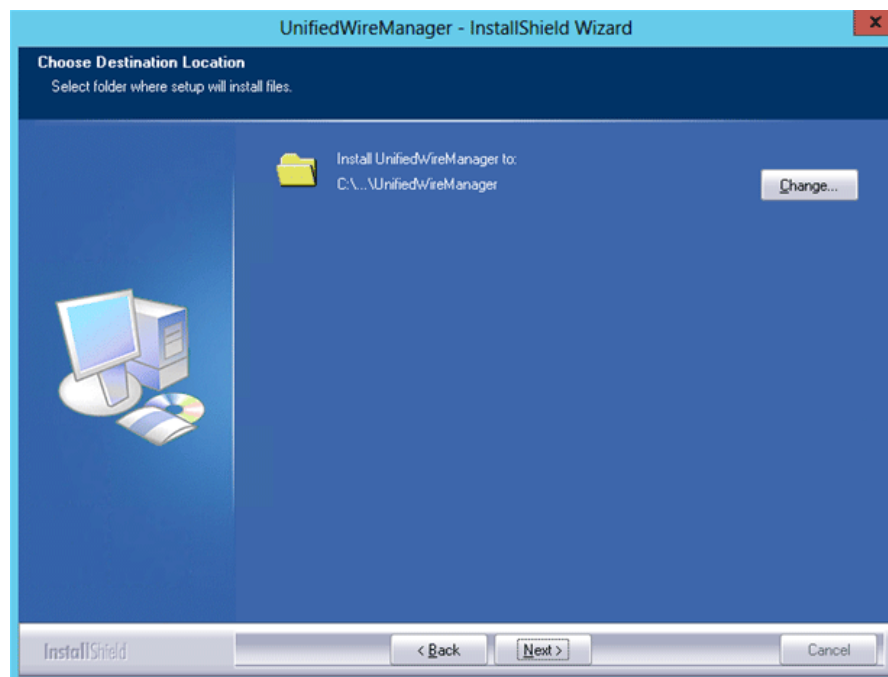


Figure 32 - Changing UM installation path

vii. Next, ensure that only **Client** is selected under features to be installed. Click **Next**.

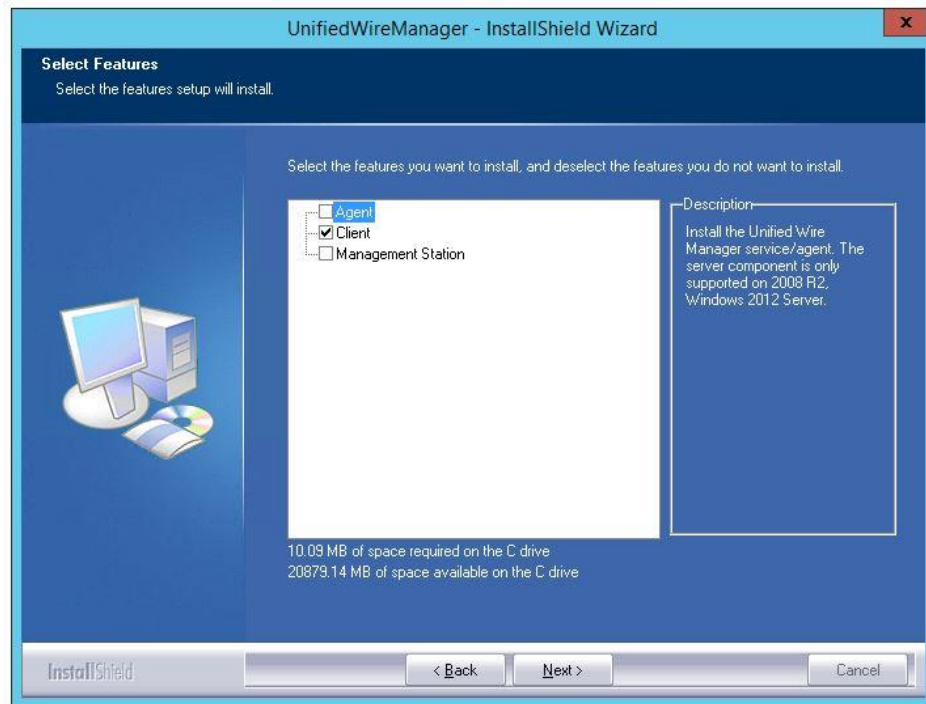


Figure 33 - Selecting UM components

viii. Click **Finish** to complete Client installation.

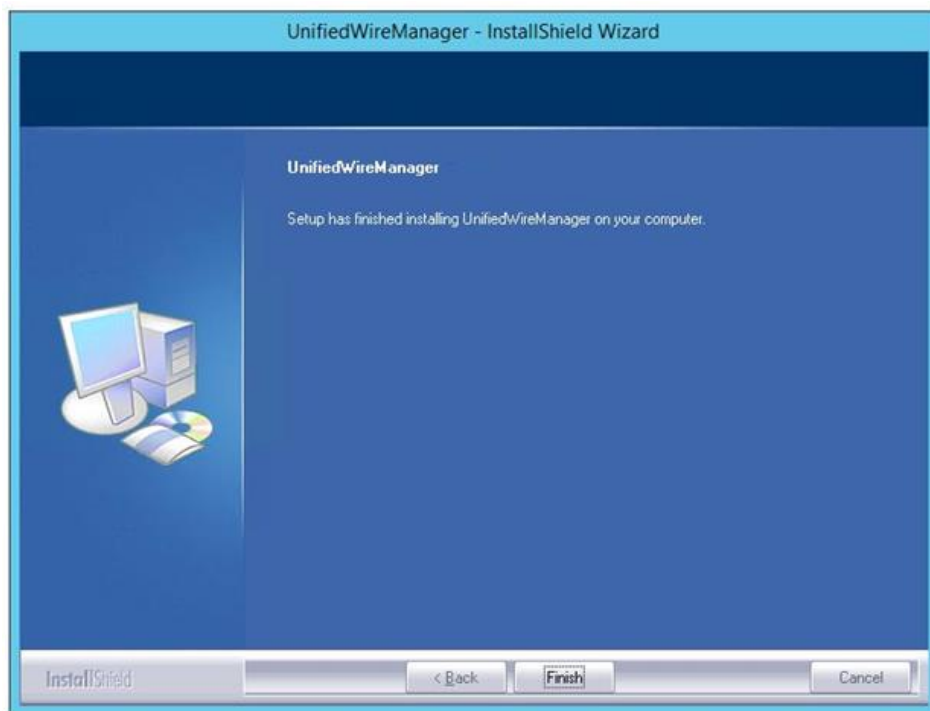


Figure 34 - Finishing UM installation

- ix. Now, installation of UM Agent component on remote nodes will commence.

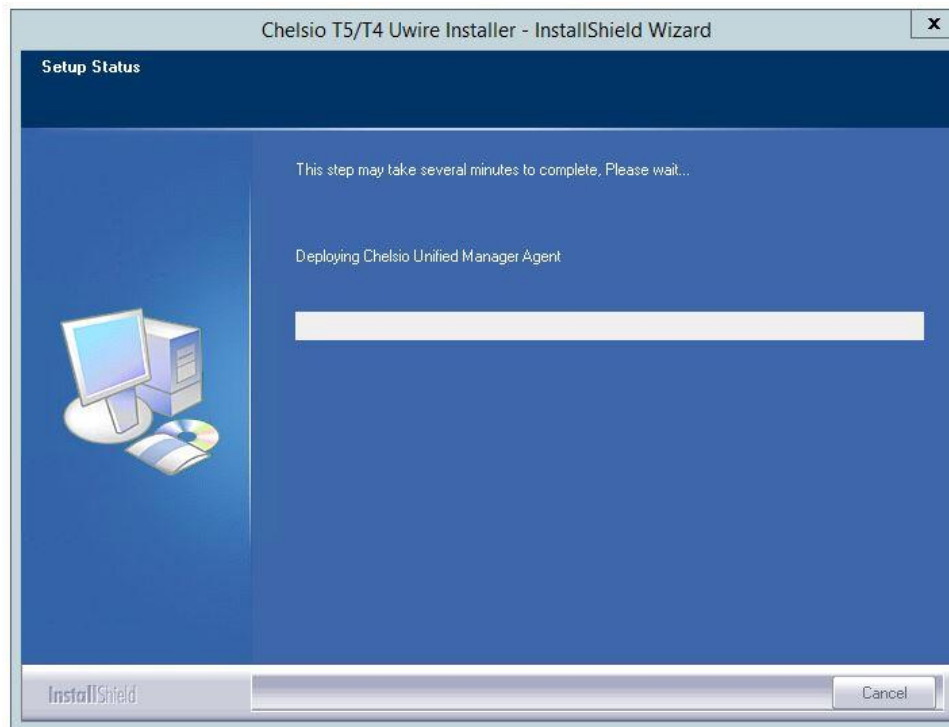


Figure 35 - Starting Agent installation

- x. Click **Agree** on the **PsExec License Agreement** window that appears. This window will appear only during first installation.

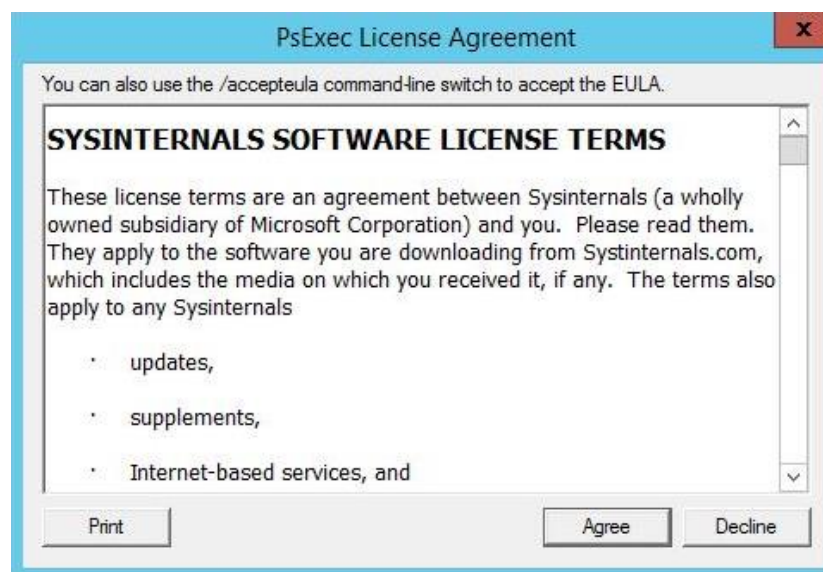


Figure 36 - PsExec license agreement

- xi. UM Agents will now be installed on remote nodes. A default group **OptionROM** will be created and all the nodes on which UM Agent was successfully installed, will be added to it as *members*.

```

-----
MassDeployment.ps1 Version 1.24
-----
10.193.150.53
Pinging...
Mapping...
Copying...
Launching Installer...
10.193.150.54
Pinging...
10.193.150.75
Pinging...
Mapping...
Copying...
Launching Installer...
10.193.185.117
Pinging...
Mapping...
Copying...
Launching Installer...
10.193.184.62
Pinging...
Mapping...
Copying...
Launching Installer...
Waiting For Agent Installation To Complete On All Nodes...
Creating Group 'OptionROM' And Adding Members to it...

```

Figure 37 - Agent installation on remote nodes

- Important** Please ensure that the **OptionROM** group created here is not deleted. Also, UM Client component should not be un-installed. Doing so will cause flashing/erasing Option ROM to fail on remote nodes. UM components will have to be deployed again to fix this issue.

- xii. Option ROM will now be flashed onto adapters on remote nodes present in the OptionROM group.

```

-----
MassDeployment.ps1 Version 1.24
-----
Flashing OptionROM On All The Nodes Present In Group "OptionROM" . Please Wait...

```

Figure 38 - Flashing option ROM

- xiii. After completion, a log file *MassDeploy.log* containing the summary of the process will be created. Click **OK** on the dialog box that appears to exit the installer and view the log.

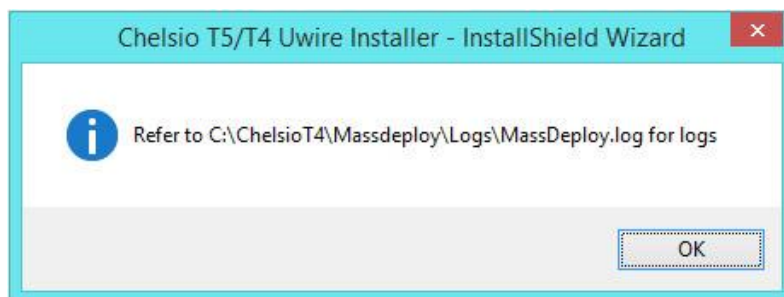


Figure 39 - Finishing option ROM flashing

5.2.2. Deploying UM components and Flashing Option ROM separately

- **Deploying UM Components**

- Run the following command to invoke the Unified Wire Installer.

```
PS C:\Users\Administrator> .\ChelsioUwire-x.x.x.xx.exe -action deployagent  
-config <config_file.txt>
```

- Follow steps (ii)-(xi) in the [Deploying UM components and Flashing Option ROM together](#) section.
- After completion, a log file *MassDeploy.log* containing the summary of the process will be created. Click **OK** on the dialog box that appears to exit the installer and view the log.

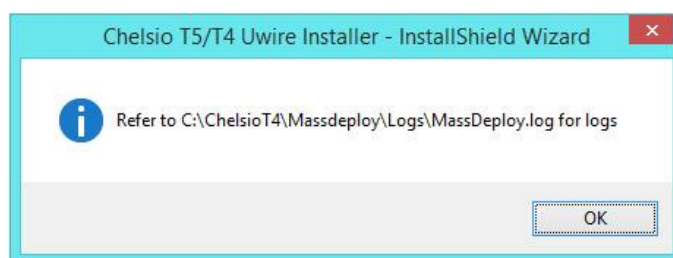


Figure 40 - Finishing UM components deployment

- **Flashing Option ROM**

- Run the following command to flash Option ROM:

```
PS C:\Users\Administrator> .\ChelsioUwire-x.x.x.xx.exe -action  
flashoptionrom
```

- Flashing Option ROM is possible only if UM Agents were installed on nodes using this installer. Click **Yes** to continue.



Figure 41 - Starting option ROM flashing

- iii. Follow steps **xii** and **xiii** in the [Deploying UM components and Flashing Option ROM together](#) section.



Flashing option ROM on remote nodes with inbox NDIS drivers will fail. Hence, please ensure that all nodes are updated to the latest version using the Unified Wire Installer.

5.3. Erasing Option ROM



Unified Wire Installer will erase option ROM only from the first Chelsio adapter present in the remote node. If you plan to erase from more adapters in the same node or add new nodes to the cluster, they will have to be added as members to a group and erased using UM's CLI component. See [Configuring using UM CLI](#) for instructions.

- i. To erase OptionROM from adapters on all the nodes, run the following command:

```
PS C:\Users\Administrator> .\ChelsioUwire-x.x.x.xx.exe -action
eraseoptionrom
```

- ii. Erasing OptionROM is possible only if the adapters were flashed using this installer. Click **Yes** to continue.

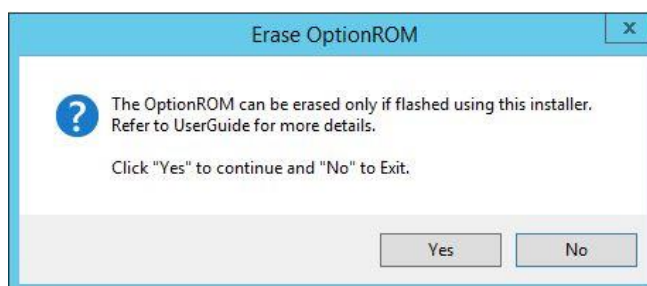


Figure 42 - Starting option ROM erasing

- iii. Option ROM will now be erased from adapters on nodes present in the **OptionROM** group.

```
-----
MassDeployment.ps1 Version 1.24
-----
Erasing Option ROM From All Nodes Present In Group "OptionROM" .Please Wait...
-
```

Figure 43 - Erasing option ROM on remote nodes

- iv. After completion, a log file *MassDeploy.log* containing the summary of the process will be created. Click **OK** on the dialog box that appears to exit the installer and view the log.

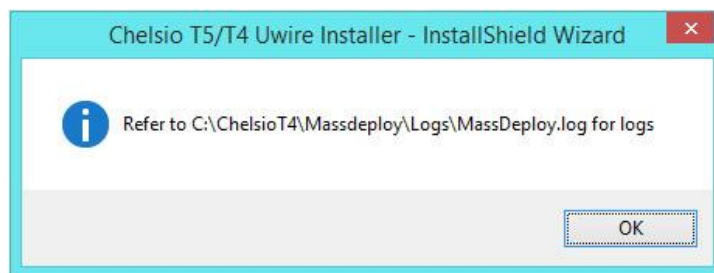


Figure 44 - Finishing option ROM erasing

5.4. Configuring using UM CLI

5.4.1. Configuring groups and members

You can manage multiple groups and members using Unified Wire Manager's CLI component, **chelsio_uwcli**.



Note

To use the CLI component, you will have to change your working directory to the location where UM Client is installed. Typically, this will be **C:\Program Files (x86)\Chelsio Communications\UnifiedWireManager\client**. To avoid this and run the command from any path, you will need to reboot the host. The following examples assume that the host machine was rebooted before running commands.

- **Create Group**

To create a new group, run the following command:

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m creategroup
grpname=<new_group_name> OSType=windows GroupType=t4adapter
```

E.g.

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m creategroup grpname=flash
OSType=windows GroupType=t4adapter
```

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m creategroup grpname=flash OSType=windows GroupType=t4adapter
Machine Group created successfully
```

Figure 45 - Creating group

- **Add member to group**

To add a member to a group, run the following command:

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m addmember
grpname=<group_name>
details="<IP_address>;<user_id>;<password>;*,*,*,<adapter_index>;*,*,*,*,*"
```

E.g.

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m addmember grpname=OptionROM  
details="10.193.185.107;administrator;cdrom888;*,*,0,*,*,*,*,*>"
```

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m addmember grpname=OptionROM details="10.193.185.107;administrator;cdrom@8888;*=*;0;*=*;*=*"
Machine added to group successfully
```

Figure 46 - Adding member to group

- **View group and member details**

To view details of all the groups and members created, run the following command:

```
PS C:\Users\Administrator> chelsio uwcli.exe -m list
```

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m list
Machine Group Details
-----
Group Name       : OptionROM
OSType           : windows
Group Type       : t4adapter

Member details
-----
index            : 0
hostname/IP address : 10.193.184.62
user             : administrator
password         : cdrom@888
pci id           : *
ifname           : *
port instance    : *
adapter no       : 0
comment          : *
param1           : *
param2           : *
param3           : *
param4           : *

Member details
-----
index            : 1
hostname/IP address : 10.193.184.78
user             : administrator
password         : cdrom@888
pci id           : *
ifname           : *
port instance    : *
adapter no       : 0
comment          : *
param1           : *
param2           : *
param3           : *
param4           : *
```

Figure 47 - Viewing group and member details

- **Delete member from a group**

To delete a member from a group, run the following command:

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m deletemember  
grpname=<group_name> index=<member_index>
```

E.g.

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m deletemember  
grpname=OptionROM index=1
```

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m deletemember grpname=OptionROM index=1  
System removed from Machine Group Successfully  
PS C:\Users\Administrator>
```

Figure 48 - Deleting member from group

- **Delete Group**

To delete a group, run the following command:

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m deletegroup  
grpname=<group_name>
```

E.g.

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m deletegroup  
grpname=OptionROM
```

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m deletegroup grpname=OptionROM  
Machine Group deleted successfully
```

Figure 49 - Deleting group

5.4.2. Flashing/Erasing Option ROM

Apart from Unified Wire Installer, you can also use Unified Wire Manager's CLI component (*chelsio_uwcli*) to flash or erase Option ROM on multiple nodes. This is particularly useful when you need to flash/erase Option ROM on groups other than the default **OptionROM** group.

- **Flashing Option ROM**

To flash Option ROM using UM, run the following command:


```
PS C:\Users\Administrator> chelsio_uwcli.exe chelsio flashrom  
adapter=BULKADAPTER path=<path_to_optionrom_image_file> -B <group_name>
```

E.g.

```
PS C:\Users\Administrator> chelsio_uwcli.exe chelsio flashrom  
adapter=BULKADAPTER path=C:\Users\Administrator\Desktop\cuwlbt4.bin -B  
OptionROM
```

```
PS C:\Users\Administrator> chelsio_uwcli.exe chelsio flashrom adapter=BULKADAPTER path=C:\Users\Administrator\Desktop\InstUM\cuwlbt4.bin -B OptionROM  
Executing...  
Sending File C:\Users\Administrator\Desktop\InstUM\cuwlbt4.bin Size 458752  
Completion Progress % (100%) ....  
File has been successfully transferred...!  
CLI version 2.4.59  
*****10.193.150.73*****  
Agent Version 2.4.59  
Command completed successfully.
```

Figure 50 - Flashing option ROM using UM CLI

 **Note** *Flashing option ROM on remote nodes with inbox NDIS drivers will fail. Hence, please ensure that all nodes are updated to the latest version using the Unified Wire Installer.*

- **Viewing status**

You can list the adapters on local host and verify if Option ROM was successfully flashed using the following command:

```
PS C:\Users\Administrator> chelsio_uwcli.exe chelsio listadapters -B  
<group_name>
```

E.g.

```
PS C:\Users\Administrator> chelsio_uwcli.exe chelsio listadapters -B  
OptionROM
```

```

PS C:\Users\Administrator>chelsio_uwcli.exe chelsio listadapters -B OptionROM
Executing...
CLI version 2.4.59
*****10.193.184.62*****
Agent Version 2.4.59

Adapter information:

Adapter #           : 0
Model               : T440-LP-CR
Serial Number       : NB15110005
Connector           : 10G FIBER_XFI
PHY                 : No Phy / No information Available
PCI Vendor ID:Device ID : 1425:01b8
PCI Location        : 08:00:04
Factory MAC address  : 00:07:43:04:75:01
OPROM               : Present
Bios Version        : 1.0.4.57
*****10.193.184.78*****
Agent Version 2.4.59

Adapter information:

Adapter #           : 0
Model               : T404-BT
Serial Number       : PT12110700
Connector           : 1G/100M BT_SGMII/RJ-45
PHY                 : VCS8634
PCI Vendor ID:Device ID : 1425:01b8
PCI Location        : 02:00:04
Factory MAC address  : 00:07:43:10:36:00
OPROM               : Present
Bios Version        : 1.0.4.57

```

Figure 51 - Viewing status

- **Erasing Option ROM**

To erase Option ROM using UM, run the following command:

```

PS C:\Users\Administrator> chelsio_uwcli.exe chelsio eraserom
adapter=BULKADAPTER force=1 -B <group_name>

```

In addition to flashing and erasing Option ROM, you can perform additional bulk operations on remote nodes like setting MTU and VLAN ID, changing adapter and port parameters, etc. To know more about these options available, run the following command:

```

PS C:\Users\Administrator> chelsio_uwcli.exe -

```

```

PS C:\Users\Administrator> chelsio_uwcli.exe chelsio eraserom adapter=BULKADAPTER force=1 -B OptionROM
Executing...
CLI version 2.4.59
*****10.193.150.73*****
Agent Version 2.4.59
Command completed successfully.

```

Figure 52 - Erasing option ROM using UM CLI

5.4.3. Help

To view Unified Wire Manager's CLI help, run the following command:

```
PS C:\Users\Administrator> chelsio_uwcli.exe -m
```

6. *cxgbtool/cxgbnano* help

The *cxgbtool* (*cxgbnano* for Nano Server) command queries or sets various aspects of Chelsio network interface cards. It complements standard tools used to configure network settings and provides functionality not available through such tools.

Some of the commands provided can be used to query running statistics to aid in debugging.

Definitions

[*nicInterface*] is the name of the network device to work on, given in the format "nic[0,1,...n]"

[*vbdInterface*] is the name of the Chelsio Bus Enumerator instance to work on, given in the format "vbd[0,1,...n]"

Syntax

cxgbtool [*vbdInterface|nicInterface*][*parameters*][(optionalParameters)]

In case of Nano Server, run the commands using **cxgbnano** instead of **cxgbtool**, i.e.,

cxgbnano [*vbdInterface|nicInterface*][*parameters*][(optionalParameters)]

- **-h**

Description: Displays help

Syntax: *cxgbtool* -h

- **cim_la**

Description: Displays results of logic analyzer trace.

Syntax: *cxgbtool* [*vbdInterface*] *cim_la*

Example:

```
C:\Users\Administrator>cxgbtool vbd0 cim_la
```

Status	Data	PC	LS0Stat	LS0Addr	LS0Data
c0	00000001	1ffffc65	00000000	00000000	00000000000000000000000000000000
fe	1ffffc65	1ffffc65	00000000	00000000	00000000000000000000000000000000
ff	1ffffc68	1ffffc68	00000003	1fff94b8	00000000000000000000000001ffff420
c0	00000001	1ffffc6a	00000000	00000000	00000000000000000000000000000000
c0	00000001	1ffffc6a	00000000	00000000	00000000000000000000000000000000
c6	1ffff420	1ffffc6a	00000000	00000000	00000000000000000000000000000000
c4	1ffffc6d	1ffffc6d	00000000	00000000	00000000000000000000000000000000
fc	1ffffc6d	1ffffc6d	00000000	1fff8c00	00000000000000000000000000000000
fc	1ffffc6d	1ffffc6d	00000000	00000000	00000000000000000000000000000000
fe	1ffff420	1ffff420	00000000	00000000	00000000000000000000000000000000
cb	1ffffc6d	1ffff423	00000000	00000000	00000000000000000000000000000000
c4	1ffff425	1ffff425	00000000	00000000	00000000000000000000000000000000

- **context**

Description: Shows an SGE context.

Syntax: `cxgbtool [vbdInterface] context [contextType] [queueId]`

Context Type Parameters:

Egress: Egress queue context.

fl: Free list manager context.

response: Response queue context.

ingress: Ingress queue context.

cq: RDMA completion queue context.

cong: Congestion context.

Example:

```
C:\Users\Administrator>cxgbtool vbd0 context egress 0
DCA_ST:          0
StatusPgNS:      0
StatusPgRO:      0
FetchNS:         0
FetchRO:         0
Valid:           1
PCIEDataChannel: 0
StatusPgTPHintEn: 0
StatusPgTPHint:  0
FetchTPHintEn:   0
FetchTPHint:     0
FCThreshOverride: 0
ReschedulePending: 0
OnChipQueue:     0
FetchSizeMode:   1
FetchBurstMin:   128
FLMPacking:      0
FetchBurstMax:   3
FLMcongMode:     1
MaxuPFLCredits:  16
FLMcontextID:    1
uPTokenEn:       1
UserModeIO:      0
uPFLCredits:     0
uPFLCreditEn:    1
FID:             0
HostFCMode:      0
HostFCOwner:     1
CIDXFlushThresh: 1
CIDX:            4
PIDX:            63
BaseAddress:     0x7f684000
QueueSize:       65
QueueType:       1
CachePriority:    0
```

- **filter**

Description: Displays list of configured hardware filters

Syntax: cxgbtool [*nicInterface*] filter

Example:


```
C:\Users\Administrator>cxgbtool nic0 filter
```

Ftid	Prot	FPORT	LPORT	Type	Que_Id	DMAC_Idx	Locked	Hits
12	0	0	0	IPv4	9	1	1	3
16	0	0	0	IPv6	9	1	1	0

- **loadfw**

Description: Loads firmware image.

Syntax: cxgbtool [*vbdInterface*] loadfw [*firmwareImage*]


 **Note** *The Firmware input file used must be a binary and not a header file.*

Example:

```
C:\Users\Administrator>cxgbtool vbd0 loadfw C:\Users\Administrator\Desktop\t5fw-1.15.35.0.bin
C:\Users\Administrator>_
```

- **loadcfg**

Description: Loads firmware configuration file or clears configuration flash region.

 **Note** *The configuration file used must be in text format and not a header file.*

Syntax: cxgbtool [*vbdInterface*] loadcfg [[*firmwareConfigurationFile*]|clear]

Example:

Loading T5 firmware configuration file:

```
C:\Users\Administrator>cxgbtool vbd0 loadcfg C:\Users\Administrator\Desktop\t5-config.txt
Flashing configuration file C:\Users\Administrator\Desktop\t5-config.txt of size 21781 ...
C:\Users\Administrator>_
```

Clearing the configuration file region in flash

```
C:\Users\Administrator>cxgbtool vbd0 loadcfg clear
Clearing configuration file in flash...
```

- **loadphy**

Description: Loads phy firmware.

Syntax: cxgbtool [*vbdInterface*] loadphy [*phyFile*]

Example:

```
C:\Users\Administrator>cxgbtool vbd0 loadphy .\Firmware_1.25.c1.Chelsio.cld
C:\Users\Administrator>_
```

- **loadboot**

Description: Flashes the Option ROM image.

Syntax: cxgbtool [*vbdInterface*] loadboot [*bootImageFile*] [pf {0|1|2|...|7}|offset {*val*}|clear]

Parameters:

pf{*val*}: Flash Option ROM image to the offset defined by the PFs EXPROM_OFST in the serial configuration.

offset {*val*}: Flash Option ROM image to the offset specified by the user.

clear: The flash area reserved for Option ROM image will be cleared.

Example:

Flashing Option ROM image to the offset defined by the PFs EXPROM_OFST:

```
C:\Users\Administrator>cxgbtool vbd0 loadboot C:\Users\Administrator\Desktop\cubt4.bin pf 0
C:\Users\Administrator>
```

Flashing Option ROM image to user specified offset:

```
C:\Users\Administrator>cxgbtool vbd0 loadboot C:\Users\Administrator\Desktop\cubt4.bin offset 0x100
C:\Users\Administrator>_
```

- **loadboot-cfg**

Description: Loads boot configuration file.

Syntax: cxgbtool [*vbdInterface*] loadboot-cfg [[*bootConfigImageFile*]|clear]

Parameters:

clear: The flash area reserved for boot configuration file will be cleared.

Example:

Loading boot configuration file:

```
C:\Users\Administrator>cxgbtool vbd0 loadboot-cfg C:\Users\Administrator\Desktop\bootcfg
Cxgb_CmdLoadBootCfg: BootROM length: 1668, value2add:0
```

Clearing the flash area:

```
C:\Users\Administrator>cxgbtool vbd0 loadboot-cfg clear
C:\Users\Administrator>_
```

• mdio

Description: Reads/writes MDIO register.

Syntax: cxgbtool [*vbdInterface*] mdio
[*physicalAddress*][*manageableDevicesAddress*][*registerAddress*] [(*writeValue*)]

Example

Read MDIO register

```
C:\Users\Administrator>cxgbtool vbd0 mdio 0 0 0
0xffff [65535]
```



Note

Write MDIO register currently not supported.

- **meminfo**

Description: Displays memory info.

Syntax: cxgbtool [vbdInterface] meminfo

Example:

```
C:\Users\Administrator>cxgbtool vbd0 meminfo
EDC0:      0-0x2ffffff [3.00 MiB]
EDC1:      0x300000-0x5ffffff [3.00 MiB]

RQUDP region: 0xffffffff-0xffffffff [1 B]
DBQ contexts: 0x1d0680-0x1e267f [72.0 KiB]
IMSG contexts: 0x1e2680-0x1f467f [72.0 KiB]
FLM cache:    0x1f4680-0x20767f [76.0 KiB]
ULPTX state:  0x207680-0x2077ff [384 B]
Timers:       0x207840-0x21587f [56.0 KiB]
TCBs:         0x215880-0x257fff [265 KiB]
Tx payload:   0x258000-0x317fff [768 KiB]
Rx payload:   0x318000-0x3d7fff [768 KiB]
Pstructs:     0x3d8000-0x3da9ff [10.5 KiB]
Rx FL:        0x3daa00-0x3daa7f [128 B]
Tx FL:        0x3daa80-0x3daaff [128 B]
Pstruct FL:   0x3dab00-0x3dacbf [448 B]
TDDP region:  0x3dacc0-0x3e5900 [43.0 KiB]
iSCSI region: 0x3e5900-0x3ed900 [32.0 KiB]
TPT region:   0x3ed900-0x42363f [215 KiB]
STAG region:  0x3ed900-0x423640 [215 KiB]
TXPBL region: 0x423640-0x59183f [1.42 MiB]
PBL region:   0x423640-0x591840 [1.42 MiB]
RQ region:    0x591840-0x5fd300 [430 KiB]

uP RAM:       0-0xffffffff [0 B]
uP Extmem2:   0-0xffffffff [0 B]

48 Rx pages of size 16KiB for 1 channels
48 Tx pages of size 16KiB for 2 channels
168 p-structs

Port 0 using 2 pages out of 862 allocated
Port 1 using 2 pages out of 2 allocated
Port 2 using 2 pages out of 862 allocated
Port 3 using 2 pages out of 2 allocated

Loopback 0 using 0 pages out of 288 allocated
Loopback 1 using 0 pages out of 0 allocated
Loopback 2 using 0 pages out of 288 allocated
Loopback 3 using 0 pages out of 0 allocated
```

- **mtus**

Description: Prints hardware MTU table.

Syntax: cxgtool [vbdInterface] mtus

Example:

```
C:\Users\Administrator>cxgbtool vbd0 mtus
Path mtus : 88 256 512 576 808 1024 1280 1488 1500 2002 2048 4096 4352 8192 9000 9600
```

- **qsets**

Description: Reads # of qsets

Syntax: cxgbtool [*nicInterface*] qsets

Example:

```
C:\Users\Administrator>cxgbtool nic0 qsets
```

QueType	AbsId	RelId	Fl0Id	IngId	Msix	QDepth
TxEth	27	27	n/a	17	n/a	1024
TxEth	28	28	n/a	18	n/a	1024
TxEth	29	29	n/a	19	n/a	1024
TxEth	30	30	n/a	20	n/a	1024
TxCtrl	32	32	n/a	22	n/a	1024
TxRdma	33	33	n/a	22	n/a	512
TxNvgre	31	31	n/a	21	n/a	1920
RxIng	22	22	0	n/a	21	1023
RxEth	17	17	22	n/a	22	2047
RxEth	18	18	23	n/a	15	2047
RxEth	19	19	24	n/a	24	2047
RxEth	20	20	25	n/a	17	2047
RxRdma	12	12	17	n/a	16	511
RxRdma	13	13	18	n/a	11	511
RxRdma	14	14	19	n/a	18	511
RxRdma	15	15	20	n/a	13	511
RxRdma	16	16	21	n/a	20	511
RxNvgre	21	21	26	n/a	19	2047

- **qstats**

Description: Displays statistics for each Tx & Rx queue.

Syntax: cxgbtool [*nicInterface*] qstats [*queueType* [(*clr*)]]

Queue Type parameters:

txeth: Tx tunnel queue statistics.

rxeth: Rx tunnel queue statistics.

txvmq: Tx VM queue statistics.

rxvmq: Rx VM queue statistics.

txrdma: RDMA Tx queue statistics.

rxrdma: RDMA Rx queue statistics.

txctrl: Chimney control queue statistics.

txfwd: Chimney forwarding queue statistics.

txnvgre: Tx NVGRE statistics.

rxnvgre: Rx NVGRE statistics.

clr: Clear Queue statistics.

Example of rxeth qstats:

```
C:\Users\Administrator>cxgbtool nic0 qstats rxeth
```

StatsType	RxEth#6	RxEth#7	RxEth#8	RxEth#9
UcPkts	0	0	0	0
UcBytes	0	0	0	0
McPkts	173	100	0	0
McBytes	14620	7662	0	0
BcPkts	344	16	0	0
BcBytes	65574	3483	0	0
CoalPkts	0	0	0	0
CoalBytes	0	0	0	0
DropPkts	0	0	0	0
RecvNbIs	517	116	0	0
RxCsumErr	0	0	0	0
RxCsumErrTcp	0	0	0	0
RxCsumErrIp	0	0	0	0
VLANex	0	0	0	0
SysThreadEvs	0	0	0	0
LargeRxDropPkts	0	0	0	0
RssProc	0	1	0	1
RssGroup	0	0	0	0

- **reg**

Description: Reads/writes register.

Syntax:

Register Read: `cxgbtool [vbdInterface] reg [readAddress]`

Register Write: `cxgbtool [vbdInterface] reg [[writeAddress] = {val}]`

Example:

Register read:

```
C:\Users\Administrator>cxgbtool vbd0 reg 0x19428
00000008 [8]
```

Register write:

```
C:\Users\Administrator>cxgbtool vbd0 reg 0x19428 = 0x3
C:\Users\Administrator>_
```

- **regdump**

Description: Displays registers of a hardware module. Not specifying any parameter will display registers for all the modules. Not all modules are available on all adapters.

Syntax:

Display registers for all available modules: `cxgbtool [vbdInterface] regdump`

Display registers for specific module: `cxgbtool [vbdInterface] regdump [registerModule]`

Table 1 – T5 register module parameters

Module Parameter	Description
<i>sge</i>	Scatter-Gather DMA Engine common register set.
<i>pci</i>	PCI Express Interface common register set. This module implements the PCI-Express SR-IOV physical logical, data link, and transaction layers.
<i>dbg</i>	Debug Engine Common register set.
<i>mc0</i>	Memory controller 0 common register set. This module implements the memory controller for the optional external DDR-II/DDR-III SDRAM.
<i>mc1</i>	Memory controller 1 common register set. This module implements the memory controller for the optional external DDR-II/DDR-III SDRAM.
<i>ma</i>	Memory Arbiter common register set. This module implements the arbitration of memory requests from the various on-chip sources to the memory hierarchy consisting of on-chip eDRAM, external DDR2/DDR3 memory, and host memory that is accessed through the PCIe.
<i>edc0</i>	eDRAM and Controller 0 common register set. This is the on-chip eDRAM and controller.
<i>edc1</i>	eDRAM and Controller 1 common register set. This is the on-chip eDRAM and controller.
<i>cim</i>	CIM common register set. This module implements the CPU interface and μ P is the embedded microprocessor. The CIM incorporates functions to improve the performance of CPU accesses to external memory.
<i>tp</i>	Transport Protocol Engine common register set. This module implements the main packet processing pipeline.
<i>ulp_rx</i>	Ingress Upper Layer Protocol common register set. This module implements the upper layer protocol processing in the ingress direction for protocols that are layered on top of TCP, such as iSCSI and RDMA.
<i>ulp_tx</i>	Egress Upper Layer Protocol common register set. This module provides Upper Layer support for RDMA and iSCSI offload in the transmit direction, and also implements LSO/TSO functionality.
<i>pmrx</i>	Ingress Payload Manager common register set. These modules implement the payload manager for receive/ingress.
<i>pmtx</i>	Egress Payload Manager common register set. These modules implement the payload manager for transmit/egress.
<i>mps</i>	Multi-port support common register set. This module implements the multi-port support for T4, and switches egress packets to the ingress path when their Ethernet DA (Destination Address) matches an address in the exact match Ethernet Address database, or if the outer-VLAN indicates that the packet is destined to another virtual machine connected to the T4, or if another virtual machine is subscribing to an L2 multicast group that is the MAC destination address of the packet.
<i>cplsw</i>	CPL Switch common register set. This module implements a configurable switch for ingress CPL messages to the SGE and/or CIM. The embedded μ P is assigned a receive queue number and can be assigned one or more MAC addresses and IP addresses, and any of these can be used to switch ingress packets to the μ P for processing.

<i>smb</i>	System Management Bus common register set. This module implements an SMBus Master/Slave for system management.
<i>i2c</i>	I2C-Bus Master common register set. This module implements an I2C-Bus Master for PHY management and I/O expansion.
<i>mi</i>	MI common register set. This module implements an MDIO Master for PHY management.
<i>uart</i>	
<i>pmu</i>	Power Management Unit common register set. Power management unit.
<i>sf</i>	Serial Flash controller common register set. This module implements the serial flash controller. It interfaces to the external serial flash device.
<i>pl</i>	PIO Local Bus controller common register set. This module implements the PIO Local Bus controller. It is physically distributed across T4/T5.
<i>le</i>	Lookup Engine Common register set. The Lookup Engine implements the connection, filter and ACL databases. This module includes a TCAM Memory controller that interfaces with the on-chip TCAM memory array, and it implements the interface to the external memory that is used to scale the support of the connection database to 1M connections. The LE stores ACL rules, it stores routing information to handle routing for SYN-cookie mode offloaded listening servers, and it stores tuple information for offloaded connections, and FCoE exchanges.
<i>ncsi</i>	Network Controller sideband Interface common register set. The module implements the NCSI (Network Controller Sideband Interface) protocol.
<i>xgmac</i>	
<i>mac</i>	MAC common register set.
<i>hma</i>	

Example:

Displaying all available module registers:

```
C:\Users\Administrator>cxgbtool vbd0 regdump
[0x1e000] SGE_PF_KDOORBELL          0          0
    31:15 QID                      0          0
    14:14 Priority                  0          0
    13:13 Type                     0          0
    12:0  PIDX                     0          0
[0x1e004] SGE_PF_GTS               0          0
    31:16 IngressQID              0          0
    15:13 TimerReg                0          0
    12:12 SEIntArm                0          0
    11:0  CIDXInc                 0          0
[0x1e008] SGE_PF_KTIMESTAMP_LO     0x183a052e 406455598
[0x1e00c] SGE_PF_KTIMESTAMP_HI     0x1b      27
[0x1e400] SGE_PF_KDOORBELL          0          0
    31:15 QID                      0          0
    14:14 Priority                  0          0
    13:13 Type                     0          0
    12:0  PIDX                     0          0
[0x1e404] SGE_PF_GTS               0          0
    31:16 IngressQID              0          0
    15:13 TimerReg                0          0
    12:12 SEIntArm                0          0
    11:0  CIDXInc                 0          0
[0x1e408] SGE_PF_KTIMESTAMP_LO     0x183a2c9c 406465692
```

Displaying specific (*mps*) module registers:

```
C:\Users\Administrator>cxgbtool vbd0 regdump mps
[ 0x9000] MPS_CMN_CTL                                0x12      18
  4:4 LpbkCrdtCtrl                                0x1       1
  3:3 Detect8023                                  0         0
  2:2 VFDDirectAccess                             0         0
  1:0 NumPorts                                    0x2       2
[ 0x9004] MPS_INT_ENABLE                             0         0
  5:5 StatIntEnb                                  0         0
  4:4 TxIntEnb                                    0         0
  3:3 RxIntEnb                                    0         0
  2:2 TrcIntEnb                                  0         0
  1:1 ClsIntEnb                                  0         0
  0:0 PLIntEnb                                    0         0
[ 0x9008] MPS_INT_CAUSE                             0x1       1
  5:5 StatInt                                    0         0
  4:4 TxInt                                       0         0
  3:3 RxInt                                       0         0
  2:2 TrcInt                                    0         0
  1:1 ClsInt                                    0         0
  0:0 PLInt                                       0x1       1
[ 0x900c] MPS_CGEN_GLOBAL                           0         0
```

- **tcb**

Description: Reads hardware TCP Control Block, which contains details regarding all offloaded connections.

Syntax: cxgbtool [*nicInterface*] tcb [*tid*]

Example:

```
C:\Users\Administrator>cxgbtool nic0 tcb 5070
0x0000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0010: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0020: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0040: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0050: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0060: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0x0070: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
   0:   3                ulp_type:          0 (0x0)
   4:  11                ulp_raw:          0 (0x0)
  12:  23                l2t_ix:           0 (0x0)
  24:  31                smac_sel:         0 (0x0)
  32:  32                TF_MIGRATING:     0 (0x0)
  33:  33                TF_NON_OFFLOAD:   0 (0x0)
  34:  34                TF_LOCK_TID:      0 (0x0)
  35:  35                TF_KEEPAKIVE:     0 (0x0)
  36:  36                TF_DACK:         0 (0x0)
  37:  37                TF_DACK_MSS:     0 (0x0)
  38:  38                TF_DACK_NOT_ACKED: 0 (0x0)
  39:  39                TF_NAGLE:        0 (0x0)
  40:  40                TF_SSWS_DISABLED: 0 (0x0)
  41:  41                TF_RX_FLOW_CONTROL_DDP: 0 (0x0)
  42:  42                TF_RX_FLOW_CONTROL_DISABLE: 0 (0x0)
  43:  43                TF_RX_CHANNEL:    0 (0x0)
  44:  45                TF_TX_CHANNEL:    0 (0x0)
```

- **tpi**

Description: Displays TP indirect registers.

Syntax: cxgbtool [*vbdInterface*] tpi

Example:

```
C:\Users\Administrator>cxgbtool vbd0 tpi

TP_PIO

[ 0x20] TP_RX_SCHED_MAP          0x55555555 1431655765
    31:24 S_RXMAPCHANNEL3        0x55      85
    23:16 S_RXMAPCHANNEL2        0x55      85
    15:8  S_RXMAPCHANNEL1        0x55      85
    7:0   S_RXMAPCHANNEL0        0x55      85
[ 0x21] TP_RX_SCHED_SGE          0xf       15
    15:12 S_RXSGEMOD1            0         0
    11:8  S_RXSGEMOD0            0         0
    3:3   S_RXSGECHANNEL3        0x1       1
    2:2   S_RXSGECHANNEL2        0x1       1
    1:1   S_RXSGECHANNEL1        0x1       1
    0:0   S_RXSGECHANNEL0        0x1       1
[ 0x22] TP_TX_SCHED_MAP          0x7777     30583
    15:12 S_TXMAPCHANNEL3        0x7        7
    11:8  S_TXMAPCHANNEL2        0x7        7
    7:4   S_TXMAPCHANNEL1        0x7        7
    3:0   S_TXMAPCHANNEL0        0x7        7
[ 0x23] TP_TX_SCHED_HDR          0x11111111 286331153
    31:28 S_TXMAPHDRCHANNEL7     0x1        1
    27:24 S_TXMAPHDRCHANNEL6     0x1        1
    23:20 S_TXMAPHDRCHANNEL5     0x1        1
    19:16 S_TXMAPHDRCHANNEL4     0x1        1
    15:12 S_TXMAPHDRCHANNEL3     0x1        1
    11:8  S_TXMAPHDRCHANNEL2     0x1        1
    7:4   S_TXMAPHDRCHANNEL1     0x1        1
    3:0   S_TXMAPHDRCHANNEL0     0x1        1
[ 0x24] TP_TX_SCHED_FIFO          0x11111111 286331153
    31:28 S_TXMAPFIFOCHANNEL7     0x1        1
    27:24 S_TXMAPFIFOCHANNEL6     0x1        1
    23:20 S_TXMAPFIFOCHANNEL5     0x1        1
    19:16 S_TXMAPFIFOCHANNEL4     0x1        1
    15:12 S_TXMAPFIFOCHANNEL3     0x1        1
    11:8  S_TXMAPFIFOCHANNEL2     0x1        1
    7:4   S_TXMAPFIFOCHANNEL1     0x1        1
    3:0   S_TXMAPFIFOCHANNEL0     0x1        1
```

- **sgedbg**

Description: Displays sge debug indirect registers.

Syntax: cxgbtool [*vbdInterface*] sgedbg

Example:

```
C:\Users\Administrator>cxgbtool vbd0 sgedbg

SGE_DEBUG_DATA_HIGH00      0x3000000  50331648
SGE_DEBUG_DATA_HIGH01      0              0
SGE_DEBUG_DATA_HIGH02      0              0
SGE_DEBUG_DATA_HIGH03      0              0
SGE_DEBUG_DATA_HIGH04      0              0
SGE_DEBUG_DATA_HIGH05      0              0
SGE_DEBUG_DATA_HIGH06      0              0
SGE_DEBUG_DATA_HIGH07      0              0
SGE_DEBUG_DATA_HIGH08      0x26020000  637665280
SGE_DEBUG_DATA_HIGH09      0              0
SGE_DEBUG_DATA_HIGH10      0x3              3
SGE_DEBUG_DATA_HIGH11      0              0
SGE_DEBUG_DATA_HIGH12      0              0
SGE_DEBUG_DATA_HIGH13      0              0
SGE_DEBUG_DATA_HIGH14      0x45475301  1162302209
SGE_DEBUG_DATA_HIGH15      0xbab8acfe  3132665086

SGE_DEBUG_DATA_LOW00       0              0
SGE_DEBUG_DATA_LOW01       0x3f000      258048
SGE_DEBUG_DATA_LOW02       0              0
SGE_DEBUG_DATA_LOW03       0              0
SGE_DEBUG_DATA_LOW04       0              0
SGE_DEBUG_DATA_LOW05       0x70000a     7340042
SGE_DEBUG_DATA_LOW06       0              0
SGE_DEBUG_DATA_LOW07       0              0
SGE_DEBUG_DATA_LOW08       0              0
SGE_DEBUG_DATA_LOW09       0x9              9
SGE_DEBUG_DATA_LOW10       0              0
SGE_DEBUG_DATA_LOW11       0              0
SGE_DEBUG_DATA_LOW12       0              0
SGE_DEBUG_DATA_LOW13       0              0
SGE_DEBUG_DATA_LOW14       0x1534745    22234949
SGE_DEBUG_DATA_LOW15       0xfeacb8ba  4272732346
```

- **dumpctx**

Description: Displays adapter context.

Syntax: cxgbtool [*nicInterface*] dumpctx

Example:

```
C:\Users\Administrator>cxgbtool nic0 dumpctx

Type          Value
Link State    Disconnected
Link Speed    Unknown
Hw Addr       00:07:43:28:86:00
Cur Addr     00:07:43:28:86:00
Port No       0
NetIfIdx      7
Mtu           1500
Pkt Filter    0xb
CurOfldCaps  0xd7fe00
FwdTx Pend    0
CtrlTx RefCnt 1
ToeTx Pend    0
RdmaTx RefCnt 1
ToeRx Pend    0
ToeRxData Pend 0
Ndk Connect   0
Ndk Accept    0
Ndk ConnectFail 0
Ndk ConnectErr 0
Ndk Active    0
Ndk CQErr     0
```

- **version**

Description: Displays the adapter Part Number, Serial Number, Device ID, Firmware Version, TP, NDIS Driver version, and VBD version.

Syntax: cxgbtool [*vbdInterface*] version

Example:

```
C:\Users\Administrator>cxgbtool vbd0 version
P/N:          11011695002
S/N:          PT26130519
DeviceId:     5407 (T520-S0)
FW Ver:       1.16.1.0
TP Ver:       0.1.4.9
Driver Ver:   6.2.8.0
Nic File Ver: 6.2.8.0
VBD File Ver: 6.2.8.0
Cudbg lib Ver: 1.11.0
```

- **fwtoc**

Description: Converts firmware binary file to source file header.

Syntax: cxgbtool [*vbdInterface*] fwtoC [*firmwareFile*] filename= [*CFileName*].bin

Example:

```
C:\Users\Administrator>cxgbtool vbd fwtoC C:\Users\Administrator\Desktop\t5fw-1.13.32.0.bin
filename=t5fw-1.13.32.0.bin filetype=bin
```

- **inst**

Description: Installs driver package specified in the setup information file (.inf).

Syntax: cxgbtool [*vbdInterface*] inst [*infFilePath*] force

Example:

```
C:\Users\Administrator>cxgbtool vbd0 inst C:\Users\Administrator\Desktop\x64\chvbdx64.inf force
ENTER: DriverPackageInstallA
ENTER: DriverPackageInstallW
Installing INF file 'C:\Users\Administrator\Desktop\x64\chvbdx64.inf' (Plug and Play).
Looking for Model Section [Chelsio.NTamd64]...
Installing devices with Id "PCI\VEN_1425&DEV_5407&SUBSYS_00001425&REV_00" using INF "C:\Windows\System32\DriverStore\FileRepository\chvbdx64.inf_amd64_8c314729d0b903fd\chvbdx64.inf".
Will force install because driver is not better and force flag is set.
ENTER UpdateDriverForPlugAndPlayDevices...
RETURN UpdateDriverForPlugAndPlayDevices...
Installation was successful.
Install completed
RETURN: DriverPackageInstallW (0x0)
RETURN: DriverPackageInstallA (0x0)

C:\Users\Administrator>cxgbtool vbd0 inst C:\Users\Administrator\Desktop\x64\chnetx64.inf force
ENTER: DriverPackageInstallA
ENTER: DriverPackageInstallW
Installing INF file 'C:\Users\Administrator\Desktop\x64\chnetx64.inf' (Plug and Play).
Looking for Model Section [Chelsio.NTamd64.6.2]...
Installing devices with Id "CHT5BUS\chnet" using INF "C:\Windows\System32\DriverStore\FileRepository\chnetx64.inf_amd64_fa62374c3af15d22\chnetx64.inf".
Will force install because driver is not better and force flag is set.
ENTER UpdateDriverForPlugAndPlayDevices...
RETURN UpdateDriverForPlugAndPlayDevices...
Installation was successful.
Install completed
RETURN: DriverPackageInstallW (0x0)
RETURN: DriverPackageInstallA (0x0)
```

- **unins**

Description: Uninstalls driver package specified in the setup information file (.inf).

Syntax: cxgbtool [*vbdInterface*] uninst [*infFile*]

Example:

```
C:\Users\Administrator>cxgbtool vbd0 uninst C:\Users\Administrator\Desktop\chnetx64.inf
Removing device instance CHT5BUS\CHNET\5&11A224E83&0000
Removing device instance CHT5BUS\CHNET\5&11A224E83&0001
Removing device instance CHT5BUS\CHNET\5&11A224E84&0000
Removing device instance CHT5BUS\CHNET\5&11A224E84&0001
ENTER: DriverPackageGetPathA
RETURN: DriverPackageGetPathA (0x7A)
ENTER: DriverPackageGetPathA
RETURN: DriverPackageGetPathA (0x0)
ENTER: DriverPackageUninstallA
ENTER: DriverPackageUninstallW
Uninstalling driver package C:\Windows\System32\DriverStore\FileRepository\chnetx64.inf_amd64_fa62374c3af15d22\chnetx64.inf...
Successfully uninstalled 'C:\Windows\INF\oem9.inf'.
No devices found for C:\Windows\System32\DriverStore\FileRepository\chnetx64.inf_amd64_fa62374c3af15d22\chnetx64.inf uninstall.
Successfully deleted properties for driver store entry 'C:\Windows\System32\DriverStore\FileRepository\chnetx64.inf_amd64_fa62374c3af15d22\chnetx64.inf'.
Uninstall completed.
RETURN: DriverPackageUninstallW (0x0)
RETURN: DriverPackageUninstallA (0x0)
```

- **update**

Description: Updates driver package.

Syntax: cxgbtool update [*infFile*]

Example:

```
C:\Users\Administrator>cxgbtool update C:\Users\Administrator\Desktop\x64\chvbdx64.inf
Driver for HwId:PCI\VEN_1425&DEV_5407&SUBSYS_00001425&REV_00 updated successfully!!!
```

- **rescan all**

Description: Scans for hardware changes in the device manager.

Syntax: cxgbtool [*vbdInterface*] rescan all

Example:

```
C:\Users\Administrator>cxgbtool vbd0 rescan all
```

- **trace**


Description: Enables driver debug prints.

Syntax: trace [*nicInterface/vbdInterface*] trace [nic|vbd] [(flags)][(level)]

Example:

```
C:\Users\Administrator>cxgbtool vbd0 trace vbd 8 7
Tracing vbd flags=0x8 level=7
Press 'q' to quit tracing: _
```

- **seeprom**

 **Important** Use this option with caution. Incorrect usage may render the adapter useless.

Description: Reads/Writes SEEPROM (init+VPD) data.


Syntax:

Read SEEPROM data to a bin file: cxgbtool [*vbdInterface*] seeprom read

Display SEEPROM data in console: cxgbtool [*vbdInterface*] seeprom dump

Write SEEPROM data: cxgbtool [*vbdInterface*] seeprom write [*seepromFile*]

Verify SEEPROM data: cxgbtool [*vbdInterface*] seeprom verify [*seepromFile*]

 **Note** *The seepromFile should be in binary format (.bin).*

Example:

Read SEEPROM data:

```
C:\Users\Administrator>cxgbtool vbd0 seeprom read
Reading Seeprom data to seeprom.bin
```

Write SEEPROM data:

```
C:\Users\Administrator>cxgbtool vbd0 seeprom write seeprom.bin

Changing the init/vpd can cause the card to become inaccessible if the operation is interrupted
Do you want to flash your T520-S0 (SN:PT26130519,PN:11011695002,NA:000743288600) card? (y/n) : y
Hardware configuration changed successfully.
Please reboot for the changes to take effect
```

Verify SEEPROM data:

```
C:\Users\Administrator>cxgbtool vbd0 seeprom verify seeprom.bin
Verifying seeprom data against seeprom.bin

verification started
Verification : PASSED
```

• **serialinit**

 **Important** *Use this option with caution. Incorrect usage may render the adapter useless.*

Description: Reads/Writes serialinit data.


Syntax:

Read serialinit data to a bin file: `cxgbtool [vbdInterface] serialinit read`

Display serialinit data in console: `cxgbtool [vbdInterface] serialinit dump`

Write serialinit data: `cxgbtool [vbdInterface] serialinit write [initdataFile]`

Verify serialinit data: `cxgbtool [vbdInterface] serialinit verify [initdataFile]`

 **Note** *The initdataFile should be in binary format (.bin).*

Example:

Read serialinit data

```
C:\Users\Administrator>cxgbtool vbd0 serialinit read
Reading Serial Init data to seeprom_init.bin
```

Write serialinit data

```
C:\Users\Administrator>cxgbtool vbd0 serialinit write "C:\ChelsioT4\Adapter Configuration\SRIOV\t520_so_init_gen3_250_825_Pf4vf.bin"
Changing the init/vpd can cause the card to become inaccessible if the operation is interrupted
Do you want to flash your T520-SO (SN:PT26130519,PN:11011695002,NA:000743288600) card? (y/n) : y
Hardware configuration changed successfully.
Please reboot for the changes to take effect
```

Verify serialinit data

```
C:\Users\Administrator>cxgbtool vbd0 serialinit verify "C:\ChelsioT4\Adapter Configuration\SRIOV\t520_so_init_gen3_250_825_Pf4vf.bin"
Verifying Serial Init data against C:\ChelsioT4\Adapter Configuration\SRIOV\t520_so_init_gen3_250_825_Pf4vf.bin
verification started
Verification : PASSED
```

• vpd

Important Use this option with caution. Incorrect usage may render the adapter useless.

Description: Reads/writes VPD data.

Syntax:

Read VPD data: cxgbtool [vpdInterface] vpd read

Write VPD data to serial EEPROM on chip: cxgbtool [vpdInterface] vpd write [vpdFile]

Note The vpdFile should be in binary format (.bin).

Example:

Read VPD Data:

```
C:\Users\Administrator>cxgbtool vbd0 vpd read
Reading Vpd data to seeprom_vpd.bin
```

Write VPD Data:

```
C:\Users\Administrator>cxgbtool vbd0 vpd write seeprom_vpd.bin

Changing the init/vpd can cause the card to become inaccessible if the operation is interrupted
Do you want to flash your T520-S0 (SN:PT26130519,PN:11011695002,NA:000743288600) card? (y/n) : y
Hardware configuration changed successfully.
Please reboot for the changes to take effect
```

- **vpdparams**

Description: Displays the adapters Serial Number, Device ID, EC, Core Clock, Part Number, and Network Address (MAC).

Syntax: cxgbtool [*vbdInterface*] vpdparams

Example:

```
C:\Users\Administrator>cxgbtool vbd0 vpdparams
Serial Number : PT26130519
Id            : T520-S0
Ec           : 0000000000000000
Core Clock   : 250000
Pn           : 11011695002
Network Addr : 000743288600
```

- **wtp**

Description: Traces the Ingress and Egress path of a packet through the Chelsio adapter.

Syntax: cxgbtool [*vbdInterface*] wtp

Example:

```

C:\Users\Administrator>cxgbtool vbd0 wtp

*****EGRESS (TX) PATH *****
MOD : core---->PCIE---->SGE<-| #Ring Doorbell
SOP   ?      ???
MOD |<-core<----PCIE<----SGE<-| #Request Work Request
SOP   14      0
MOD |->core---->PCIE---->SGE----->CIM->|uP<-CIM<-CSW #->Work req. <-Pkts
SOP   14      0      2      |      2
MOD |<-core<----PCIE<----SGE<-----UTX<----| #data dma requests
SOP   0      0      0
MOD |->core->PCIE-->SGE-->UTX---->TPC-->TPE-->MPS--->MAC--->wire
SOP_CH0      0 0 0 2 2 2 0 0 0 0 0
SOP_CH1      0 0 0 1 1 1 0 0 0 0 0
SOP_CH2      0 0 0 0 0 0 0 0 0 0 0
SOP_CH3      0 0 0 0 0 0 0 0 0 0 0
SOP          0 0 0 3 3 3 0 0 0 0 0
*****INGRESS (RX) PATH *****
MOD core<-PCIE<-SGE<-CSW<--TPC<-URX<-LE->TPE<--MPS<---MAC<---wire
SOP_CH0      2 4 0 2 2 0 0 0 0 0 0
SOP_CH1      0 0 0 0 0 0 0 0 0 0 0
SOP_CH2      0 0 0 0 0 0 0 0 0 0 0
SOP_CH3      0 0 0 0 0 0 0 0 0 0 0
SOP_CH4      0
SOP_CH5      0
SOP_CH6      0
SOP_CH7      0
SOP          2 4 0 2 2 0 0 0 0 0 0
INT_CH0-CH4: 2<-2 0<-0 0<-0 0<-0 rxdrop:0x0 txdrop:0x0 errors:0x0

```

- **stats**

Description: Prints MAC statistics for a given port or TP MIB statistics.

Syntax: cxgbtool [*vbdInterface*] stats [*mac{portInstance}*][*mib*]

Example:

```

C:\Users\Administrator>cxgbtool vbd0 stats mac0
LOW 0x00000000
HIGH 0x00440022
LOW 0x0003f000
HIGH 0x00000022
LOW 0x00000000
HIGH 0x00000000
LOW 0x00000000
HIGH 0x00000000
LOW 0x00000000
HIGH 0x00000000
LOW 0x00700015
HIGH 0x00000000
LOW 0x00000000
HIGH 0x00000000
LOW 0x00000000
HIGH 0x00000044
LOW 0x00000000
HIGH 0x00020002
LOW 0x0000001a

```

- **cpl_stats**

Description: Displays CPL Request and Response Statistics for all channels.

Syntax: cxgbtool [*vbdInterface*] cpl_stats

Example:

```
C:\Users\Administrator>cxgbtool vbd0 cpl_stats
          channel 0  channel 1  channel 2  channel 3
CPL requests:         2         1         0         0
CPL responses:        1         1         0         0
```

- **debugfs**

Description: When used in conjunction with other options, *debugfs* displays useful information regarding Chelsio adapters.

Syntax: cxgbtool [*vbdInterface*] debugfs [option]

debugfs options:

- **cctrl**

Description: Displays congestion control table.

Syntax: cxgbtool [*vbdInterface*] debugfs cctrl

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs cctrl
0:  24 108 236 268 384 492 620 724
    730 981 1004 2028 2156 4076 4480 4780    1 0.5
1:   8  36  78  89 128 164 206 241
    243 327 334 676 718 1358 1493 1593    1 0.5
2:   4  21  47  53  76  98 124 144
    146 196 200 405 431 815 896 956    1 0.5
3:   3  15  33  38  54  70  88 103
    104 140 143 289 308 582 640 682    1 0.5
4:   2  10  23  26  38  49  62  72
    73  98 100 202 215 407 448 478    1 0.5
5:   2   7  16  19  27  35  44  51
    52  70  71 144 154 291 320 341    1 0.5
6:   2   5  11  13  19  24  31  36
    36  49  50 101 107 203 224 239    1 0.5
7:   2   3   8   9  13  17  22  25
    26  35  35  72  77 145 160 170    1 0.5
8:   2   2   5   6   9  12  15  18
    18  24  25  50  53 101 112 119    1 0.5
```

- **cim_pif_la**

Description: Displays CIM PIF logic analyzer trace.

Syntax: cxgbtool [*vbdInterface*] debugfs cim_pif_la

Example:

```
C:\Users\Administrator>cxbgtool vbd0 debugfs cim_pif_la
Cntl ID DataBE Addr Data
81 00 f000 e1003060 40003044400030444000304440003044
01 01 0f00 e1003064 40003044400030444000304440003044
01 01 f000 e1003060 40003044400030444000304440003044
81 00 f000 e1003060 00003044400030444000304440003044
81 00 f000 e1003060 40002044400020444000204440002044
01 01 0f00 e1003064 40002044400020444000204440002044
01 01 f000 e1003060 40002044400020444000204440002044
81 00 f000 e1003060 00002044400020444000204440002044
81 00 f000 e1003060 40001044400010444000104440001044
01 01 0f00 e1003064 40001044400010444000104440001044
01 01 f000 e1003060 40001044400010444000104440001044
81 00 f000 e1003060 00001044400010444000104440001044
81 00 f000 e1003060 40000044400000444000004440000044
01 01 0f00 e1003064 40000044400000444000004440000044
01 01 f000 e1003060 40000044400000444000004440000044
81 00 f000 e1003060 00000044400000444000004440000044
01 01 0f00 e1003144 00000044400000444000004440000044
```

- **cim_ma_la**

Description: Displays results of CIM MA logic analyzer trace.

Syntax: cxgbtool [*vbdInterface*] debugfs cim_ma_la

Example:

[illegible]

- **cim_qcfg**

Description: Displays CIM queue configuration details.

Syntax: cxgbtool [*vbdInterface*] debugfs cim_qcfg

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs cim_qcfg
Queue Base Size Thres RdPtr WrPtr SOP EOP Avail
TP0 0 2048 0 40 40 2 2 2048
TP1 800 2048 0 0 0 0 0 2048
ULP 1000 2048 0 0 0 0 0 2048
SGE0 1800 2048 0 660 660 34 34 2048
SGE1 2000 2048 0 0 0 0 0 2048
NC-SI 2800 2048 0 0 0 0 0 2048
ULP0 0 2048 e0 e0 4 4 2048
ULP1 800 2048 30 30 1 1 2048
ULP2 1000 2048 0 0 0 0 2048
ULP3 1800 2048 0 0 0 0 2048
SGE 2000 2048 80 80 68 68 2048
NC-SI 2800 2048 0 0 0 0 2048
```

- **clk**

Description: Displays the core clock.

Syntax: cxgbtool [*vbdInterface*] debugfs clk

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs clk
Core clock period: 4 ns
TP timer tick: 32.768 us
TCP timestamp tick: 1048.576 us
DACK tick: 8.192 us
DACK timer: 488 us
Retransmit min: 960 us
Retransmit max: 9765440 us
Persist timer min: 976544 us
Persist timer max: 9765440 us
Keepalive idle timer: 7031116800 us
Keepalive interval: 73240800 us
Initial SRTT: 137437100448 us
FINWAIT2 timer: 9765440 us
```

- **sensor**

Description: Displays sensor data.

Syntax: cxgbtool [*nicInterface*] debugfs sensor

Example:

```
C:\Users\Administrator>cxgbtool nic0 debugfs sensor
Temperature: 69C
Core VDD: 995mV
```

- **ddp_stats**

Description: Displays DDP(Direct Data Placement) statistics.

Syntax: cxgbtool [*vbdInterface*] debugfs ddp_stats

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs ddp_stats
Frames: 0
Octets: 0
Drops: 0
```

- **edc0**

Description: Redirects EDC0 memory details to a file.

Syntax: cxgbtool [*vbdInterface*] debugfs edc0 [*fileName*]



Note *It is recommended that the fileName be provided without any extension.*

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs edc0 edc0_debug
cxgbtool: This may take a while. Please be patient
cxgbtool: Reading MEM_EDC0 (0) memory of size 3145728 bytes
cxgbtool: Writing memory block to file edc0_debug...
cxgbtool: Done writing memory block to file edc0_debug
```

- **edc1**

Description: Redirects EDC1 memory details to a file.

Syntax: cxgbtool [*vbdInterface*] debugfs edc1 [*fileName*]



Note *It is recommended that the fileName should be provided without any extension.*

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs edc1 edc1_debug
cxgbtool: This may take a while. Please be patient
cxgbtool: Reading MEM_EDC1 (1) memory of size 3145728 bytes
cxgbtool: Writing memory block to file edc1_debug...
cxgbtool: Done writing memory block to file edc1_debug
```

- **flash**

Description: Redirects Flash memory details to a file.

Syntax: cxgbtool [vbdInterface] debugfs flash [fileName]

 **Note** *It is recommended that the fileName should be provided without any extension.*

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs flash flash_debug
cxgbtool: This may take a while. Please be patient
cxgbtool: Reading Flash memory of size 4194304 bytes
cxgbtool: Writing memory block of size 4194304 bytes to file flash_debug...
cxgbtool: Done writing memory block to file flash_debug
```

- **ibq_tp**

Description: Displays CIM TP inbound queue.

Syntax: cxgbtool [vbdInterface] debugfs ibq_tp[{0|1}]

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs ibq_tp0
000000: 078103ff ffc04102 2e8103ff 00000000
0x0010: 2effc041 00000000 00000000 00000000
0x0020: 078003ff ffc04202 2e8003ff 00000000
0x0030: 2effc042 00000000 00000000 00000000
0x0040: 478103ff 0007e102 3a8103ff 00000000
0x0050: 3a0007e1 0000a000 00000000 0000013c
0x0060: 478103ff 0007e102 3a8103ff 00000000
0x0070: 3a0007e1 0000a000 00000000 0000013c
0x0080: 478103ff 0007e102 3a8103ff 00000000
0x0090: 3a0007e1 0000a000 00000000 0000013c
0x00a0: 478103ff 0007e102 3a8103ff 00000000
0x00b0: 3a0007e1 0000a000 00000000 0000013c
0x00c0: 478103ff 0007e102 3a8103ff 00000000
0x00d0: 3a0007e1 0000a000 00000000 0000013c
0x00e0: 478103ff 0007e102 3a8103ff 00000000
0x00f0: 3a0007e1 0000a000 00000000 0000013c
0x0100: 078103ff ffc04102 2e8103ff 00000000
0x0110: 2effc041 00000000 00000000 00000000
0x0120: 00000000 00000000 00000000 00000000
```

- **ibq_ulp**

Description: Displays CIM ULP inbound queue.

Syntax: cxgbtool [*vbdInterface*] debugfs ibq_ulp

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs ibq_ulp
000000: 00000000 00000000 00000000 00000000
0x0010: 00000000 00000000 00000000 00000000
0x0020: 00000000 00000000 00000000 00000000
0x0030: 00000000 00000000 00000000 00000000
0x0040: 00000000 00000000 00000000 00000000
0x0050: 00000000 00000000 00000000 00000000
0x0060: 00000000 00000000 00000000 00000000
0x0070: 00000000 00000000 00000000 00000000
0x0080: 00000000 00000000 00000000 00000000
0x0090: 00000000 00000000 00000000 00000000
0x00a0: 00000000 00000000 00000000 00000000
0x00b0: 00000000 00000000 00000000 00000000
0x00c0: 00000000 00000000 00000000 00000000
0x00d0: 00000000 00000000 00000000 00000000
0x00e0: 00000000 00000000 00000000 00000000
0x00f0: 00000000 00000000 00000000 00000000
0x0100: 00000000 00000000 00000000 00000000
0x0110: 00000000 00000000 00000000 00000000
```

- **ibq_sge**

Description: Displays CIM SGE inbound queue.

Syntax: cxgbtool [*vbdInterface*] debugfs ibq_sge[{0|1}]

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs ibq_sge0
000000: 04001000 08007e00 000000fb b3000106
0x0010: 01fd9361 00013c03 00000000 00000000
0x0020: 00000000 00000000 00014000 77100030
0x0030: 04001000 08007e00 000000fb b3000106
0x0040: 01fd47c6 00013c03 00000000 00000000
0x0050: 00000000 00000000 00014000 77100030
0x0060: 04001000 08007e00 000000fb b3000106
0x0070: 01fdef6f 00013c03 00000000 00000000
0x0080: 00000000 00000000 00014000 77100030
0x0090: 04001000 08007e00 000000fb b3000106
0x00a0: 01fd68e9 00013c03 00000000 00000000
0x00b0: 00000000 00000000 00000000 00000000
0x00c0: 00000000 00000000 00000000 00000000
0x00d0: 01fdb4be 00013c03 00000000 00000000
0x00e0: 00000000 00000000 00000000 00000000
0x00f0: 00000000 00000000 00000000 00000000
0x0100: 01fdd1bb 00013c03 00000000 00000000
0x0110: 00000000 00000000 00000000 00000000
0x0120: 00000000 00000000 00000000 00000000
0x0130: 01fdb700 00013c03 00000000 00000000
0x0140: 00000000 00000000 00000000 00000000
```

- **ibq_ncsi**

Description: Displays CIM NCSI inbound queue.

Syntax: cxgbtool [*vbdInterface*] debugfs ibq_ncsi

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs ibq_ncsi
000000: 00000000 00000000 00000000 00000000
0x0010: 00000000 00000000 00000000 00000000
0x0020: 00000000 00000000 00000000 00000000
0x0030: 00000000 00000000 00000000 00000000
0x0040: 00000000 00000000 00000000 00000000
0x0050: 00000000 00000000 00000000 00000000
0x0060: 00000000 00000000 00000000 00000000
0x0070: 00000000 00000000 00000000 00000000
0x0080: 00000000 00000000 00000000 00000000
0x0090: 00000000 00000000 00000000 00000000
0x00a0: 00000000 00000000 00000000 00000000
0x00b0: 00000000 00000000 00000000 00000000
0x00c0: 00000000 00000000 00000000 00000000
0x00d0: 00000000 00000000 00000000 00000000
0x00e0: 00000000 00000000 00000000 00000000
0x00f0: 00000000 00000000 00000000 00000000
0x0100: 00000000 00000000 00000000 00000000
0x0110: 00000000 00000000 00000000 00000000
```

- **mc**

Description: Redirects MC memory details to a file.

Syntax: cxgbtool [*vbdInterface*] debugfs mc[{0|1}] [*dumpFileName*]

Example:

```
C:\Users\Administrator>cxgbtool nic0 debugfs mc1 mc1_debug
cxgbtool: This may take a while. Please be patient
cxgbtool: Reading MEM_MC1 (3) memory of size 1073741824 bytes
cxgbtool: Writing memory block to file mc1_debug...
cxgbtool: Done writing memory block to file mc1_debug
```



It is recommended that the dumpFileName should be provided without any extension.

- **mps_tcam**

Description: Displays MPS TCAM configuration.

Syntax: cxgbtool [*vbdInterface*] debugfs mps_tcam

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs mps_tcam
```

[illegible]

- **mps_trc_rd trace**

Description: Reads MPS trace filter.

Syntax: `cxgbootool [vbdInterface] debugfs mps_trc_rd trace[traceQueueId]`

Example:

[illegible]

- **mps_trc_wr trace**

Description: Sets MPS trace filter.

Syntax:

```
cxgbrtc [vbdInterface] debugfs mps_trc_wr trace[0|1|2|3] [tx[portInstance]|rx[portInstance]]
```

Example:

Setting up trace0 with tx0 (tx0 is port0 Tx path)

```
C:\Users\Administrator>cxgbtool vbd0 debugfs mps_trc_wr trace0 tx0
```

- **mbox**

Description: Displays the last command in each mailbox.

Syntax: cxgbtool [*vbdInterface*] debugfs mbox[{0|1|2|...|7}]

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs mbox0
mailbox[0] owned by driver

0000000000000000
0000000000000000
0000000000000000
0000000000000000
0000000000000000
0000000000000000
0000000000000000
0000000000000000
0000000000000000
```

- **obq_ulp**

Description: Displays ULP outbound queue.

Syntax: cxgbtool [*vbdInterface*] debugfs obq_ulp[{0|1|2|3}]

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs obq_ulp0
000000: 04000008 00000003 81000000 00000018
0x0010: 05000000 83ff0000 00000000 00000001
0x0020: 00000000 00000000 00000000 00000000
0x0030: 04010008 00013c04 81000000 00000030
0x0040: e0000000 00000000 e0000000 ffffffff
0x0050: 1b000001 00030002 001fc91f c1cac1ca
0x0060: 05ee0000 000dc0c0 00000000 00000000
0x0070: 04000000 0001c203 00000000 00000000
0x0080: 81000000 00000018 14ffc042 04200000
0x0090: 0c420000 00000000 017b0007 43288600
0x00a0: 04010008 00013c04 81000000 00000030
0x00b0: e0000000 00000000 e0000000 ffffffff
0x00c0: 1b000000 00030002 001fc91f c1cac1ca
0x00d0: 05ee0000 000dc0c0 00000000 00000000
0x00e0: 04010008 00013c04 81000000 00000030
0x00f0: e0000000 00000000 e0000000 ffffffff
0x0100: 1b000001 00030002 001fc91f c1cac1ca
0x0110: 05ee0000 000dc0c0 00000000 00000000
0x0120: 00000000 00000000 00000000 00000000
```

- **obq_sge**

Description: Displays SGE outbound queue.

Syntax: cxgbtool [*vbdInterface*] debugfs obq_sge

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs obq_sge
000000: 02000000 00000d03 00000000 00000000
0x0010: 00000001 00000000 00014000 26000a72
0x0020: 8404ea00 00000000 000000f7 c0201004
0x0030: 01000000 00000001 01fd4ff0 00013c03
0x0040: 02000000 00000e03 00000000 00000000
0x0050: 00000001 00000000 00014000 26000a92
0x0060: 84054a00 00000000 000000f7 bc401e04
0x0070: 01000000 00000001 01fd0f06 00013c03
0x0080: 02000000 00000f03 00000000 00000000
0x0090: 00000001 00000000 00034080 26000ab2
0x00a0: 8405fa00 00000000 000000f7 ba201004
0x00b0: 01000000 00000001 01fd63e4 00013c03
0x00c0: 02000000 00001003 00000000 00000000
0x00d0: 00000001 00000000 00034080 26000002
0x00e0: 8005fa00 00000000 000000f7 b9000804
0x00f0: 01000000 00000001 01fde10d 00013c03
```

- **obq_ncsi**

Description: Displays NCSI outbound queue.

Syntax: cxgbtool [*vbdInterface*] debugfs obq_ncsi

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs obq_ncsi
000000: 00000000 00000000 00000000 00000000
0x0010: 00000000 00000000 00000000 00000000
0x0020: 00000000 00000000 00000000 00000000
0x0030: 00000000 00000000 00000000 00000000
0x0040: 00000000 00000000 00000000 00000000
0x0050: 00000000 00000000 00000000 00000000
0x0060: 00000000 00000000 00000000 00000000
0x0070: 00000000 00000000 00000000 00000000
0x0080: 00000000 00000000 00000000 00000000
0x0090: 00000000 00000000 00000000 00000000
0x00a0: 00000000 00000000 00000000 00000000
0x00b0: 00000000 00000000 00000000 00000000
0x00c0: 00000000 00000000 00000000 00000000
0x00d0: 00000000 00000000 00000000 00000000
0x00e0: 00000000 00000000 00000000 00000000
0x00f0: 00000000 00000000 00000000 00000000
0x0100: 00000000 00000000 00000000 00000000
0x0110: 00000000 00000000 00000000 00000000
0x0120: 00000000 00000000 00000000 00000000
0x0130: 00000000 00000000 00000000 00000000
0x0140: 00000000 00000000 00000000 00000000
0x0150: 00000000 00000000 00000000 00000000
```

- **obq_sge_rx_q**

Description: Displays CIM SGE outbound queue.

Syntax: cxgbtool [*vbdInterface*] debugfs obq_sge_rx_q[{0|1}]

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs obq_sge_rx_q0
000000: 00000000 00000000 00000000 00000000
0x0010: 00000000 00000000 00000000 00000000
0x0020: 00000000 00000000 00000000 00000000
0x0030: 00000000 00000000 00000000 00000000
0x0040: 00000000 00000000 00000000 00000000
0x0050: 00000000 00000000 00000000 00000000
0x0060: 00000000 00000000 00000000 00000000
0x0070: 00000000 00000000 00000000 00000000
0x0080: 00000000 00000000 00000000 00000000
0x0090: 00000000 00000000 00000000 00000000
```

- **pm_stats**

Description: Displays page memory statistics.

Syntax: cxgbtool [*vbdInterface*] debugfs pm_stats

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs pm_stats
                                Tx cycles    Tx bytes
Read:                          0             0
Write bypass:                  108782         843
Write mem:                     0             0
Bypass + mem:                  0             0
                                Rx cycles    Rx bytes
Read:                          0             0
Write bypass:                  207098        1547
Write mem:                     0             0
Flush:                         0             0
```

- **tcp_stats**

Description: Displays IPv4/IPv6 TCP statistics.

Syntax: cxgbtool [*vbdInterface*] debugfs tcp_stats

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs tcp_stats
                                IP           IPv6
OutRsts:                       0           0
InSegs:                        0           0
OutSegs:                       0           0
RetransSegs:                   0           0
```

- **tp_err_stats**

Description: Displays TP error statistics for channel 0-3.

Syntax: cxgbtool [*vbdInterface*] debugfs tp_err_stats

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs tp_err_stats
channel 0 channel 1 channel 2 channel 3
macInErrs: 0 0 0 0
hdrInErrs: 0 0 0 0
tcpInErrs: 0 0 0 0
tcp6InErrs: 0 0 0 0
tnlCongDrops: 0 0 0 0
tnlTxDrops: 0 0 0 0
ofldVlanDrops: 0 0 0 0
ofldChanDrops: 0 0 0 0

ofldNoNeigh: 0
ofldCongDefer: 0
```

- **tp_la**

Description: Dumps TP la.

Syntax:

```
cxgbtool [vbdInterface] debugfs tp_la
```

```
cxgbtool [vbdInterface] debugfs tp_la [{2|3}]
```

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs tp_la
TP LA Debug Mode: 3

RcfOpCodeOut: 8 State: 0 WcfState: 0 RcfOpSrcOut: 1 CRxError: 0 ERxError: 0
SanityFailed: 0 SpuriousMsg: 0 FlushInputMsg: 0 FlushInputCpl: 0
RssUpBit: 1 RssFilterHit: 0 Tid: 993 InitTcb: 0 LineNumber: 10 Emsg: 0
EdataOut: 0 Cmsg: 1 CdataOut: 0 EreadPdu: 0 CreadPdu: 0 TunnelPkt: 0
RcfPeerFin: 0 RcfReasonOut: 0 TxChannel: 1 RcfTxChannel: 0
RxEchannel: 0 RcfRxChannel: 0 RcfDataOutSrdy: 1 RxDvld: 0 RxOoDvld: 0
RxCongestion: 0 TxCongestion: 0

CplCmdIn: 5 CplCmdOut: 58 ESynOut: 0 EAckOut: 0 EFinOut: 0 ERstOut: 0 SynIn: 0
AckIn: 0 FinIn: 0 RstIn: 0 DataIn: 0 DataInVld: 0 PadIn: 1
RxBufEmpty: 1 RxDdp: 0 RxFbCongestion: 0 TxFbCongestion: 0
TxPktSumSrdy: 1 RcfUlpType: 12 Eread: 0 Ebypass: 0 Esave: 0 Static0: 1
Cread: 0 Cbypass: 0 Csave: 0 CPktOut: 0 RxPagePoolFull: 2 RxLpbkPkt: 0
TxLpbkPkt: 0 RxVfValid: 0 SynLearned: 0 SetDelEntry: 0 SetInvEntry: 0
CpcmdDvld: 0 CpcmdSave: 0 RxPstructsFull: 0 EpcmdDvld: 0 EpcmdFlush: 0
EpcmdTrimPrefix: 0 EpcmdTrimPostfix: 0 ERssIp4Pkt: 0 ERssIp6Pkt: 0
ERssTcpUdpPkt: 0 ERssFceFipPkt: 0

RcfOpCodeOut: 8 State: 0 WcfState: 0 RcfOpSrcOut: 1 CRxError: 0 ERxError: 0
SanityFailed: 0 SpuriousMsg: 0 FlushInputMsg: 0 FlushInputCpl: 0
RssUpBit: 1 RssFilterHit: 0 Tid: 993 InitTcb: 0 LineNumber: 10 Emsg: 0
EdataOut: 0 Cmsg: 0 CdataOut: 0 EreadPdu: 0 CreadPdu: 0 TunnelPkt: 0
RcfPeerFin: 0 RcfReasonOut: 0 TxChannel: 1 RcfTxChannel: 0
RxEchannel: 0 RcfRxChannel: 0 RcfDataOutSrdy: 1 RxDvld: 0 RxOoDvld: 0
RxCongestion: 0 TxCongestion: 0

CplCmdIn: 5 CplCmdOut: 58 ESynOut: 0 EAckOut: 0 EFinOut: 0 ERstOut: 0 SynIn: 0
AckIn: 0 FinIn: 0 RstIn: 0 DataIn: 0 DataInVld: 0 PadIn: 1
RxBufEmpty: 1 RxDdp: 0 RxFbCongestion: 0 TxFbCongestion: 0
TxPktSumSrdy: 1 RcfUlpType: 12 Eread: 0 Ebypass: 0 Esave: 0 Static0: 1
Cread: 0 Cbypass: 0 Csave: 0 CPktOut: 0 RxPagePoolFull: 2 RxLpbkPkt: 0
TxLpbkPkt: 0 RxVfValid: 0 SynLearned: 0 SetDelEntry: 0 SetInvEntry: 0
CpcmdDvld: 0 CpcmdSave: 0 RxPstructsFull: 0 EpcmdDvld: 0 EpcmdFlush: 0
EpcmdTrimPrefix: 0 EpcmdTrimPostfix: 0 ERssIp4Pkt: 0 ERssIp6Pkt: 0
ERssTcpUdpPkt: 0 ERssFceFipPkt: 0
```

- **tid_info**

Description: Displays TID info.

Syntax: cxgbtool [*nicInterface*] debugfs tid_info

Example:

```
C:\Users\Administrator>cxgbtool nic0 debugfs tid_info
TID range: 0..31, in use: 0
STID range: 32..63, in use: 0
ATID range: 0..15, in use: 0
FTID range: 544..911
HW TID usage: 0 IP users, 0 IPv6 users
```

- **tx_rate**

Description: Displays TX rate for NIC and offload traffic.

Syntax: cxgbtool [*vbdInterface*] debugfs tx_rate

Example:

```
C:\Users\Administrator>cxgbtool vbd0 debugfs tx_rate
channel 0 channel 1 channel 2 channel 3
NIC B/s: 0 0 0 0
Offload B/s: 0 0 0 0
```

- **ulprx_la**

Description: Dumps ULP RX LA.

Syntax: cxgbtool [*vbdInterface*] debugfs ulprx_la

Example:

```
C:\Users\Administrator>cxgbtool nic0 debugfs ulprx_la
Pcmd Type Message Data
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
0000000000000000 0 00000000 00000000000000000000000000000000
```

- **cudbg**

Description: Collects and processes Chelsio adapter debug logs.

Syntax: cxgbtool [*vbdInterface*] debugfs cudbg [operation] [entity] [outfile][(optionalParams)]

Examples:

- Collecting debug log for all entities

```
C:\Users\Administrator>cxgbtool vbd0 debugfs cudbg collect all dump_file
cxgbtool: This may take a while. Please be patient
cxgbtool: Writing cudbg block to file dump_file... size: 12767264 bytes
cxgbtool: Done writing cudbg data to file dump_file
```

- Collecting debug log skipping specific debug entities

```
C:\Users\Administrator>cxgbtool vbd0 debugfs cudbg collect all dump_file skip edc1,edc0
cxgbtool: This may take a while. Please be patient
cxgbtool: Writing cudbg block to file dump_file... size: 12289636 bytes
cxgbtool: Done writing cudbg data to file dump_file
```

- Collecting debug log avoiding entities that can affect running traffic

```
C:\Users\Administrator>cxgbtool vbd0 debugfs cudbg collect all dump_file safe
cxgbtool: This may take a while. Please be patient
cxgbtool: Writing cudbg block to file dump_file... size: 39456 bytes
cxgbtool: Done writing cudbg data to file dump_file
```

- Displaying debug log on the screen.

```
C:\Users\Administrator>cxgbtool vbd0 debugfs cudbg view clk dump_file
cudbg_view() dbg entity : clk
Core clock period: 4 ns
TP timer tick: 32.768 us
TCP timestamp tick: 1048.576 us
DACK tick: 8.192 us
DACK timer: 488 us
Retransmit min: 960 us
Retransmit max: 9765440 us
Persist timer min: 976544 us
Persist timer max: 9765440 us
Keepalive idle timer: 7031116800 us
Keepalive interval: 73240800 us
Initial SRTT: 244128 us
FINWAIT2 timer: 9765440 us
```


- o Displaying summary of debug log present in a compressed dump file on screen

```

C:\Users\Administrator>cxgbtool vbd0 debugfs cudbg info dump_file
regdump                compressed size 9752
devlog                  compressed size 3296
cimla                   compressed size 336
cimmala                 compressed size 76
cimqcfg                 compressed size 288
ibqtp0                  compressed size 224
ibqtp1                  compressed size 72
ibqulp                  compressed size 72
ibqsge0                 compressed size 544
ibqsge1                 compressed size 72
obqncsi                 compressed size 72
obqulp0                 compressed size 424
obqulp1                 compressed size 484
obqulp2                 compressed size 72
obqulp3                 compressed size 72
obqsge                  compressed size 1140
ibqncsi                 compressed size 72
edc0                    compressed size 447664
edc1                    compressed size 14000
Entity error: Type mc0, Entity not found
Entity error: Type mc1, Entity not found
rss                     compressed size 96
rss_pf_config           compressed size 76
rss_key                 compressed size 96
rss_vf_config           compressed size 100
rss_config              compressed size 84
pathmtu                 compressed size 88
Entity error: Type swstate, Not implemented
wtp                     compressed size 384
pmstats                 compressed size 120
hwsched                 compressed size 72
tcpstats                compressed size 64
tperrstats              compressed size 68
fcoestats               compressed size 64
rdmstats                compressed size 64
tpindirect              compressed size 700
sgeindirect             compressed size 184
cplstats                compressed size 84
ddpstats                compressed size 72
wcstats                 compressed size 64
ulprxla                 compressed size 128
lbstats                 compressed size 68
tpla                    compressed size 184
meminfo                 compressed size 376
cimpifla                compressed size 1132
clk                     compressed size 128
obq_sge_rx_q0           compressed size 72
obq_sge_rx_q1           compressed size 1424
macstats                compressed size 152
pcieindirect            compressed size 456
pmindirect              compressed size 264
full                    compressed size 80
txrate                  compressed size 72
tidinfo                 compressed size 100
pcieconfig              compressed size 292
dumpcontext             compressed size 3376
mpstcam                 compressed size 360
vpddata                 compressed size 120
letcam                  compressed size 18656
cctrl                   compressed size 708
Entity error: Type maindirect, Entity not found
ulptxla                 compressed size 152
upcimindirect           compressed size 504
pbttables               compressed size 2236
mboxlog                 compressed size 7768

```

- Extracting the compressed debug log in a human readable format to the specified path

```
C:\Users\Administrator>cxgbtool vbd0 debugfs cudbg extract meminfo dump_file D:\cudbg_log
cudbg_view() dbg entity : meminfo

Debug logs extracted to D:\cudbg_log

C:\Users\Administrator>type D:\cudbg_log\debug_1\meminfo.txt
EDC0:      0-0x2fffff [3.00 MiB]
EDC1:      0x300000-0x5fffff [3.00 MiB]
RQUDP region: 0xffffffff-0xffffffff [1 B]
DBQ contexts: 0x1d0680-0x1e267f [72.0 KiB]
IMSG contexts: 0x1e2680-0x1f467f [72.0 KiB]
FLM cache:   0x1f4680-0x20767f [76.0 KiB]
ULPTX state: 0x207680-0x2077ff [384 B]
ULPRX state: 0x207800-0x20783f [64 B]
Timers:      0x207840-0x21587f [56.0 KiB]
TCBs:        0x215880-0x257fff [265 KiB]
Tx payload:  0x258000-0x317fff [768 KiB]
Rx payload:  0x318000-0x3d7fff [768 KiB]
Pstructs:    0x3d8000-0x3da9ff [10.5 KiB]
Rx FL:       0x3daa00-0x3daa7f [128 B]
Tx FL:       0x3daa80-0x3daaff [128 B]
Pstruct FL:  0x3dab00-0x3dacbf [448 B]
TDDP region: 0x3dacc0-0x3e5900 [43.0 KiB]
iSCSI region: 0x3e5900-0x3ed900 [32.0 KiB]
TPT region:  0x3ed900-0x42363f [215 KiB]
STAG region: 0x3ed900-0x423640 [215 KiB]
TXPBL region: 0x423640-0x59183f [1.42 MiB]
PBL region:  0x423640-0x591840 [1.42 MiB]
RQ region:   0x591840-0x5fd300 [430 KiB]
uP RAM:      0-0xffffffff [0 B]
uP Extmem2:  0-0xffffffff [0 B]

48 Rx pages of size 16KiB for 1 channels
48 Tx pages of size 16KiB for 2 channels

Port 0 using 2 pages out of 862 allocated
Port 1 using 2 pages out of 2 allocated
Port 2 using 2 pages out of 862 allocated
Port 3 using 2 pages out of 2 allocated
Loopback 0 using 0 pages out of 288 allocated
Loopback 1 using 0 pages out of 0 allocated
Loopback 2 using 0 pages out of 288 allocated
Loopback 3 using 0 pages out of 0 allocated
```

- Extracting the compressed debug log in a human readable format to the specified path skipping specific entities

```
C:\Users\Administrator>cxgbtool vbd0 debugfs cudbg extract all dump_file D:\cudbg_log skip cimla,mc0,mcl,swstate,maindirect
cudbg_view() dbg entity : regdump
cudbg_view() dbg entity : devlog
cudbg_view() dbg entity : cimmla
cudbg_view() dbg entity : cimqcfg
cudbg_view() dbg entity : ibqtp0
cudbg_view() dbg entity : ibqtp1
cudbg_view() dbg entity : ibqulp
cudbg_view() dbg entity : ibqsge0
cudbg_view() dbg entity : ibqsge1
cudbg_view() dbg entity : ibqncsi
cudbg_view() dbg entity : obqulp0
cudbg_view() dbg entity : obqulp1
cudbg_view() dbg entity : obqulp2
cudbg_view() dbg entity : obqulp3
cudbg_view() dbg entity : obqsge
cudbg_view() dbg entity : obqncsi
cudbg_view() dbg entity : edc0
cudbg_view() dbg entity : edc1
cudbg_view() dbg entity : rss
cudbg_view() dbg entity : rss_pf_config
cudbg_view() dbg entity : rss_key
cudbg_view() dbg entity : rss_vf_config
cudbg_view() dbg entity : rss_config
cudbg_view() dbg entity : pathmtu
cudbg_view() dbg entity : wtp
cudbg_view() dbg entity : pmstats
cudbg_view() dbg entity : hwsched
cudbg_view() dbg entity : tcpstats
cudbg_view() dbg entity : tperrstats
cudbg_view() dbg entity : fcoestats
cudbg_view() dbg entity : rdmastats
cudbg_view() dbg entity : tpindirect
cudbg_view() dbg entity : sgeindirect
cudbg_view() dbg entity : cplstats
cudbg_view() dbg entity : ddpstats
cudbg_view() dbg entity : wcstats
cudbg_view() dbg entity : ulprxla
cudbg_view() dbg entity : lbstats
cudbg_view() dbg entity : tpla
cudbg_view() dbg entity : meminfo
cudbg_view() dbg entity : cimpifla
cudbg_view() dbg entity : clk
cudbg_view() dbg entity : obq_sge_rx_q0
cudbg_view() dbg entity : obq_sge_rx_q1
cudbg_view() dbg entity : macstats
cudbg_view() dbg entity : pcieindirect
cudbg_view() dbg entity : pmindirect
cudbg_view() dbg entity : full
cudbg_view() dbg entity : txrate
cudbg_view() dbg entity : tidinfo
cudbg_view() dbg entity : pcieconfig
cudbg_view() dbg entity : dumpcontext
cudbg_view() dbg entity : mpstcam
cudbg_view() dbg entity : vpddata
cudbg_view() dbg entity : letcam
cudbg_view() dbg entity : cctrl
cudbg_view() dbg entity : ulptxla
cudbg_view() dbg entity : upcimindirect
cudbg_view() dbg entity : pbttables
cudbg_view() dbg entity : mboxlog

Debug logs extracted to D:\cudbg_log
```

- Displaying debug log on the screen without storing them in any file.

```
C:\Users\Administrator>cxgbtool vbd0 debugfs cudbg dbg full
cudbg_view() dbg entity : full

Tx0 ==0=\      /=0= Rx0
Tx1 ==0= | T | =0= Rx1
Tx2 ==0= | P | =0= Rx2
Tx3 ==0=/      \=0= Rx3

Tx0 P =0=0=\ S ? U ==0=\
Tx1 C =0=0= | G ? T ==0= | T
Tx2 I =0=0= | E ? X ==0= | P
Tx3 E =0=0=/   ?   ==0=/

      Rd Wr
RX0 P /=0=0=0 S <=0= C <=0= T <=T <=0= T /=0= M
RX1 C | =0=0=0 G <=0= X <=0= C <=P <=0= E | =0= P
RX2 I | =0=0=0 E               | =0= S
RX3 E \=0=0=0                \=0=
```

• devlog

Description: Prints firmware device log information.

Syntax: cxgbtool [*vbdInterface*] devlog

Example:

```
C:\Users\Administrator>cxgbtool vbd0 devlog
Seq#      Tstamp      Level  Facility  Message
0          388513      INFO   CORE      log initialized @ 0x200a0000 size 32768 (128 entries) fwrev 0x01100100 pcie_fw 0x0014cc10
1          473847      INFO   CORE      bootstrap firmware took 27 msec to run
2          477462      NOTICE CORE      pcie: Serial Configuration SPARE3 has Cookie Generation enabled.
3          477464      INFO   CORE      pcie: npf 7 (pfbtmap 0x7f) nvf 64 (pf 0..7 0x0808080820000000) vfstride 4
4          488271      INFO   CORE      flr_timer_start: flowc_id 108 00000000205FFF80 buf 00000000205FC940
5          568683      INFO   DUMMY     cf_parse: file memtype 0x1 memaddr 0x5e0000 mapped @ 00000000205E0000:
6          568737      INFO   DUMMY     configuration file parser: pl timeout value is too large, changing from 10000 to 4194usecs
7          569675      INFO   CORE      configured with caps nbm|link 0x00000005 switch|nic 0x00030003 toe|rdma 0x00010003 iscsi|fcoe 0x00010000
8          569727      INFO   HW        hw_tp_tcp_tunings: tuning for cluster environment
9          576597      INFO   RES       le configuration: nentries 2048 route 32 clip 32 filter 1440 server 512 active 32 hash 0 nserversram 0
10         579573      INFO   DCB       dcbx_ieee_cmdh[0] requesting DCB_IEEE_CMD
11         580560      INFO   DCB       dcbx_ieee_cmdh[1] requesting DCB_IEEE_CMD
12         583343      INFO   CORE      flr_timer_start: flowc_id 506 00000000200DFD00 buf 00000000201D3080
13         604170      INFO   RES       le initialization: nentries 2048 route 32 clip 32 filter 1440 server 512 active 32 hash 0 nserversram 0
14         607002      INFO   TM        pktsched channel 0 sets speed (from 0) to 10000000 kbps
15         607033      INFO   TM        pktsched channel 1 sets speed (from 0) to 10000000 kbps
16         607041      INFO   TM        pktsched channel 2 sets speed (from 0) to 10000000 kbps
17         607048      INFO   TM        pktsched channel 3 sets speed (from 0) to 10000000 kbps
18         27993451      INFO   PORT      port[1] update (flowcid 316 rc 0)
19         28693450      INFO   PORT      port[0] update (flowcid 316 rc 0)
20         53793533      INFO   PORT      port[1] update (flowcid 316 rc 0)
```

- **rss**

Description: Prints RSS info.

Syntax: cxgbtool [*vbdInterface*] rss

Example:

```
C:\Users\Administrator>cxgbtool vbd0 rss
0:      0      0      0      0      0      0      0      0
8:      0      0      0      0      0      0      0      0
16:     0      0      0      0      0      0      0      0
24:     0      0      0      0      0      0      0      0
32:     6      7      8      9      6      7      8      9
40:     6      7      8      9      6      7      8      9
48:     6      7      8      9      6      7      8      9
56:     6      7      8      9      6      7      8      9
64:    17     18     19     20    17     18     19     20
72:    17     18     19     20    17     18     19     20
80:    17     18     19     20    17     18     19     20
88:    17     18     19     20    17     18     19     20
96:     0      0      0      0      0      0      0      0
104:    0      0      0      0      0      0      0      0
112:    0      0      0      0      0      0      0      0
```

- **rss_config**

Description: Prints RSS Configuration.

Syntax: cxgbtool [*vbdInterface*] rss_config

Example:

```
C:\Users\Administrator>cxgbtool vbd0 rss_config
TP_RSS_CONFIG: 0x300001c
Tnl4TupEnIpv6:  no
Tnl2TupEnIpv6:  no
Tnl4TupEnIpv4:  no
Tnl2TupEnIpv4:  no
TnlTcpSel:      no
TnlIp6Sel:       no
TnlVrtSel:       yes
TnlMapEn:        yes
OfdHashSave:     no
OfdVrtSel:       no
OfdMapEn:        no
OfdLkpEn:        no
Syn4TupEnIpv6:   no
Syn2TupEnIpv6:   no
Syn4TupEnIpv4:   no
Syn2TupEnIpv4:   no
Syn4TupEnIpv6:   no
SynIp6Sel:       no
SynVrt6Sel:      no
SynMapEn:        no
SynLkpEn:        no
ChnEn:           no
PrtEn:           no
TnlAllLkp:       no
VrtEn:           yes
CngEn:           yes
HashToeplitz:    yes
Udp4En:          no
Disable:         no
```

- **rss_key**

Description: Prints RSS Key.

Syntax: cxgbtool [*vbdInterface*] rss_key

Example:

```
C:\Users\Administrator>cxgbtool vbd0 rss_key
6d5a56da255b0ec24167253d43a38fb0d0ca2bcbac7b30b477cb2da38030f20c6a42b73bbeac01fa
```

- **rss_pf_config**

Description: Prints RSS PF Configuration

Syntax: cxgbtool [*vbdInterface*] rss_pf_config

Example:

```
C:\Users\Administrator>cxgbtool vbd0 rss_pf_config
PF Map Index Size = 0
```

PF	RSS			IPF Map	Mask Size	VF Mask Size	Hash Tuple		Enable		UDP Four	Default Queue	
	Enable	Chn	Prt				IPv6 Four	IPv6 Two	IPv4 Four	IPv4 Two		Ch1	Ch0
1	yes	no	no	1	5	6	no	no	no	no	no	0	0
2	yes	no	no	2	5	6	no	no	no	no	no	0	0
3	yes	no	no	3	5	6	no	no	no	no	no	0	0
4	yes	no	no	4	5	6	no	no	no	no	no	0	0
5	yes	no	no	5	5	6	no	no	no	no	no	0	0
6	yes	no	no	6	5	6	no	no	no	no	no	0	0
7	yes	yes	no	7	5	7	yes	yes	yes	yes	no	0	0

- **rss_vf_config**

Description: Prints RSS VF Configuration.

Syntax: cxgbtool [*vbdInterface*] rss_vf_config

Example:

```
C:\Users\Administrator>cxgbtool vbd0 rss_vf_config
```

VF	RSS			IVF Map	Dis VLAN	Enb uP	Hash Tuple		Enable		UDP Four	Def Que	Secret Idx	Key Hash
	Enable	Chn	Prt				IPv6 Four	IPv6 Two	IPv4 Four	IPv4 Two				
1	no	no	0	no	no	no	no	no	no	no	0	0	0	
2	no	no	0	no	no	no	no	no	no	no	0	0	0	
3	no	no	0	no	no	no	no	no	no	no	0	0	0	
4	no	no	0	no	no	no	no	no	no	no	0	0	0	
5	no	no	0	no	no	no	no	no	no	no	0	0	0	
6	no	no	0	no	no	no	no	no	no	no	0	0	0	
7	no	no	0	no	no	no	no	no	no	no	0	0	0	
8	no	no	0	no	no	no	no	no	no	no	0	0	0	
9	no	no	0	no	no	no	no	no	no	no	0	0	0	
10	no	no	0	no	no	no	no	no	no	no	0	0	0	
11	no	no	0	no	no	no	no	no	no	no	0	0	0	
12	no	no	0	no	no	no	no	no	no	no	0	0	0	
13	no	no	0	no	no	no	no	no	no	no	0	0	0	
14	no	no	0	no	no	no	no	no	no	no	0	0	0	
15	no	no	0	no	no	no	no	no	no	no	0	0	0	

- **coalesce**

Description: Changes the coalescing settings for tunnel Rx queues of the specified Ethernet device.

Syntax: `cxgbtool [nicInterface] coalesce [rx-usecs-irq {val}] [rx-frames-irq {val}] [(persistent)]`

Parameters

rx-usecs-irq: Rx Coalescing Timer. Number of microseconds after which interrupt will be sent.

rx-frames-irq: Rx Coalescing Threshold Packets. Number of packets after which interrupt will be sent.

Example:

Setting Rx Coalescing Timer:

```
C:\Users\Administrator>cxgbtool nic0 coalesce rx-usecs-irq 5
```

Setting Rx Coalescing Threshold Packets

```
C:\Users\Administrator>cxgbtool nic0 coalesce rx-frames-irq 20
```

- **eps**

Description: Prints endpoints (eps) if NDK/ND is enabled.

Syntax: `cxgbtool [nicInterface] eps`

Example:

```
C:\Users\Administrator>cxgbtool nic0 eps
ep FFFFB088A99CD220 cm_id FFFFB088A9928640 state 1 flags 0x80 stid 32 backlog 1024 fe80:0000:0000:0000:308f:612b:9593:6ec5:5445
ep FFFFB088A9F823B0 cm_id FFFFB088A995CA00 state 1 flags 0x80 stid 40 backlog 1024 169.254.110.197:5445
```

- **qps**

Description: Prints queue paris (qps) if NDK/ND is enabled.

Syntax: `cxgbtool [nicInterface] qps`

Example:

```
C:\Users\Administrator>cxgbtool nic0 qps
rc qp sq id 1031 in_use 0 rq id 1030 in_use 127 state 1 onchip 0 ep tid 4784 state 7 102.1.1.3:5445 -> 102.1.1.5:14641
rc qp sq id 1041 in_use 0 rq id 1040 in_use 127 state 1 onchip 0 ep tid 9330 state 7 102.1.1.3:5445 -> 102.1.1.5:14631
rc qp sq id 1043 in_use 0 rq id 1042 in_use 127 state 1 onchip 0 ep tid 16152 state 7 102.1.1.3:5445 -> 102.1.1.5:14626
rc qp sq id 1045 in_use 0 rq id 1044 in_use 127 state 1 onchip 0 ep tid 6592 state 7 102.1.1.3:5445 -> 102.1.1.5:14625
rc qp sq id 1051 in_use 0 rq id 1050 in_use 127 state 1 onchip 0 ep tid 12974 state 7 102.1.1.3:5445 -> 102.1.1.5:14627
rc qp sq id 1052 in_use 0 rq id 1053 in_use 127 state 1 onchip 0 ep tid 7749 state 7 102.1.1.3:5445 -> 102.1.1.5:14611
rc qp sq id 1055 in_use 0 rq id 1054 in_use 127 state 1 onchip 0 ep tid 17516 state 7 102.1.1.3:5445 -> 102.1.1.5:14645
rc qp sq id 1057 in_use 0 rq id 1056 in_use 127 state 1 onchip 0 ep tid 8884 state 7 102.1.1.3:5445 -> 102.1.1.5:14646
rc qp sq id 1059 in_use 0 rq id 1058 in_use 127 state 1 onchip 0 ep tid 7942 state 7 102.1.1.3:5445 -> 102.1.1.5:14640
rc qp sq id 1061 in_use 0 rq id 1060 in_use 127 state 1 onchip 0 ep tid 8864 state 7 102.1.1.3:5445 -> 102.1.1.5:14634
rc qp sq id 1063 in_use 0 rq id 1062 in_use 127 state 1 onchip 0 ep tid 10714 state 7 102.1.1.3:5445 -> 102.1.1.5:14644
rc qp sq id 1088 in_use 0 rq id 1089 in_use 127 state 1 onchip 0 ep tid 6612 state 7 102.1.1.3:5445 -> 102.1.1.5:14653
rc qp sq id 1092 in_use 0 rq id 1093 in_use 127 state 1 onchip 0 ep tid 4832 state 7 102.1.1.3:5445 -> 102.1.1.5:14656
rc qp sq id 1105 in_use 0 rq id 1104 in_use 127 state 1 onchip 0 ep tid 88 state 7 102.1.1.3:5445 -> 102.1.1.5:36632
rc qp sq id 1106 in_use 0 rq id 1107 in_use 127 state 1 onchip 0 ep tid 10634 state 7 102.1.1.3:5445 -> 102.1.1.5:14661
```

- **rdma_stats**

Description: Prints RDMA statistics if NDK/ND is enabled

Syntax: cxgbtool [*nicInterface*] rdma_stats

Example:

```
C:\Users\Administrator>cxgbtool nic0 rdma_stats
Object:      Total      Current      Max      Fail
PDID:        65536      0            0        0
QID:         2048      0            0        0
TPTMEM:      231936     0            0        0
PBLMEM:      1577216    0            0        0
RQTMEM:      463872    0            0        0
OCQPMEM:     0         0            0        0
DB FULL:     0         0            0        0
DB EMPTY:    0         0            0        0
DB DROP:     0         0            0        0
DB State: NORMAL Transitions 0
TCAM_FULL:   0         0            0        0
ACT_OFLOD_CONN_FAILS: 0
PAS_OFLOD_CONN_FAILS: 0
AVAILABLE IRD: 1024
```

- **stags**

Description: Prints STAG contents if NDK/ND is enabled.

Syntax: cxgbtool [*nicInterface*] stags

Example:

```
C:\Users\Administrator>cxgbtool nic1 stags

Stag(0):0x1c00
0x8787bc0 0000000000000000 0000000000000000 0000000000000000 0000000000000000
0x08787bc0: (inactive): stag idx 0x1c00 key 0x00 state INV type NSMR pdid 0x0
                perms none rem_inv_dis 0 addr_type ZBTO
                bind_enable 0 pg_size 4096 qpid 0x0 pbl_off 0x0000
                pbl_addr 0x0b72d280 len 0 va 0000000000000000 bind_cnt 0

Stag(1):0x1f00
0x8787c20 0000000000000000 0000000000000000 0000000000000000 0000000000000000
0x08787c20: (inactive): stag idx 0x1f00 key 0x00 state INV type NSMR pdid 0x0
                perms none rem_inv_dis 0 addr_type ZBTO
                bind_enable 0 pg_size 4096 qpid 0x0 pbl_off 0x0000
                pbl_addr 0x0b72d280 len 0 va 0000000000000000 bind_cnt 0

Stag(2):0x1f900
0x878b760 0000000000000000 0000000000000000 0000000000000000 0000000000000000
0x0878b760: (inactive): stag idx 0x1f900 key 0x00 state INV type NSMR pdid 0x0
                perms none rem_inv_dis 0 addr_type ZBTO
                bind_enable 0 pg_size 4096 qpid 0x0 pbl_off 0x0000
                pbl_addr 0x0b72d280 len 0 va 0000000000000000 bind_cnt 0

Stag(3):0x20300
0x878b8a0 0000000000000000 0000000000000000 0000000000000000 0000000000000000
0x0878b8a0: (inactive): stag idx 0x20300 key 0x00 state INV type NSMR pdid 0x0
                perms none rem_inv_dis 0 addr_type ZBTO
                bind_enable 0 pg_size 4096 qpid 0x0 pbl_off 0x0000
                pbl_addr 0x0b72d280 len 0 va 0000000000000000 bind_cnt 0
```

- **chim_sock**

Description: Prints chimney statistics.

Syntax: cxgbtool [*nicInterface*] chim [*tcb {tid}*]{*sock*}

tcb: Prints Hardware TCB information for given tid of an offloaded connection.

sock: Prints driver per socket statistics.

 **Note** *Currently not supported.*

- **l2t**

Description: Displays l2t table contents.

Syntax: cxgbtool [*nicInterface*] l2t

Example:

```
C:\Users\Administrator>cxgbtool nic0 l2t
IDX      REF_COUNT      MTU      DEST_ADDR      DEST_MAC      PORT
0         4             1500     103.11.11.29   00:07:43:29:63:F8   1
1         2             1500     102.11.11.29   00:07:43:29:63:F0   0
```

- **hw_sched**

Description: Displays hardware schedule information

Syntax: cxgbtool [*vbdInterface*] hw_sched

Example:

```
C:\Users\Administrator>cxgbtool vbd0 hw_sched
Scheduler Mode Channel Rate (Kbps) Class IPG(0.1 ns) Flow IPG(us)
0         class    0       32000000 disabled disabled
1         class    1       32000000 disabled disabled
2         class    2       32000000 disabled disabled
3         class    3       32000000 disabled disabled
4         class    0       32000000 disabled disabled
5         class    0       32000000 disabled disabled
6         class    0       32000000 disabled disabled
7         class    0       32000000 disabled disabled
```

- **mbox_log**

Description: Prints firmware mailbox command/reply log information.

Syntax: cxgbtool [*vbdInterface*] mbox_log

Example:

```
C:\Users\Administrator>cxgbtool vbd0 mbox_log
```

Seq#	Tstamp	Atime	Etime	Command/Reply
2390	267620	0	0	01c00010 00000004 0000003b 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0
2391	267620	0	1	01000010 007a0004 0000003b 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0
2392	267620	0	0	01c00010 00000004 0000003a 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0
2393	267620	0	1	01000010 007b0004 0000003a 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0
2394	267620	0	0	01c00010 00000004
				0000003b 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0
				00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0
2395	267620	0	1	01000010 007a0004 0000003b 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0
2396	267620	0	0	01c00010 00000004

7. Firmware Update

The driver will auto-load the T5 firmware if an update is required. The firmware version can be verified using *cxgbtool*:

```
C:\Users\Administrator>cxgbtool nic0 version
```

In case of installer, the firmware binaries will be copied to <system_drive>\ChelsioUwire\Firmware\ folder during installation.

For zip package, the binaries will be present in *ChelsioUwire-x.x.x.xx\firmware* folder.

For Nano Server Installer, the binaries will be present in *Chelsio-NANO-installer-x.x.x.xx\firmware* folder.

8. Software/Driver Uninstallation

Similar to installation, Chelsio Unified Wire can be uninstalled using the Installer or zip package. Refer the relevant section depending on the method of installation used to install drivers.

8.1. Installer

Chelsio Unified Wire Installer can be uninstalled using two methods: **GUI** or **CLI** mode. GUI mode requires user interaction and uninstallation occurs with options specified by the user. Whereas, CLI mode does not require any user input.

8.1.1. GUI mode (Installer)

- i. Run the **ChelsioUwire-x.x.x.xx.exe** application.
- ii. Select **Modify** to add or remove features. Select **Repair** to repair the previous installation. Select **Remove** to uninstall the application. After you have selected the appropriate option, click **Next**.

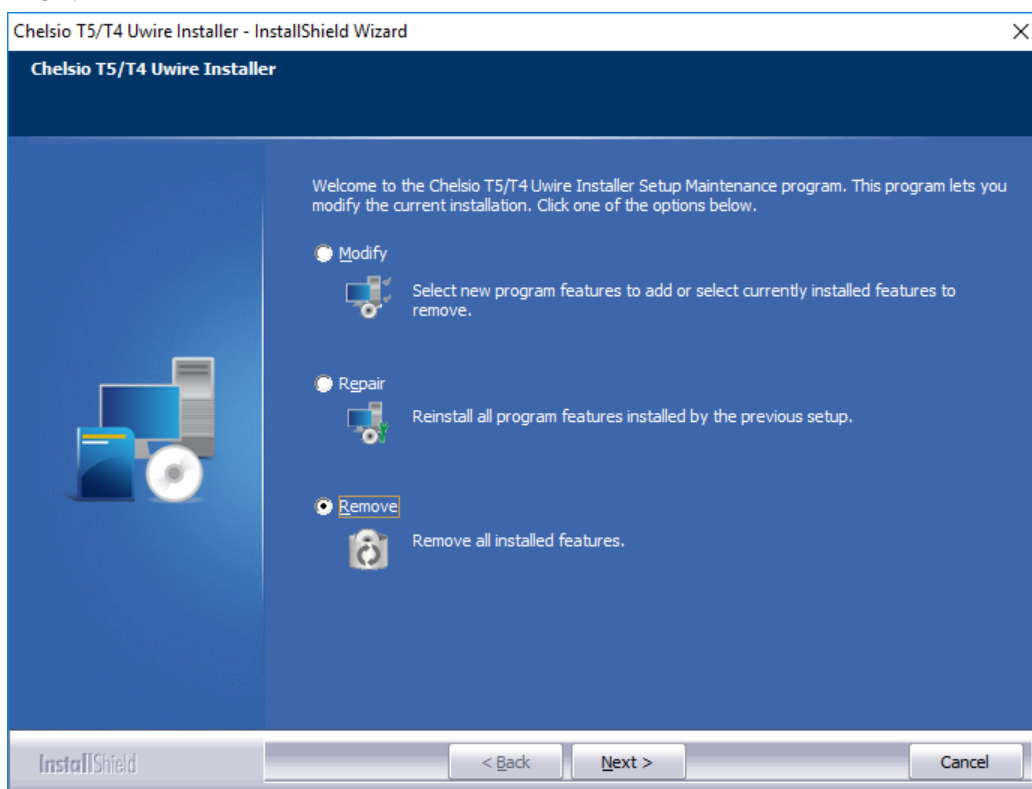


Figure 53 - Selecting maintenance option

- iii. Click on the **Finish** button to exit from the installer.

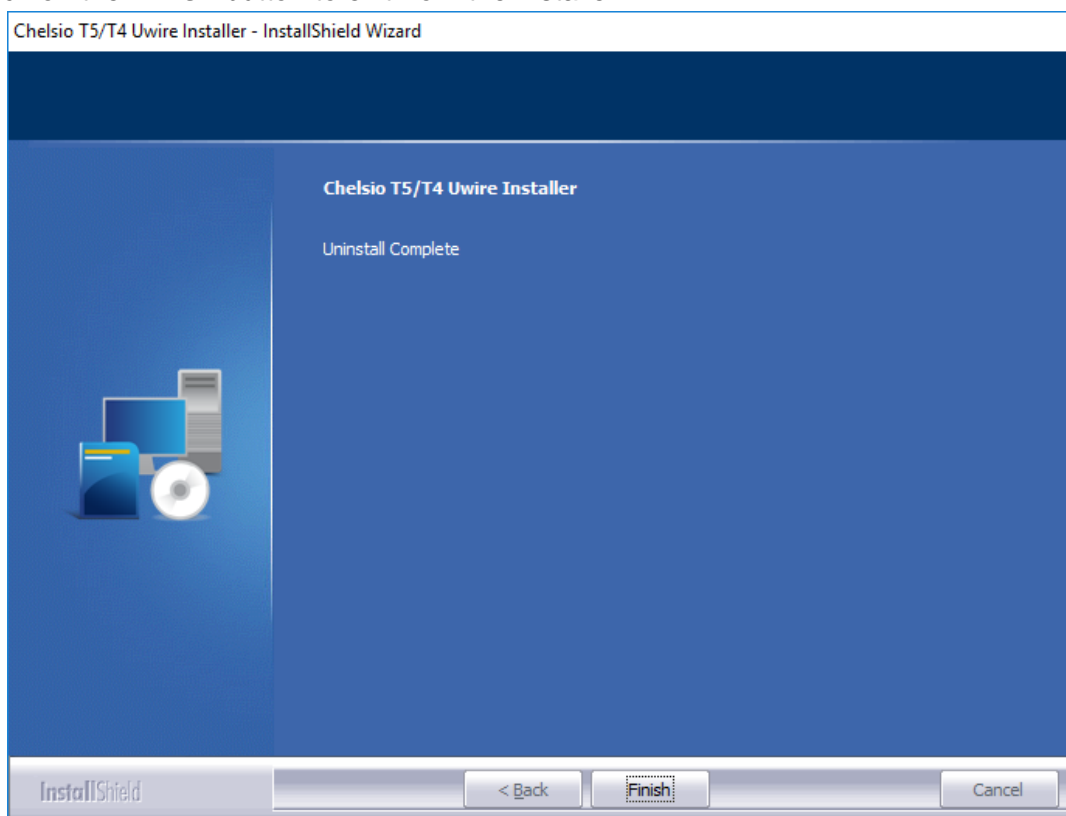


Figure 54 - Finishing uninstallation

Note

- This method of uninstallation is possible only if the drivers were installed using Unified Wire Installer.
- Uninstalling Unified Wire package using the above method will not uninstall Unified Wire Manager. See [Uninstallation](#) section of **Unified Wire Manager** chapter for more information.

8.1.2. CLI Mode

To uninstall all the drivers, execute the following command:

```
C:\Users\Administrator>ChelsioUwire-x.x.x.xx.exe -un all
```

To uninstall a particular driver, execute the following command:

```
C:\Users\Administrator>ChelsioUwire-x.x.x.x.exe -rm <driver(s)>
```

Note

Uninstalling Unified Wire package using the above method will not uninstall Unified Wire Manager. You will have to manually uninstall it using “Programs and Features” in the Control Panel.

8.2. Zip Package

If the driver components were installed using the zip package, they will have to be uninstalled manually. The following section lists the various components and their respective methods of uninstallation.

Important *The driver components need to be uninstalled strictly in the order described here. Using any other order is not supported.*

- **NDIS Miniport driver**

- i. Open the **Device Manager** (Control Panel -> System & Security-> System -> Device Manager), click on the **Network Adapters**, right click on the **Chelsio Network Adapter** and select **Uninstall**.

Note *In case of Virtual Functions in VM, use Chelsio VF Network Adapter.*

- ii. Select the **Delete the driver software for this device** checkbox when **Confirm Device Uninstall** is prompted and click **OK**.
- iii. Repeat the same procedure for the other **Chelsio Network Adapters**.

- **Virtual Bus Driver**

- i. Open the **Device Manager** (Control Panel -> System & Security-> System -> Device Manager), click on the **System Devices**, right click on the **Chelsio T5 10G/40G Bus Enumerator** and select **Uninstall**.

Note *In case of Virtual Functions in VM, use **Chelsio T5 10G/40G Bus Enumerator [Virtual Function]**.*

- ii. Select the **Delete the driver software for this device** checkbox when **Confirm Device Uninstall** is prompted and click **OK**.

- **Generic Function**

- i. Open the **Device Manager** (Control Panel -> System & Security-> System -> Device Manager), click on the **Network Adapters**, right click on the **Chelsio T5 10G/40G Generic Function** and select **Uninstall**.
- ii. Select the **Delete the driver software for this device** checkbox when **Confirm Device Uninstall** is prompted and click **OK**.
- iii. Repeat the same procedure for the other **Generic Functions**.

9. Software/Driver Update

For any distribution specific problems, please check README and Release Notes included in the release for possible workaround.

Please visit Chelsio Download Center, <http://service.chelsio.com/>, for regular updates on various software/drivers. You can also subscribe to our newsletter for the latest software updates.

II. NDIS Function

1. Introduction

Chelsio's T5 series of Unified Wire adapters provide extensive support for NIC operation, including all stateless offload mechanisms for both IPv4 and IPv6 (IP, TCP and UDP checksum offload, LSO - Large Send Offload aka TSO - TCP Segmentation Offload, Network Direct and assist mechanisms for accelerating LRO - Large Receive Offload).

1.1. Hardware Requirements

1.1.1. Supported Adapters

Following is the list of NDIS components and supported Chelsio adapters:

Table 2 - Chelsio adapters and supported NDIS components

Chelsio Adapter	NDIS Components
T580-CR	NIC, NVGRE, VXLAN, vRSS
T520-CR	
T580-LP-CR	
T580-OCP-SO	NIC, NVGRE, VXLAN
T520-OCP-SO	
T580-SO-CR	NIC, NVGRE, VXLAN, vRSS
T520-SO-CR	
T520-LL-CR	NIC, NVGRE, VXLAN, vRSS
T540-CR	
T520-BT	

1.2. Software Requirements

1.2.1. Windows Requirement

Currently Chelsio T5 NDIS function driver is available for the following Windows versions:

- Server 2016
- Nano Server 2016
- 10 AU Client
- Windows Server 2012 R2

2. Software/Driver Configuration and Fine-tuning

2.1. Advanced Configuration

The Chelsio network driver provides advanced configuration options under the **Device Properties**. In the **Network Connections** window, select the Chelsio adapter's **Local Area Connection** interface (right-click -> properties). Click the **Configure** button.

2.1.1. VBD Driver Parameters

To see all tunable VBD driver parameters, open the **Device Manager**, click on the **System Devices**, double click on the **Chelsio T5 10G/40G Bus Enumerator**, and then click the **Advanced** tab.

- **iSCSI Instances**
 - *Description:* Specify the number of iSCSI instances.
 - *Value:* 0-2 | default
 - *Default:* 0
- **Nic Instances:**
 - *Description:* Specify the number of NIC instances.
 - *Value:* 0-8 | default
 - *Default:* default

2.1.2. NDIS Miniport Driver Parameters

To see all tunable NDIS Miniport Driver parameters, open the **Device Manager**, click on the **Network adapters**, double click on any **Chelsio Network Adapter**, and then click the **Advanced** tab.

- **Encapsulated Task Offload**
 - *Description:* Enable or disable stateless offloads (checksums, LSO, VMQ and filtering) of encapsulated traffic.
 - *Value:* Disabled | Enabled
 - *Default:* Enabled
- **Encapsulated Overhead**
 - *Description:* Specify the amount of overhead required in Ethernet frames due to virtual network overlay encapsulation such as VXLAN and NVGRE.
 - *Value:*
 - 32
 - 64
 - 96

- 128
- 160
- 192
- 224
- 256
- *Default:* 0

- **Flow Control**

- *Description:* Enable or disable the receipt or transmission of PAUSE frames. If Rx is enabled, all incoming PAUSE frames will be honored. If Tx is enabled, the HW will send PAUSE frames when its MAC Rx FIFO usage is beyond a high-watermark. If Disabled option is selected, no PAUSE will be sent. When Rx MAC FIFO gets full, further ingress packets will be dropped. If Rx & Tx Enabled is selected, both Rx and Tx options will be enabled.
- *Value:*
 - Auto Negotiation
 - Disabled
 - Rx & Tx Enabled
 - Rx Enabled
 - Tx Enabled
- *Default:* Auto Negotiation

- **Interrupt Moderation**

- *Description:* Control the interrupts generated by NIC hardware.
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **Interrupt Moderation Rate**

- *Description:* Set the interrupt rate.
- *Value:*
 - Extreme
 - High
 - Low
 - Minimal
 - Moderate
- *Default:* Low

- **IPv4 Checksum Offload**

- *Description:* Allow the checksum to be computed by the adapter for IPV4 packets.
- *Value:*
 - Disabled
 - Rx & Tx Enabled
 - Rx Enabled
 - Tx Enabled

- *Default:* Rx & Tx Enabled
- **Jumbo Packet (Maximum Transmission Unit)**
 - *Description:* Specify the Maximum Transmission Unit (MTU) value.
 - *Value:*
 - 4088 Bytes
 - 9014 Bytes
 - Disabled
 - *Default:* Disabled
- **Large Send Offload V2 (IPv4)**
 - *Description:* Allow for configuring Large Send Offload (LSO) using version 2 for the IPv4 traffic.
 - *Value:* Disabled | Enabled
 - *Default:* Enabled
- **Large Send Offload V2 (IPv6)**
 - *Description:* Allow for configuring Large Send Offload (LSO) using version 2 for the IPv6 traffic.
 - *Value:* Disabled | Enabled
 - *Default:* Enabled
- **Locally Administered Address**
 - *Description:* Specify a new MAC address for the port. If Not Present, the default MAC from EEPROM is used. If specified, the new MAC overwrites the default MAC. This specified MAC is persistent across machine reboot.
 - *Value:* Not Present | Any legal 6-byte MAC address
 - *Default:* Not Present
- **Maximum Number of RSS Processors**
 - *Description:* Change the number of RSS Processors.
 - *Value:* 1-64
 - *Default:* 8
- **Maximum Number of RSS Queues**
 - *Description:* Change the number of RSS Queues.
 - *Value:* 1-16
 - *Default:* 8
- **Maximum RSS Processor Number**
 - *Description:* Set the number of RSS processors to help the overall performance of the computer.
 - *Value:* 0-63
 - *Default:* 63

- **NDIS QoS**

- *Description:* Enable or disable NDIS Quality of Service for DCB interface.
- *Value:* Disabled | Enabled
- *Default:* Disabled

- **NetworkDirect Functionality**

- *Description:* Enable or disable Network Direct Functionality.
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **NetworkDirect Interrupt Moderation**

- *Description:* Control the interrupts generated during NDK traffic.
- *Value:* Disabled | Enabled
- *Default:* Enabled


For more information, refer <http://msdn.microsoft.com/en-us/library/windows/hardware/ff556017%28v=vs.85%29.aspx>

- **Nvgre Task Offload**

- *Description:* Enable or disable offloading processing of NVGRE encapsulated frames.
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **Packet Direct**

- *Description:* Enable or disable PacketDirect feature.
- *Value:* Disabled | Enabled
- *Default:* Enabled

 *Note* This feature is not supported in the current release.

- **Preferred NUMA node**

- *Description:* The NUMA node that the adapter can allocate memory from.
- *Value:*
 - Default Settings
 - Node 0
 - Node 1
 - Node 2
 - Node 3
 - Node 4
 - Node 5
 - Node 6
 - Node 7
- *Default:* Default Settings

- **Receive Side Scaling (RSS)**

- *Description:* Control the RSS functions. If on, the Microsoft RSS function is enabled. If off, the Chelsio RSS function is enabled.
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **Recv Segment Coalescing (IPv4)**

- *Description:* Enable or disable the Receive Segment Coalescing feature for IPv4 traffic. This is a receiver packets aggregating feature which helps reduce the receive host CPU load and improve throughput in a 10/40Gb network environment where CPU can be the bottleneck.
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **Recv Segment Coalescing (IPv6)**

- *Description:* Enable or disable the Receive Segment Coalescing feature for IPv6 traffic. This is a receiver packets aggregating feature which helps reduce the receive host CPU load and improve throughput in a 10/40Gb network environment where CPU can be the bottleneck.
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **RSS Base processor**

- *Description:* Specify the number of the base RSS processors.
- *Value:* 0-63
- *Default:* 0

- **RSS load balancing profile**

- *Description:* Control the RSS load balancing profile.
- *Value:*
 - Closest Processor
 - Closest Processor Static
 - Conservative Scaling
 - NUMA Scaling
 - NUMA Scaling Static
- *Default:* NUMA Scaling Static

For more information, refer <http://technet.microsoft.com/en-us/library/hh997036.aspx>

- **Rx Ethernet Queue Size**

- *Description:* Set different Rx Queue sizes. Driver ships with reasonable defaults.
- *Value:* 512-4096
- *Default:* 2048

- **Rx Offload Queue Size**

- *Description:* Set different Offload Rx Queue sizes. Driver ships with reasonable defaults.
- *Value:* 256-2048
- *Default:* 512



This feature is not fully tested and available for experimental usage only.

- **SR-IOV**

- *Description:*
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **TCP Checksum Offload (IPv4):**

- *Description:* Enable or disable computation of TCP checksum by the adapter for IPv4 packets.
- *Value:*
 - Disabled
 - Rx & Tx Enabled
 - Rx Enabled
 - Tx Enabled
- *Default:* Rx & Tx Enabled

- **TCP Checksum Offload (IPv6):**

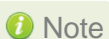
- *Description:* Enable or disable computation of TCP checksum by the adapter for IPv6 packets.
- *Value:*
 - Disabled
 - Rx & Tx Enabled
 - Rx Enabled
 - Tx Enabled
- *Default:* Rx & Tx Enabled

- **Tx Ethernet Queue Size**

- *Description:* Set different Tx Queue sizes. Driver ships with reasonable defaults.
- *Value:* 512-4096
- *Default:* 1024

- **Tx Offload Queue Size**

- *Description:* Set different Offload Tx Queue sizes. Driver ships with reasonable defaults.
- *Value:* 256-4096
- *Default:* 512



This feature is not fully tested and available for experimental usage only.

- **UDP Checksum Offload (IPv4)**

- *Description:* Enable or disable computation of UDP checksum by the adapter for IPv4 packets.
- *Value:*
 - Disabled
 - Rx & Tx Enabled
 - Rx Enabled
 - Tx Enabled
- *Default:* Rx & Tx Enabled

- **UDP Checksum Offload (IPv6)**

- *Description:* Enable or disable computation of UDP checksum by the adapter for IPv6 packets.
- *Value:*
 - Disabled
 - Rx & Tx Enabled
 - Rx Enabled
 - Tx Enabled
- *Default:* Rx & Tx Enabled

- **User Mode NetworkDirect**

- *Description:* Enable or disable Microsoft's Remote Direct memory Access (RDMA) interface for high speed, low latency networks.
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **Virtual Machine Queues**

- *Description:* Enable or disable the virtual machine queue feature on the interface.
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **Virtual Switch RSS**

- *Description:* Enable or disable Virtual Receive Side Scaling.
- *Value:* Disabled | Enabled
- *Default:* Enabled

- **VLAN Identifier**

- *Description:* Specify the VLAN ID to be inserted.
- *Value:* 0-4095
- *Default:* 0

- **VMQ LookAhead Split**

- *Description:* Enable or disable the ability to split receive buffers into lookahead and post-lookahead buffers.

- *Value:* Disabled | Enabled
- *Default:* Enabled
- **VMQ VLAN ID Filtering**
 - *Description:* Enable or disable the ability to filter network packets by using the VLAN identifier in the media access control (MAC) header.
 - *Value:* Disabled | Enabled
 - *Default:* Enabled
- **Vxlan Task Offload**
 - *Description:* Enable or disable offloading processing of VXLAN encapsulated frames.
 - *Value:* Disabled | Enabled
 - *Default:* Enabled
- **Vxlan UDP Port Number**
 - *Description:* Specify the current VXLAN UDP destination port number that is currently operational in the NIC.
 - *Value:* 1-65535
 - *Default:* 4789

2.2. NVGRE Offload

Chelsio's T5 based adapters are uniquely capable of offloading the processing of NVGRE encapsulated frames such that all stateless offloads (checksums, LSO, VMQ, RSS and filtering) are preserved, resulting in significant performance benefits. This feature is enabled by default. Configure the relevant customer and provider network settings on the host.

2.3. VXLAN Task Offload

Virtual Extensible LAN (VXLAN), an extension of the existing VLAN protocol, is an encapsulation protocol which creates an overlay network on the existing Layer 3 infrastructure. VXLAN not only extends VLAN's Ethernet Layer 2 network services but also provides more extensibility, flexibility and scalability for large scale cloud deployments than VLAN.

Chelsio's T5 based adapters are capable of offloading the processing of VXLAN encapsulated frames such that all stateless offloads (checksums, LSO, VMQ, RSS and filtering) are preserved, resulting in significant performance benefits. This feature is enabled by default.

2.4. Virtual RSS (vRSS)

Network throughput of a multi-core virtual machine is limited by the processing power of a single virtual processor, since only one processor handles all the interrupts from a virtual network

adapter. Virtual RSS or vRSS solves this bottleneck by distributing the network traffic across multiple virtual processors. This feature is enabled by default.

III. iWARP (ND)

1. Introduction

ND or Network Direct is Microsoft's new Remote Direct memory Access (RDMA) interface for high speed, low-latency networks such as those running on 10/40 Gigabit Ethernet or InfiniBand, with an architecture that directly bypasses OS and TCP/IP overhead. ND achieves better performance for massively parallel programs that can utilize very low-latency, high-bandwidth, and enables efficient CPU utilization.

1.1. Hardware Requirements

1.1.1. Supported Adapters

The following are the currently shipping Chelsio adapters that are compatible with Chelsio iWARP (ND) driver:

- T580-CR
- T580-LP-CR
- T540-CR
- T520-CR
- T520-LL-CR
- T520-BT

1.2. Software Requirements

1.2.1. Windows Requirement

Currently Chelsio T5 iWARP (ND) driver is available for the following Windows version(s):

- Server 2016
- Windows Server 2012 R2

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

2. Software/Driver Configuration and Fine-tuning

2.1. Registering iWARP(ND) driver

Chelsio Unified Wire Installer registers Chelsio iWARP provider automatically during installation.

In case of zip package, run the following command to register:

```
C:\Users\Administrator>chinstallsp.exe -i
```

The iWARP provider should show up using:

```
C:\Users\Administrator>chinstallsp.exe -l
```

You should see a similar output:

```
0000001019 - Chelsio Network Direct provider
```

IV. SMB Direct

3. Introduction

SMB Direct is an extension of the Server Message Block (SMB) technology by Microsoft used for file operations. The *Direct* part implies the use of various high speed Remote Data Memory Access (RDMA) methods to transfer large amounts of data with little CPU intervention. By using RDMA as a transport medium for SMB, unprecedented levels of performance and efficiency can be achieved. With fully offloaded RDMA support, Terminator 5 based adapters deliver large performance and efficiency gains to Windows users in a seamless, plug and play fashion.

3.1. Hardware Requirements

3.1.1. Supported Adapters

The following are the currently shipping Chelsio adapters that are compatible with Chelsio SMB Direct and RDMA/NVGRE concurrent (Mode 2) driver:

- T580-CR
- T580-LP-CR
- T540-CR
- T520-CR
- T520-LL-CR
- T520-BT

3.2. Software Requirements

3.2.1. Windows Requirement

Currently Chelsio T5 SMB Direct driver is available for the following Windows versions:

- Server 2016 *
- Nano Server 2016
- 10 AU Client
- Windows Server 2012 R2 ^

*SMB Direct and RDMA/NVGRE concurrent (Mode 2)

^Mode 2 not supported

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

4. Software/Driver Configuration and Fine-tuning

4.1. Enabling SMB Direct

- **Server 2016/2012 R2**

SMB Direct is installed and enabled by default on Windows Server 2016 and 2012 R2 versions. RDMA functionality on Chelsio adapters will be enabled after installing the driver from the package.

- **10 AU Client**

On Windows 10 AU Client systems, SMB Direct is installed but disabled by default. To enable this feature, follow the steps mentioned below:

- Open **Control Panel** and click **Programs**.
- Under **Programs and Features**, click **Turn Windows features on or off**.
- In the **Windows Features** window, scroll down and select the *SMB Direct* checkbox.
- Click **OK**.

- **Configuration**

You can use the PowerShell command `Get-NetAdapterRdma` to get a list of RDMA capable interfaces in your system. At least one adapter should indicate “RDMA Capable” true to take advantage of SMB RDMA capability.

The next step is to configure your network so that SMB server and client machines can communicate with each other. Please configure the Microsoft firewall to allow traffic between the SMB clients and server.

4.2. Verifying RDMA

There are number of ways to verify if RDMA is working:

4.2.1. Verify active connections using PowerShell

Open PowerShell window and execute the command `Get-SmbConnection`

4.2.2. Use Event Viewer

You can use Event Viewer to view SMB connection events. To do this:

- Open Event Viewer
- In the console tree, expand **Event Viewer**.
- Navigate to **Application and Service Logs-> Microsoft->Windows->SMBClient ->Operational**

4.3. RDMA/NVGRE concurrent (Mode 2)

In this mode, you can run RDMA traffic using a virtual switch. This feature is enabled by default in the driver, but must be enabled on the Hyper-V Virtual Ethernet adapter. Follow the steps mentioned below to enable the feature:

- i. If you haven't done already, run the Chelsio Unified Wire Installer which will install NDIS function driver.
- ii. Verify if the driver is installed and loaded using the *Get-NetAdapter* command. The *InterfaceDescription* field should list Chelsio adapter as shown in the image below:

```
PS C:\Users> Get-NetAdapter
```

Name	InterfaceDescription	ifIndex	Status	MacAddress	LinkSpeed
Ethernet 6	Chelsio Network Adapter #2	16	Up	00-07-43-29-14-28	40 Gbps
Ethernet 4	Chelsio Network Adapter	15	Up	00-07-43-29-14-20	40 Gbps
Corporate	QLogic BCM5709C Gigabit Ethernet ...#38	6	Up	D4-BE-D9-AC-7C-6A	100 Mbps
Local Area Connection* 1	Microsoft Kernel Debug Network Adapter	2	Up	D4-BE-D9-AC-7C-6C	1 Gbps

Figure 55 - Verifying Chelsio driver

- iii. Next, create a virtual switch using the following syntax:

```
PS C:\Users\Administrator> New-VMSwitch -Name <virtual_switch> -
NetAdapterName <chelsio_interface>
```

```
PS C:\Users> New-VMSwitch -Name switch0 -NetAdapterName "Ethernet 4"
```

Name	SwitchType	NetAdapter	InterfaceDescription
switch0	External	Chelsio	Network Adapter

Figure 56 - Creating virtual switch

- iv. Using *Get-NetAdapter* command, verify if the virtual switch is created successfully. The Mac address of the switch and the port on which the switch was created, should be same.

```
PS C:\Users> Get-NetAdapter
```

Name	InterfaceDescription	ifIndex	Status	MacAddress	LinkSpeed
vEthernet (switch0)	Hyper-V Virtual Ethernet Adapter #2	29	Up	00-07-43-29-14-20	40 Gbps
Ethernet 6	Chelsio Network Adapter #2	16	Up	00-07-43-29-14-28	40 Gbps
Ethernet 4	Chelsio Network Adapter	15	Up	00-07-43-29-14-20	40 Gbps
Corporate	QLogic BCM5709C Gigabit Ethernet ...#38	6	Up	D4-BE-D9-AC-7C-6A	100 Mbps
Local Area Connection* 1	Microsoft Kernel Debug Network Adapter	2	Up	D4-BE-D9-AC-7C-6C	1 Gbps

Figure 57 - Verifying virtual switch

- v. Enable RDMA on the virtual switch using *Enable-NetAdapterRdma* command.

```
PS C:\Users> Enable-NetAdapterRdma
PS C:\Users> _
```

Figure 58 - Enabling RDMA on virtual switch

- vi. Run *Get-NetAdapterRdma* command to verify if RDMA is enabled on the switch.

```
PS C:\Users> Get-NetAdapterRdma
```

Name	InterfaceDescription	Enabled
vEthernet (chel_p0)	Hyper-V Virtual Ethernet Adapter #2	True
Ethernet 6	Chelsio Network Adapter #2	True
Ethernet 4	Chelsio Network Adapter	True

Figure 59 - Verifying RDMA on virtual switch

4.4. Troubleshooting

If RDMA is not working in your system, please check for the following:

- Operating system version should be Windows Server 2016, 2012 R2 or 10 AU Client.
- Verify network interface configurations on both sides.
- Please ensure that the interfaces are reachable using *ping* command.
- In the Event Viewer (on the client side), please ensure that the traffic running is not over TCP.
- Verify that SMB driver is loaded and working. Open PowerShell window and execute the following command:

```
C:\Users\Administrator>driverquery.exe | findstr \I smb
```

- Verify that Chelsio driver is loaded and working. Open PowerShell window and execute the following command:

```
C:\Users\Administrator>driverquery.exe | findstr \I chel
```

- Confirm that traffic is running over Chelsio adapter.
- Look for potential errors in Event Log.

V. NDIS SR-IOV

1. Introduction

The ever increasing network infrastructure of IT enterprises has led to a phenomenal increase in maintenance and operational costs. IT managers are forced to acquire more physical servers and other data center resources to satisfy storage and network demands. To solve the Network and I/O overhead, users are opting for server virtualization which consolidates I/O workloads onto lesser physical servers thus resulting in efficient, dynamic and economic data center environments. Other benefits of Virtualization include improved disaster recovery, server portability, cloud computing, Virtual Desktop Infrastructure (VDI), etc.

Chelsio's T5 Unified Wire family of adapters deliver increased bandwidth, lower latency and lower power with virtualization features to maximize cloud scaling and utilization. The adapters also provide full support for PCI-SIG SR-IOV to improve I/O performance on a virtualized system.

1.1. Hardware Requirements

1.1.1. Supported Adapters

The following are the currently shipping Chelsio adapters that are compatible with the Chelsio NDIS SR-IOV driver:

- T580-CR
- T580-LP-CR
- T580-SO-CR
- T540-CR
- T520-CR
- T520-LL-CR
- T520-SO-CR
- T520-BT

1.2. Software Requirements

1.2.1. Windows Requirements

Currently, the NDIS SR-IOV driver is available for the following Windows versions:

- Server 2016
- Nano Server 2016
- 10 AU Client
- Windows Server 2012 R2

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

2. Software/Driver Configuration and Fine-tuning

Please ensure that Unified Wire is installed on the host before proceeding. Refer [Software/Driver Installation](#) section of the **Chelsio Unified Wire** chapter for step-by-step instructions.

2.1. Enabling SR-IOV

! Important

*The adapter's configuration should be updated to make use of the SR-IOV feature. You can do this by running the **chelsio_adapter_config.ps1** configuration script. To use the adapter in non-SRIOV scenarios in Windows or with other operating systems, the configuration type must be changed to **NON-SRIOV (Default)**.*

2.1.1. Windows GUI Machine

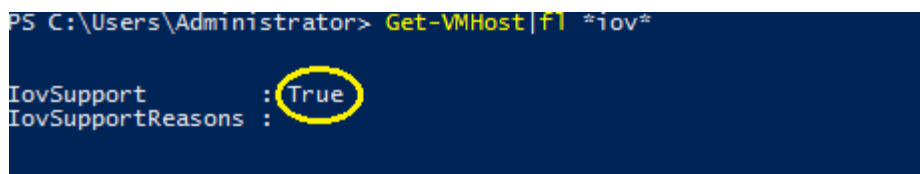
In case of Installer, the script will be copied to <system_drive>\Windows\System32 during installation.

If you are using the zip package, copy *cxgbtool.exe* from *ChelsioUwire-x.x.x.xx* folder to <system_drive>\Windows\System32. Also, change your working directory to *ChelsioUwire-x.x.x.xx\Adapter Configuration*.

- i. Open PowerShell with administrative privileges.
- ii. Check if the machine is SR-IOV capable:

```
PS C:\Users\Administrator> Get-VMHost | fl *iov*
```

The *IovSupport* field should display “True” as shown in the image below:



```
PS C:\Users\Administrator> Get-VMHost | fl *iov*
IovSupport           : True
IovSupportReasons    :
```

Figure 60 - Checking SR-IOV capability

- iii. Run the adapter configuration script and select *Windows GUI* (option 1) as the Windows version. Hit [Enter].

Installer:

```
PS C:\Users\Administrator> chelsio_adapter_config.ps1
```

```
PS C:\Users\Administrator> chelsio_adapter_config.ps1
1. Windows GUI
2. Windows Nano Server
Input: 1

chelsio_adapter_config Version 2.0
Please stop all the traffic on Chelsio adapters before updating !!
```

Figure 61 - Adapter configuration utility (Installer)

Zip Package:

```
PS D:\ChelsioUwire-x.x.x.xx\Adapter Configuration>
.\chelsio_adapter_config.ps1
```

```
PS D:\ChelsioUwire-x.x.x.xx\Adapter Configuration> .\chelsio_adapter_config.ps1
1. Windows GUI
2. Windows Nano Server
Input: 1

chelsio_adapter_config Version 2.0
Please stop all the traffic on Chelsio adapters before updating !!
```

Figure 62 - Adapter configuration utility (Zip Package)

- iv. Enter the index of the adapter for which the configuration needs to be updated. Hit [Enter].

```
Select the Adapter
1. T580-LP-CR      S/N:PT02141246
2. T520-CR        S/N:PT28140315
3. T580-S0-CR     S/N:PT03140038
4. T580-CR        S/N:PT13140096
Input : 2_
```

Figure 63 - Selecting adapter

- v. Select SRIOV (option 2) as the configuration type and enter y to confirm. Hit [Enter].

```
Choose the configuration type:
1. NON-SRIOV (Default)
2. SRIOV
Input : 2
Do you want to continue (y/n): y
Successfully updated the selected configuration type.
Verification: Passed
Please reboot the machine for changes to take effect.
PS C:\Users\Administrator> _
```

Figure 64 - Setting the configuration type

- vi. Reboot system for changes to take effect.

2.1.2. Nano Server (Nano Server Installer & Zip Package)

- i. Connect to Nano Server Machine.
- ii. Check if the machine is SR-IOV capable using the following command:

```
[nanomachine-ip]: PS C:\> Get-VMHost | fl *iov*
```

The *IovSupport* field should display “True” as shown in the image below:

```
[10.193.187.62]: PS C:\> Get-VMHost | fl *iov*
IovSupport           : True
IovSupportReasons    :
```

Figure 65 - Checking SR-IOV capability

- iii. If Unified wire was installed on the Nano Server machine using the Nano Server installer, skip to step (vii). If the driver components were manually installed using the boot image (Zip package), follow all the steps mentioned below.
- iv. Copy ChelsioUwire-x.x.x.xx folder to a desired location.
- v. Copy *cxgbnano.exe* from *ChelsioUwire-x.x.x.xx* folder to *<system_drive>\Windows\System32*
- vi. Change your working directory to *ChelsioUwire-x.x.x.xx\Adapter Configuration*.
- vii. Run the adapter configuration script and select *Windows Nano Server (option 2)* as the Windows version. Hit [Enter].

Nano Server Installer

```
[nanomachine-ip]: PS D:\> chelsio_adapter_config.ps1
```

```
[10.193.187.62]: PS D:\> chelsio_adapter_config.ps1
1. Windows GUI
2. Windows Nano Server
Input: 2
chelsio_adapter_config Version 2.0
Please stop all the traffic on Chelsio adapters before updating !!
```

Zip Package

```
[nanomachine-ip]: PS D:\ChelsioUwire-x.x.x.xx\Adapter Configuration>
.\chelsio_adapter_config.ps1
```

```
[10.193.187.62]: PS D:\ChelsioUwire-5.0.0.57\Adapter Configuration> .\chelsio_adapter_config.ps1
1. Windows GUI
2. Windows Nano Server
Input: 2

chelsio_adapter_config Version 2.0
Please stop all the traffic on Chelsio adapters before updating !!
```

Figure 66 - Adapter configuration utility

- viii. Enter the index of the Chelsio adapter for which the configuration needs to be updated. Hit [Enter].

```
Select the Adapter
1. T580-S0-CR      S/N:PT39131112
Input : 1
```

Figure 67 - Selecting adapter

- ix. Select *SRIOV* (option 2) as the configuration type and enter y to confirm. Hit [Enter].

```
Choose the configuration type:
1. NON-SRIOV (Default)
2. SRIOV
3. Port settings
Input : 2
Do you want to continue (y/n): y
Successfully updated the selected configuration type.
Verification: Passed
Please reboot the machine for changes to take effect.
```

Figure 68 - Setting the configuration type

- x. Reboot the Nano Server system for changes to take effect.

2.2. vSwitch Configuration

- i. Create a vSwitch with SR-IOV enabled using Chelsio adapter.
- ii. Assign a virtual network adapter with SR-IOV enabled to the VM.
- iii. Bring up the VM.

2.3. Guest (VM) Configuration

Please ensure that Unified Wire is installed on the guest before proceeding. Refer [Software/Driver Installation](#) section of the **Chelsio Unified Wire** chapter for step-by-step instructions.

To uninstall Unified Wire, please refer [Software/Driver Uninstallation](#) section of the **Chelsio Unified Wire** chapter for step-by-step instructions.

VI. Data Center Bridging (DCB)

1. Introduction

Data Center Bridging (DCB) refers to a set of bridge specification standards, aimed to create a converged Ethernet network infrastructure shared by all storage, data networking and traffic management services. An improvement to the existing specification, DCB uses priority-based flow control to provide hardware-based bandwidth allocation and enhances transport reliability.

One of DCB's many benefits includes low operational cost, due to consolidated storage, server and networking resources, reduced heat and noise, and less power consumption.

Administration is simplified since the specifications enable transport of storage and networking traffic over a single unified Ethernet network.

1.1. Hardware Requirements

1.1.1. Supported Adapters

The following are the currently shipping Chelsio adapters that are compatible with Chelsio's DCB feature:

- T580-CR
- T580-LP-CR
- T540-CR
- T520-CR
- T520-LL-CR
- T520-BT

1.2. Software Requirements

1.2.1. Windows Requirements

Currently Chelsio's DCB feature is available for the following Windows versions:

- Server 2016
- Nano Server 2016
- 10 AU Client
- Windows Server 2012 R2

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

2. Software/Driver Configuration and Fine-tuning

2.1. Installing DCB

To install DCB on the host machine, open PowerShell with administrative privileges and run the following command:

```
PS C:\Users\Administrator> Install-WindowsFeature -Name "Data-Center-Bridging" -IncludeAllSubFeature -IncludeManagementTools
```

Although not mandatory, it is recommended to reboot the machine after installation.

2.2. Quality of Service (QoS)

Quality of Service (QoS) is an advanced Windows feature used to prioritize and manage the outgoing network traffic. The feature ensures efficient usage of resources and minimizes the impact of bandwidth congestion.

2.2.1. Enabling QoS

Note *Chelsio DCB requires a minimum of 8 cores to work. In case of multiple sockets, where the number of cores per socket is less than 8, Chelsio adapters will have to be configured to utilize all the available cores before enabling QoS.*

Run the following command on all Chelsio ports:

```
PS C:\Users\Administrator> Set-NetAdapterRss -Name <interface name> -MaxProcessorGroup 3
```

QoS can be enabled by using either Device Manager or PowerShell:

- **Using Device Manager**

- i. Open the **Device Manager** (Start > Control Panel -> System & Security-> System -> Device Manager), click on the **Network adapters**, double click on any **Chelsio Network Adapter**, and then click the **Advanced** tab.
- ii. Select the **NDIS QoS** property and change the value to *Enabled*.

• Using PowerShell

Open PowerShell with administrative privileges and run the following command:

```
PS C:\Users\Administrator> Get-NetAdapterRdma | where
{$_.InterfaceDescription -like "Chelsio*"} | Enable-NetAdapterQos'
```

2.2.2. Verifying QoS

To verify if QoS is enabled, use the PowerShell command *Get-NetAdapterQos* and observe the results. You should see a similar output:

```
PS C:\Users\Administrator> Get-NetAdapterQos

Name           : Chelsio_p1
Enabled        : True
Capabilities    :
Hardware       :
Current        :
-----
MacSecBypass   : NotSupported NotSupported
DcbxSupport    : IEEE         IEEE
NumTCs (Max/ETS/PFC) : 8/8/8     8/8/8
```

2.3. Configuring Dell Force10 Switch

2.3.1. Enabling DCB

To enable DCB functions on a Dell Force10 switch, follow the steps mentioned below:

- i. Log in to the switch and enter the configuration mode:

```
Login: admin
Password:
Force10#enable
Force10#configure
```

- ii. Enable DCB and LLDP:

```
Force10(conf)#enable dcb
Force10(conf)#protocol lldp
Force10(conf-lldp)#no disable
```

iii. Set DCBx version to *auto*:

```
Force10(conf-lldp)#dcbx version auto
```

iv. Specify the intervals between hello packets:

```
Force10(conf-lldp)#hello 5
```

v. Create a DCB map. For example, here we are configuring 2 groups/classes:

- Group 0 has BW of 80% with *pfc* enabled.
- Group 1 had BW of 20% with *pfc* disabled.
- Assigning priority groups: Priority 5-7 are under group 0 and 0-4 are under group 1.

```
Force10(conf)#dcb-map win_dcb  
Force10(conf-dcbmap-win_dcb)# priority-group 0 bandwidth 80 pfc on  
Force10(conf-dcbmap-win_dcb)# priority-group 1 bandwidth 20 pfc off  
Force10(conf-dcbmap-win_dcb)# priority-pgid 1 1 1 1 1 0 0 0
```

vi. Enter interface configuration mode and configure protocol LLDP:

```
Force10(conf)#interface tengigabitethernet 0/17  
Force10(conf-if-te-0/17)#protocol lldp  
Force10(conf-if-te-0/17-lldp)#no disable
```

vii. Set DCBx version to *auto*:

```
Force10(conf-if-te-0/17-lldp)#dcbx version auto
```

viii. Apply the DCB-MAP created:

```
Force10(conf-if-te-0/17)#dcb-map win_dcb
```

2.3.2. Verifying

To verify remote and operational QoS configurational parameters, run the *Get-NetAdapterQos* command on the host machine. You should see a similar output:

```
PS C:\Users\Administrator> Get-NetAdapterQos
Name                               : Chelsio_p1
Enabled                           : True
Capabilities                       :
                                     Hardware      Current
                                     -----      -
                                     MacSecBypass : NotSupported NotSupported
                                     DcbxSupport  : IEEE         IEEE
                                     NumTCs (Max/ETS/PFC) : 8/8/8        8/8/8

OperationalTrafficClasses          : TC  TSA      Bandwidth Priorities
                                     --  ---      -
                                     0  ETS      80%      5-7
                                     1  ETS      20%      0-4

OperationalFlowControl             : Priorities 5-7 Enabled
OperationalClassifications         : Not Available
RemoteTrafficClasses               : TC  TSA      Bandwidth Priorities
                                     --  ---      -
                                     0  ETS      80%      5-7
                                     1  ETS      20%      0-4

RemoteFlowControl                  : Priorities 5-7 Enabled
RemoteClassifications              : Not Available
```

VII. Unified Wire Manager (UM)

1. Introduction

Chelsio's Unified Wire Manager is a powerful management software tool, allowing you to view and configure different aspects of the system, including Chelsio hardware installed in the system. The software includes a command line interface (CLI) tool and a web management interface (Web GUI) to help you manage all Chelsio network adapter cards on the network across multiple operating systems.

Unified Wire Manager enables the management of all aspects of the client side of the iSCSI SAN in two main areas. The ability to configure Chelsio adapter's boot option ROM without entering each individual adapter's configuration screen and manage group of iSCSI initiators remotely from a common user interface saves administrator's time considerably. Unified Wire Manager fully supports Microsoft iSCSI initiator. All supported Chelsio FCoE initiators available on Linux can be managed.

Users can manage Option ROM (PXE and FCoE) capability for Chelsio cards using various tools available in the software.

Additionally, Unified Wire Manager allows for Chelsio adapter NIC and TOE parameters to be centrally managed through the same easy-to-use user interface. It can bring interfaces up or down, tune parameters for optimal performance, and any number of administrative tasks normally done at each individual machine.

Chelsio's Unified Wire Manager is an indispensable tool for saving administrator's time for managing the network and SAN. Chelsio's high performance network adapters with its Unified Wire approach to networking can now be managed centrally in a simple and fast way!

1.1. Features

Chelsio's Unified Wire Manager is designed to provide the following features to the end-user:

- Remotely manage Chelsio adapters and various related tasks like driver installation from a single application.
- Single tool with CLI and Web interface that works across Storage, Networking and Hardware.
- Manage all Chelsio adapters installed on the system.
- Tool for FAE to debug issues on the Customer front.
- Freedom to choose various modes of management i.e. CLI or Web GUI.

1.2. Reference Architecture

Chelsio's Web GUI is a web-based management interface that lets you remotely manage several Chelsio CNAs from anywhere, at any time on the network using a web browser. The Web GUI provides a great amount of flexibility, efficiency and accessibility to system administrators in managing the Network and SAN. The users have the freedom to access the interface using any of the major browsers available, based on individual preferences and corporate policy.

System performance degradation issues will not be observed when using the Web GUI, since it's lightweight and utilizes very less system resources.

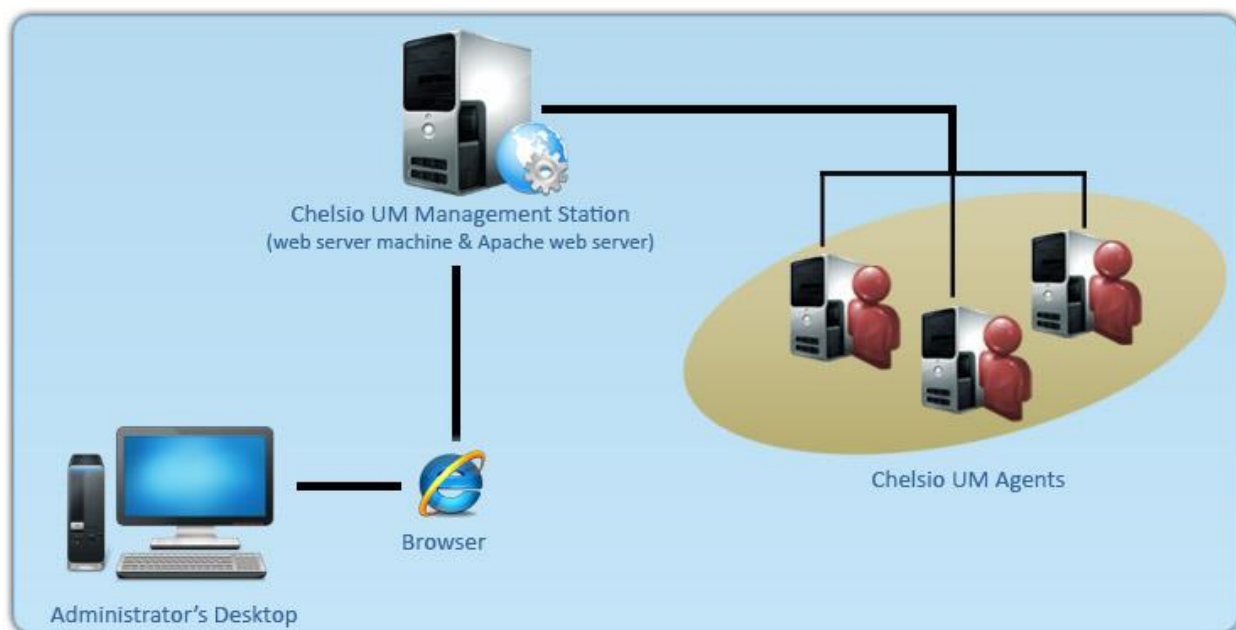


Figure 69 - Chelsio Unified Wire Manager with web interface (Web GUI)

1.3. Unified Wire Manager Components

1.3.1. Management Agent

The Management Agent is a binary executable, which runs as a service on the system that has at least one Chelsio card installed. It is installed along with libraries that can manage various components of the system and enabled during system startup.

1.3.2. Management Client

The Management Client can be used to connect to agents and manage them. Once connected you can view and configure Chelsio CNAs and related networking, storage and hardware properties. You can use either the CLI or Web GUI client to manage agents based on your preference. It makes service requests based on the command issued by the user and returns the appropriate information.

- **CLI Client**

The **CLI Client** (*chelsio_uwcli*) is an executable binary which allows you to manage and configure agents using the command-line interface. It is not a command shell with a prompt; it accepts all command parameters as arguments when launching it, making it script-friendly.

- **Web GUI Client**

The **Web Management Interface** (Web GUI) client is a web-based management interface which allows you to securely manage agents from anywhere using a web browser. The management interface uses a secure 256-bit encrypted HTTP connection, ensuring that authentication and configuration data are protected during transmission from the web browser to the system and vice versa. Many agents can be accessed on single interface making it very efficient & user-friendly.

Currently supported browsers are **Internet Explorer 9+**, **Mozilla Firefox 3.6.9+**, **Google Chrome 5+** and **Apple Safari 5+**.

1.4. Authentication and encryption

The Unified Wire Manager requires user authentication to manage a system. A user must have administrative privileges to manage a system. The authentication credentials, as well as all data exchanged between the CLI client or the Web GUI and the agent, are encrypted using SSL. This ensures that the data cannot be accessed when it is being transmitted over the network.

2. Hardware and Software

2.1. Supported Adapters

Following are the currently shipping Chelsio adapters that are compatible with Chelsio Unified Wire Manager:

- T580-CR
- T580-LP-CR
- T580-SO-CR
- T540-CR
- T520-CR
- T520-LL-CR
- T520-SO-CR

2.2. Platform/Component Matrix

The table below lists the Windows versions and the supported UM components.

Table 3 - Supported UM components

Version/Distribution	Supported UM Components
Windows Server 2012 R2	Management Agent, Management Client, Management Station

2.3. Platform/Driver Matrix

The table below lists the Chelsio T5 driver(s) and their supported versions:

Table 4 - Supported NIC version

Chelsio driver	Version
NIC	6.3.5.0

3. Installation (Zip Package)

This section describes the procedure to install UM. This is applicable only for zip package since the Unified Wire installer will install UM by default. If an older version of the software exists, the installer will upgrade it to the version provided in the package.

- i. Run the **UnifiedWireManager-x.x.xx-x64** installer application located in *ChelsioUwire-x.x.x.xx/UM* folder.
- ii. Click the **Next** button for the Chelsio End User License Agreement Window.

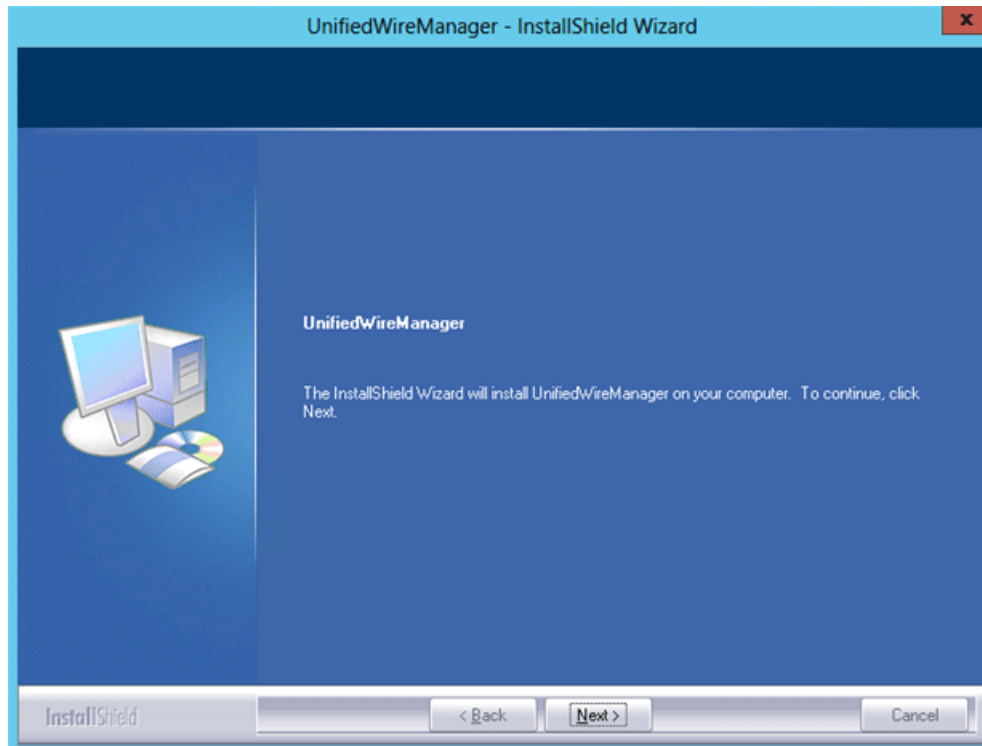


Figure 70 - UM installer welcome window

- iii. Select the radio button **I accept the terms of the license agreement** and click **Next**.

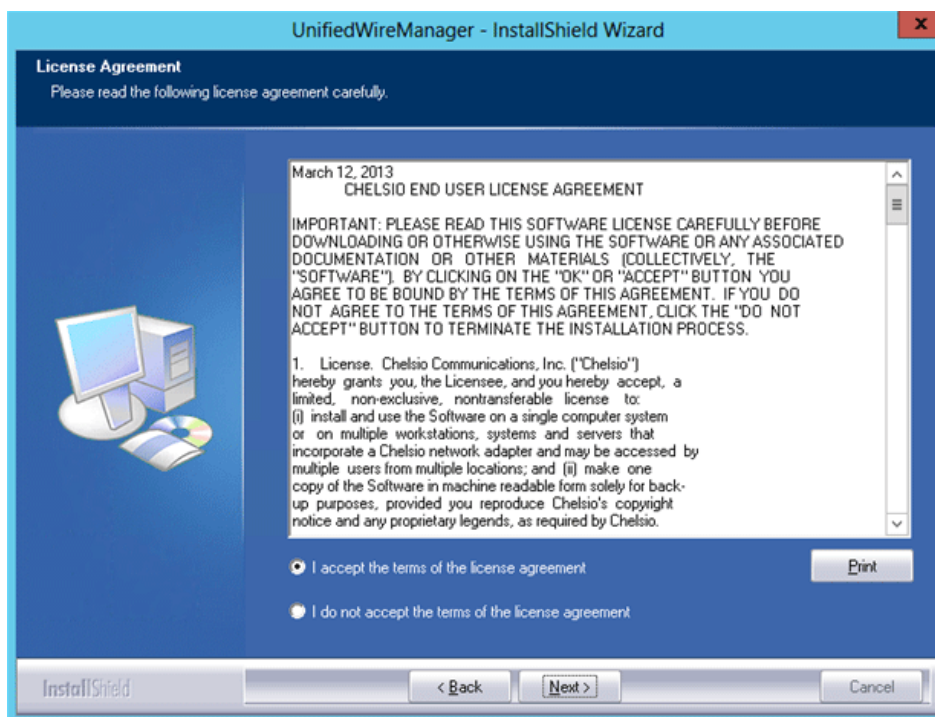


Figure 71 - Chelsio EULA window

- iv. The next window will display the pre-requisites for various UM components. Ensure that they are met before proceeding. Click **Next**.

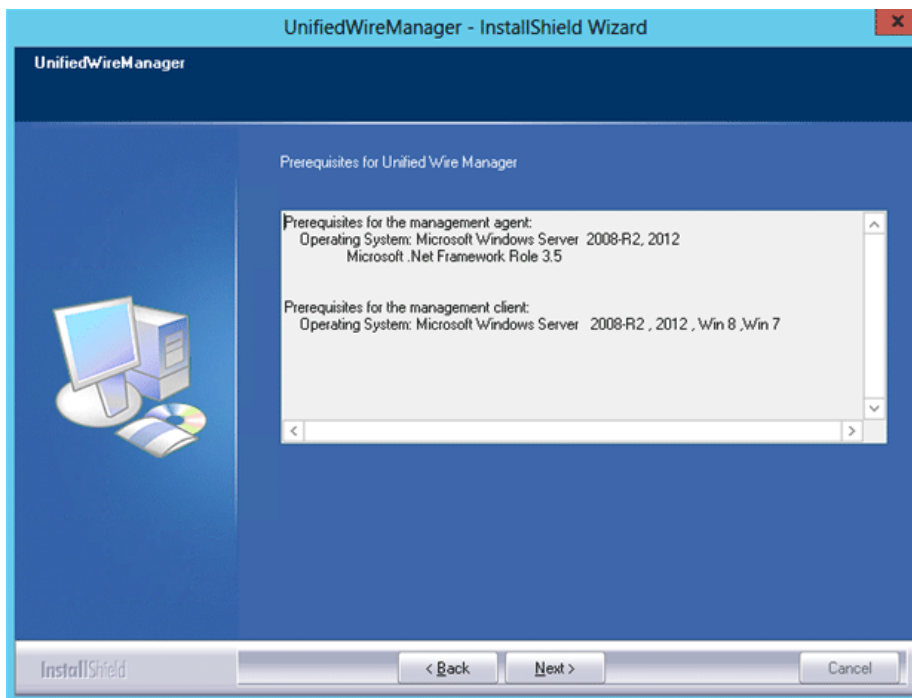


Figure 72 - UM prerequisites window

- v. Now, either select **Complete** for complete package installation or else select **Custom** radio button to customize the installation. Click **Next**.

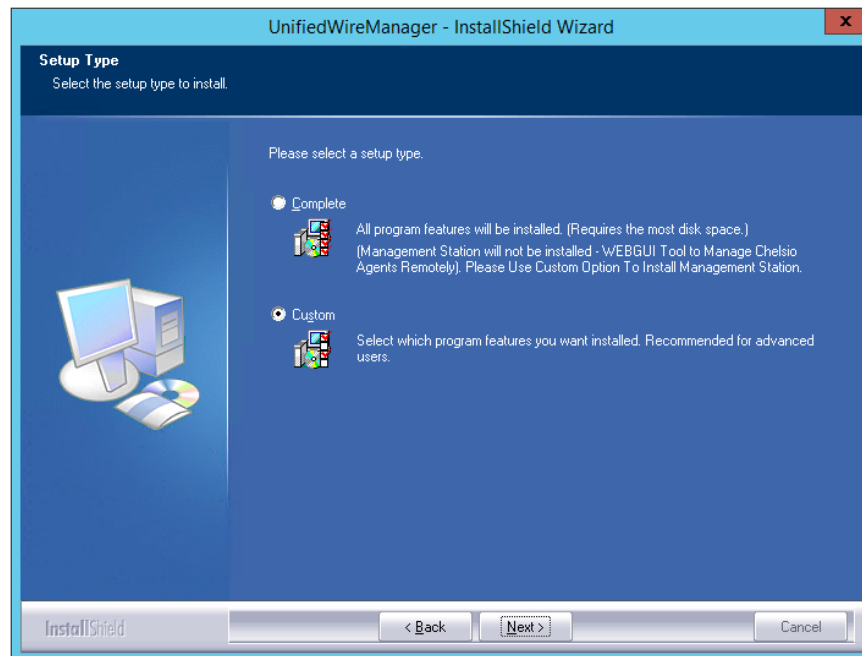


Figure 73 - Select setup (installation) type

- a. If you selected **Custom**, the next window will display the location where UM will be installed by default. You can change the location by using the **Change** button or click **Next** to continue with the default path.

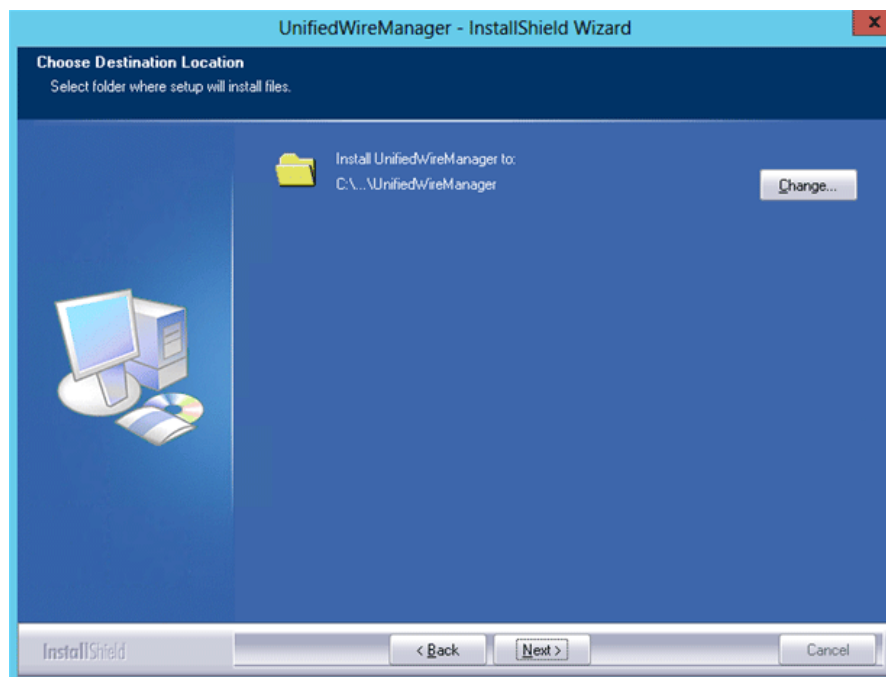


Figure 74 - Changing UM installation path

- b. Next, you can choose the UM components you wish to install. Deselect the components you don't wish to install and click **Next**.

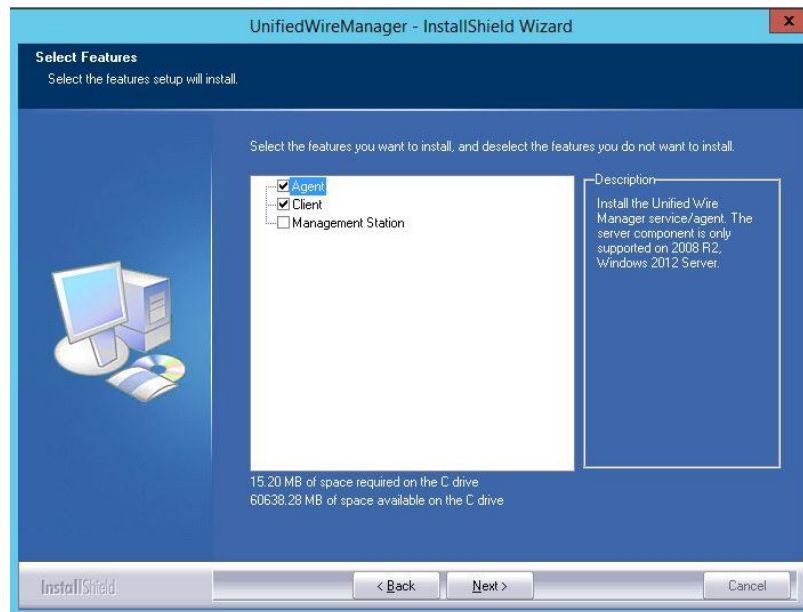


Figure 75 - Selecting UM components to install



Note If Management Station is selected, please make sure that all related prerequisites are met before proceeding (See [Pre-requisites](#)) or else the component will be skipped during installation.

- vi. Click **Install** to start the installation. Unified Wire Manager will now be installed with the selected options.

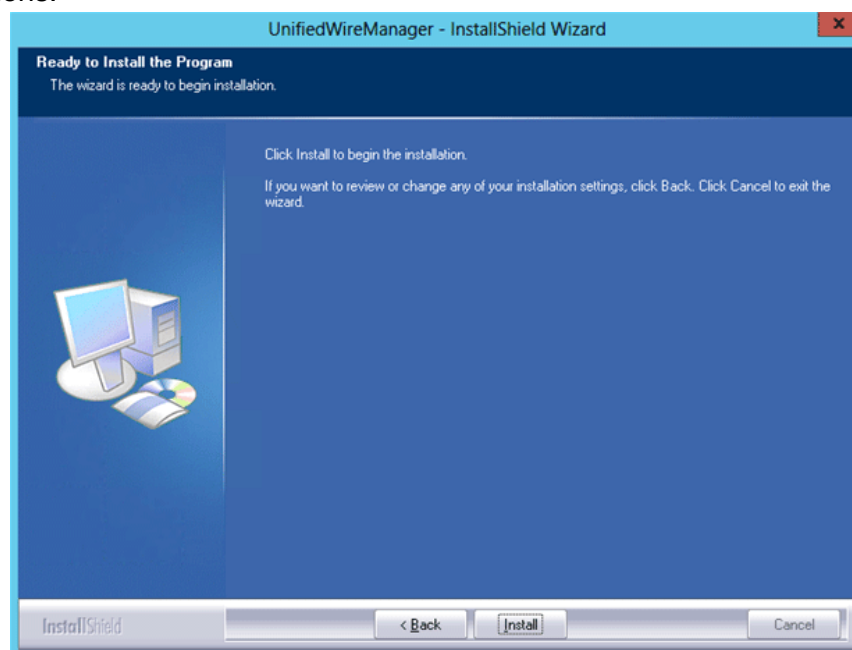


Figure 76 - Starting UM installation

vii. Select **Finish** to exit the UM Installer.

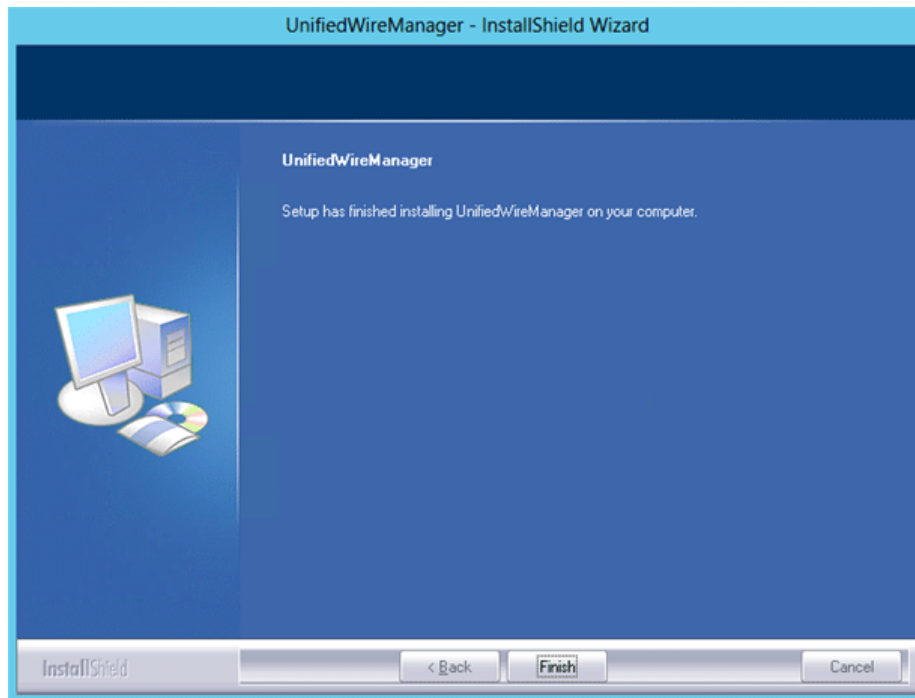


Figure 77 - Finishing UM installation

4. Configuration

4.1. Configuring Management Station

Follow the steps mentioned below to configure Apache Server and SSL certificate.

4.1.1. Apache HTTP Server

- i. Assuming that Apache HTTP Server 2.2 is installed at the default location, append the following lines in *C:\Program Files (x86)\Apache Software Foundation\Apache2.2\Conf\httpd.conf*

```
ScriptAlias /python/ "C:/Program Files (x86)/Apache Software
Foundation/Apache2.2/htdocs/chelsio/python/"

<Directory "C:/Program Files (x86)/Apache Software
Foundation/Apache2.2/htdocs/chelsio/python/">
    PythonPath '['C:/Program Files (x86)/Apache
Software
Foundation/Apache2.2/htdocs/chelsio/python']+sys.path"

    SetHandler mod_python
    PythonHandler mod_python.publisher
    PythonDebug on
</Directory>

LoadModule python_module modules/mod_python.so
ThreadStackSize 8388608
```

- ii. Perform the following tasks in *C:\Program Files (x86)\Apache Software Foundation\Apache2.2\Conf\httpd.conf* file
 - a. Change "DocumentRoot" to "C:\Program Files (x86)\Apache Software Foundation\Apache2.2\htdocs\chelsio"
 - b. Uncomment "LoadModule rewrite_module modules/mod_rewrite.so"
 - c. Uncomment "Include conf\extra\httpd-ssl.conf"
 - d. Uncomment "LoadModule ssl_module modules/mod_ssl.so"
 - e. Add the following lines:



```
RewriteEngine On
RewriteCond %{HTTPS} !=on
RewriteRule ^/?(.*) https://%{SERVER_NAME}/$1 [R,L]
```

4.1.2. SSL Certificate


- i. Execute the following lines in command prompt and provide info to generate OpenSSL certificate and keys:

```
cd "C:\Program Files (x86)\Apache Software Foundation\Apache2.2\conf"
..\bin\openssl req -config openssl.cnf -new -out blarg.csr -keyout blarg.pem
..\bin\openssl rsa -in blarg.pem -out blarg.key
..\bin\openssl x509 -in blarg.csr -out blarg.crt -req -signkey blarg.key -
days 365
```

- ii. Browse to the following location:
C:\Program Files (x86)\Apache Software Foundation\Apache2.2\conf\extra
- iii. Open the file *httpd-ssl.conf* and make the following modifications:
- iv. Modify "SSLCertificateFile" to "C:\Program Files (x86)\Apache Software Foundation\Apache2.2\conf\blarg.crt"
- v. Modify "SSLCertificateKeyFile" to "C:\Program Files (x86)\Apache Software Foundation\Apache2.2\conf\blarg.key"

 **Note** *On some installation, Apache is seen to report problems regarding SSL cache. In such a case, do the following in C:\Program Files (x86)\Apache Software Foundation\Apache2.2\conf\extra\httpd-ssl.conf*

- a. *Uncomment the following line*
SSLSessionCache "dbm:C:/Program Files (x86)/Apache Software Foundation/Apache2.2/logs/ssl_scache"
- b. *Comment the following line*
SSLSessionCache "shmcb:C:/Program Files (x86)/Apache Software Foundation/Apache2.2/logs/ssl_scache(512000)"

 **Note** *Use the Windows Event Log (Event Viewer) for troubleshooting any installation related issues.*

5. Verifying UM components status

The following section explains how to verify status of various UM components.

5.1. Verifying Management Agent

- i. On the system running Management Agent, launch **Services** from the Control Panel. You can also type `services.msc` in the **Run** command. This will open the **Services** window.

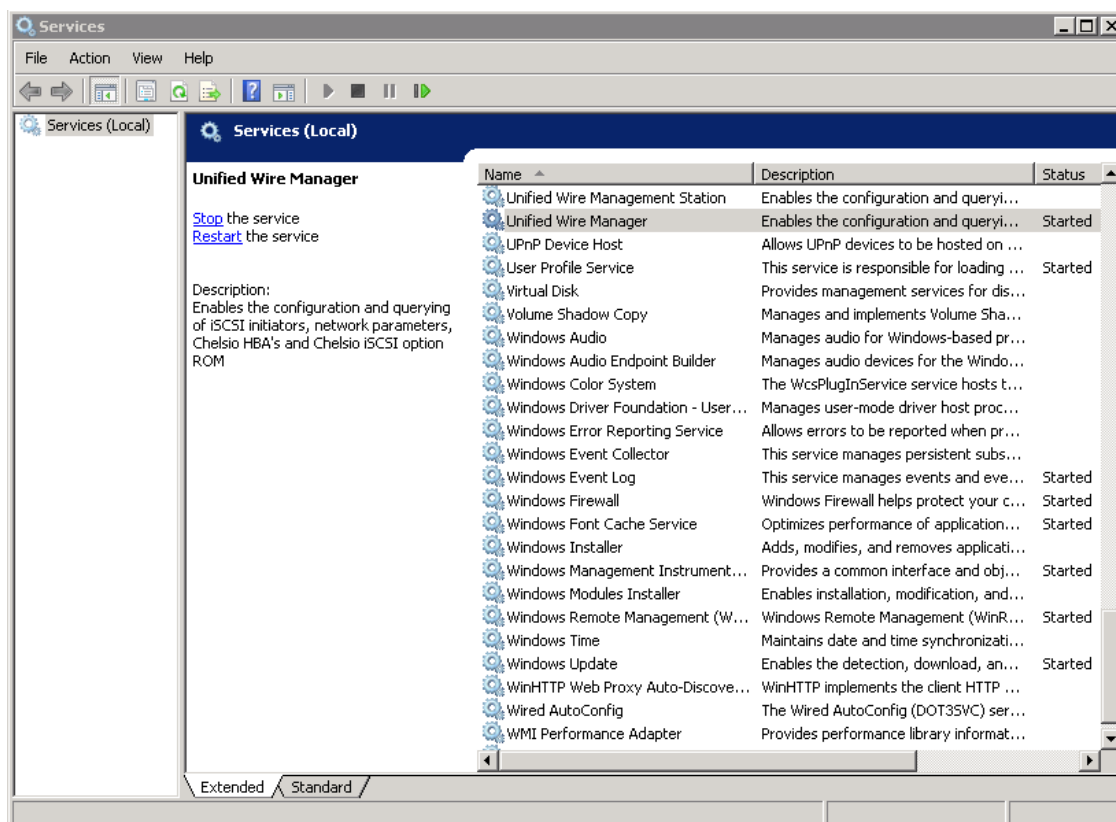


Figure 78 - Windows Services

- ii. Search for *Unified Wire Manager* in the list of services. You should get the options to stop and restart in the *Actions* menu on the left side, indicating that Management Agent is already running.

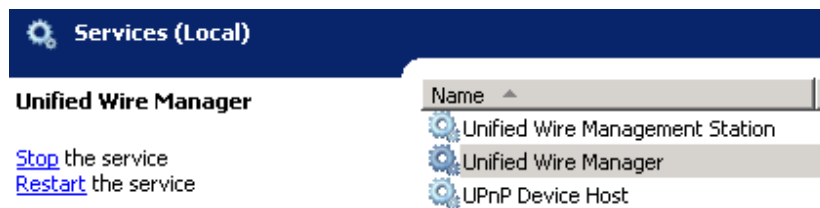


Figure 79 - Actions available for Unified Wire Manager service

5.2. Verifying Management Client

Execute the following query command to determine if Management Client is installed:

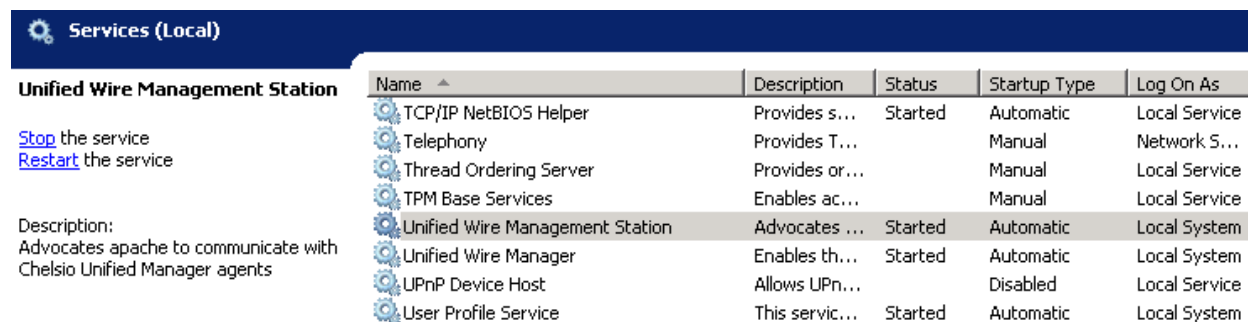
```
C:\Users Administrator>chelsio_uwcli.exe -V
```

The above query should confirm that Management Client is installed by displaying a similar result:

```
Unified Manager client CLI version : 2.x.yy
```

5.3. Verifying Management Station

- Launch **Services** from the Control Panel. You can also type `services.msc` in the **Run** command. This will open the **Services** window.
- Search for *Unified Wire Management Station* in the list of services. You should get the options to stop, start and restart the service in the *Actions* menu on the left side.



Name	Description	Status	Startup Type	Log On As
TCP/IP NetBIOS Helper	Provides s...	Started	Automatic	Local Service
Telephony	Provides T...		Manual	Network S...
Thread Ordering Server	Provides or...		Manual	Local Service
TPM Base Services	Enables ac...		Manual	Local Service
Unified Wire Management Station	Advocates ...	Started	Automatic	Local System
Unified Wire Manager	Enables th...	Started	Automatic	Local System
UPnP Device Host	Allows UPn...		Disabled	Local Service
User Profile Service	This servic...	Started	Automatic	Local System

Figure 80 - Verifying Management Station service status

Note While accessing the Web Management Interface, if an error “Management Station is not running” is displayed at the log-in page, follow the above steps to restart Management Station and try again.

6. Management Agent

6.1. Communication

The agent uses a TCP connection over IP to communicate with the client. After the connection is established, SSL (Secure Sockets Layer) encryption is enabled using the Open SSL libraries. The agent listens on a TCP port for new incoming connections from clients. This port is set to 35001 by default.

6.2. Service configuration

The agent is installed as a service on the system, and enabled to start on boot. The following sections will describe the procedure to configure service startup manually:

6.2.1. Service startup configuration

The service name on Windows is *Unified Wire Manager* and the service startup configuration can be changed by following these steps:

- i. Launch **Services** from the Control Panel. You can also type `services.msc` in the **Run** command. This will open the **Services** window.
- ii. Scroll and highlight the "Unified Wire Manager" service, and double-click on it.
- iii. Select the startup type, either "Automatic (Delayed Start)", "Automatic", "Manual", or "Disabled".

6.2.2. Service start/stop/restart

- i. Launch **Services** from the Control Panel. You can also type `services.msc` in the **Run** command. This will open the **Services** window.
- ii. Scroll and highlight the "Unified Wire Manager" service.
- iii. Click on **Start/Stop/Restart** to carry out the respective tasks in the Description section on the left.

6.3. Firewall

If the system has a firewall configured, it should be configured to allow traffic to the management agent's default TCP port configured i.e. 35001. Review the firewall documentation and configure it appropriately. If there is a firewall appliance / software protecting the network that the system is on, and you wish to connect to the system from a different network, using the client, the firewall appliance also needs to be configured appropriately.

7. CLI client

7.1. CLI Help system

A detailed help and usage documentation is built into the CLI, and is accessible through its help system. The help can be invoked by the usual argument of `/?` or `--help`.

7.1.1. Viewing help

- i. Open command prompt by typing `cmd` in the **Run** command.
- ii. Type `chelsio_uwcli.exe --help`. Press enter to view the built-in help.

7.2. Client conflict resolution

The CLI and Web GUI cannot manage the same system at the same time by default. This is to ensure that configuration changes being applied by one client are not interrupted by another client. Also, two different Web GUI or CLI clients cannot connect to a management agent at the same time. There is no mechanism to allow this scenario.

8. Web GUI client

8.1. Management Station

In order to access the Web Management Interface, start the Apache HTTP server, if it's not running already. Also, Cookies and Javascript must be enabled in the browser.

8.1.1. Running Management Station

- i. Launch **Services** from the Control Panel. You can also type `services.msc` in the **Run** command. This will open the **Services** window.
- ii. Search for “*Apachex.x*” in the list of services and click **Start** in the **Action** menu on the left.

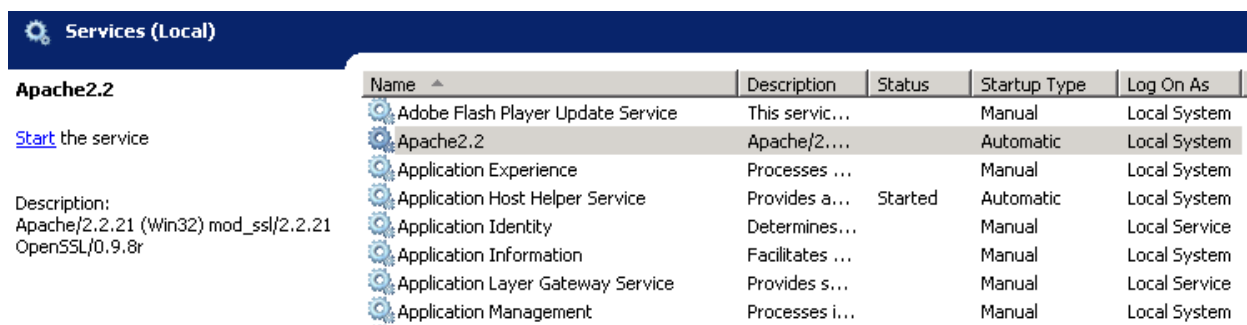


Figure 81 - Starting Apache HTTP server

- iii. Search for “*Unified Wire Management Station*” and click **Start** in the **Action** menu on the left.

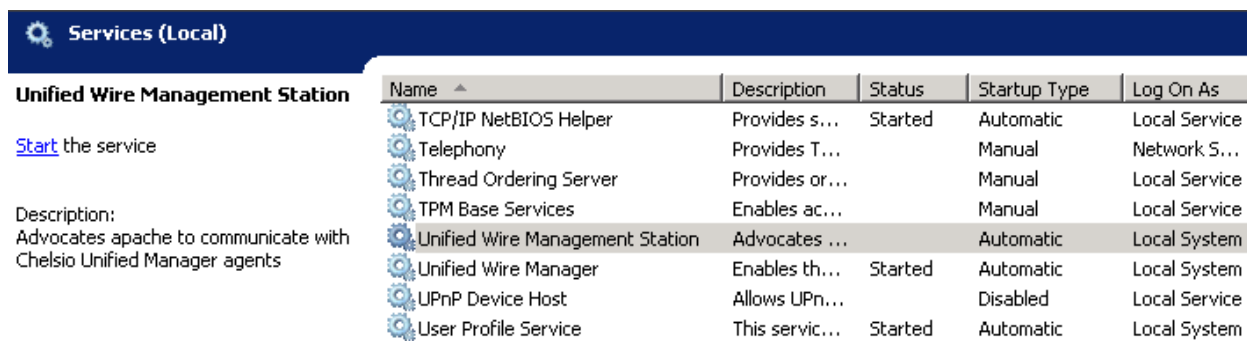


Figure 82 - Starting Management Station service

8.2. Accessing Web Management Interface

- i. To access the Web GUI, type in the URL `https://<management station IP address>` in a web browser.
- ii. The security certificate used by the web server is a generic one. It may cause the following types of prompts in different browsers. You will need to select the correct option to continue.

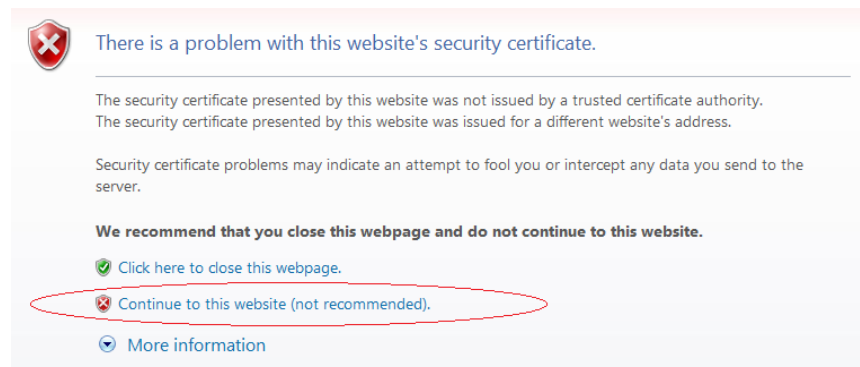


Figure 83 - Security Certificate prompt in Internet Explorer

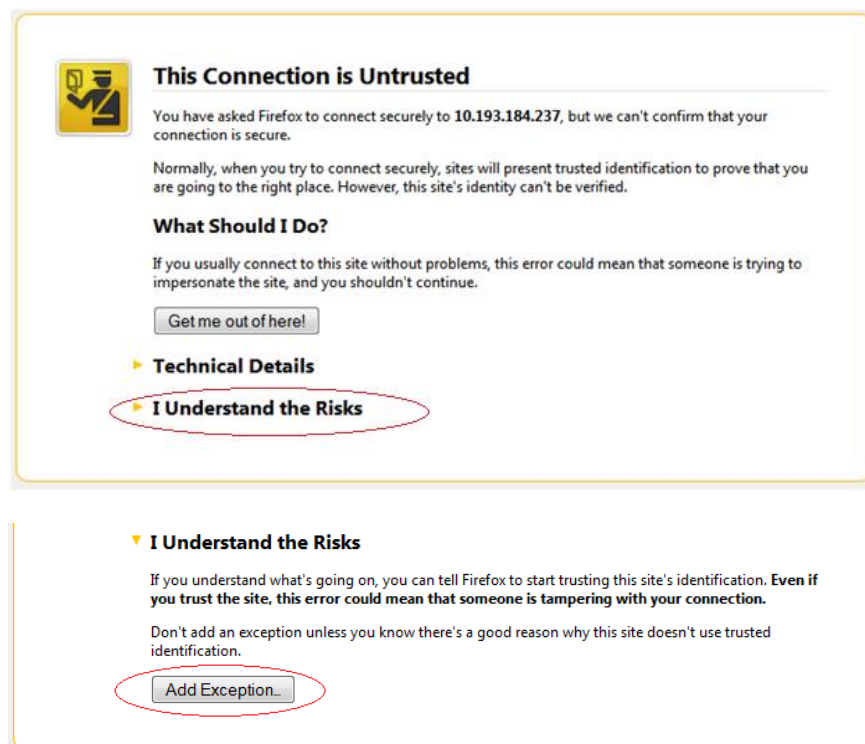


Figure 84 - Security Certificate prompt in Mozilla Firefox

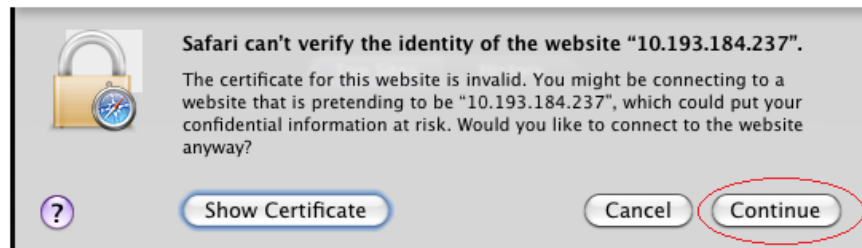


Figure 85 - Security Certificate prompt in Apple Safari



Figure 86 - Security Certificate prompt in Google Chrome

- iii. The web interface requires password authorization to be accessed. Enter the administrator/root credentials that were set up on the management station system and click on the *Login* button.

Figure 87 - Web GUI Login page

Note *Not performing any operation/action for 5 minutes will result in session timeout. You will have to re-login and connect to the Agents again.*

8.3. Layout and Navigation

The Web Management Interface consists of the following:

- **Title bar** displaying the username on the left, Unified Wire Manager logo and name in the centre; and a Logout button on the right.
- **Menu Bar** consisting of the **Home**, **Add System**, **Remove System**, **Refresh**, **Subscribe** and **Bulk Configuration** buttons.
- The **Navigation Pane** with a cascading tree of links to various configuration modules for a UM Agent. You can navigate between connected agents and various sections of the managed agent's interface. You can view and hide the configuration modules for each Agent by clicking on the "+" and "-" links respectively
- The **Details Pane** on the right displaying panels associated with the tree menu item selected in the **Navigation Pane**. The panels can be expanded and collapsed by clicking on the panel heading.
- The **Bottom bar** has the **About** link on the right and copyright details on the left.

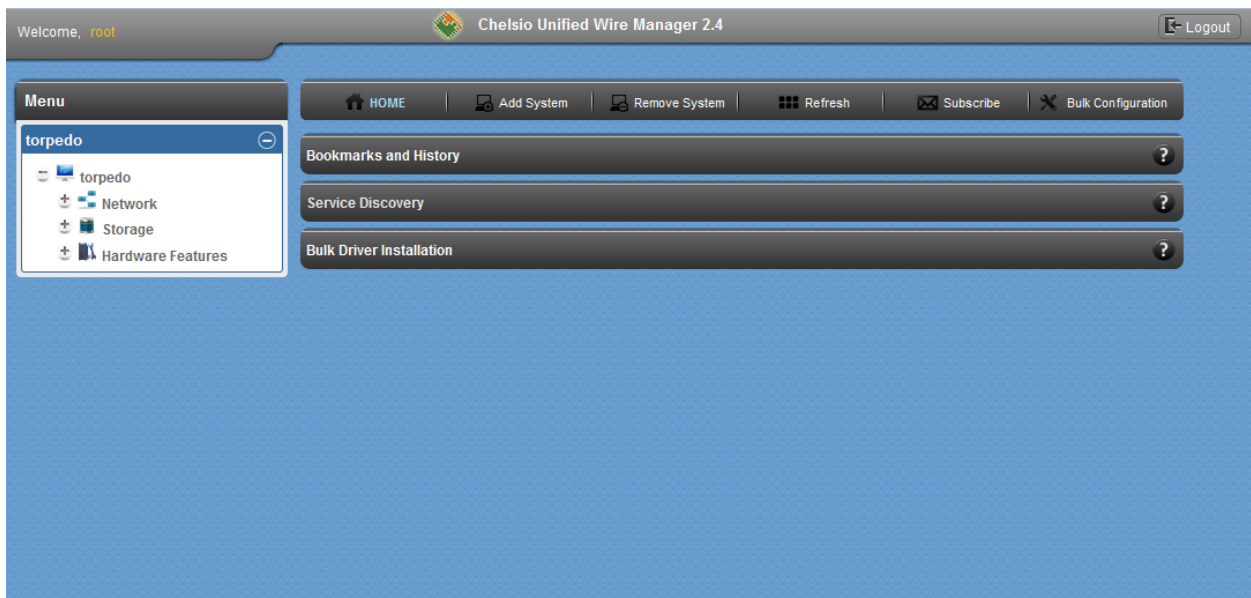


Figure 88 - Web Management Interface

8.4. Home page

The home page is displayed by default on launching the Web GUI. It displays **Bookmarks and History**, **Service Discovery** and **Bulk Driver Installation** modules. Options to go back to home page, add/remove system, refresh and configure email alerts are also available.

8.4.1. Home

This option will display the home page.

- **Bookmarks and History**

A history of the last 128 systems that were managed from this system, by the current user, will be shown here in a list. Each system's management IP address, TCP port, and Login details are also stored. This may be edited and saved. Any systems that are not required in the list may be deleted.



Important

Storing login passwords for the managed systems is inherently insecure. The passwords are encrypted, but it is still advisable to store passwords only if the system you are running the GUI client on, is secure.

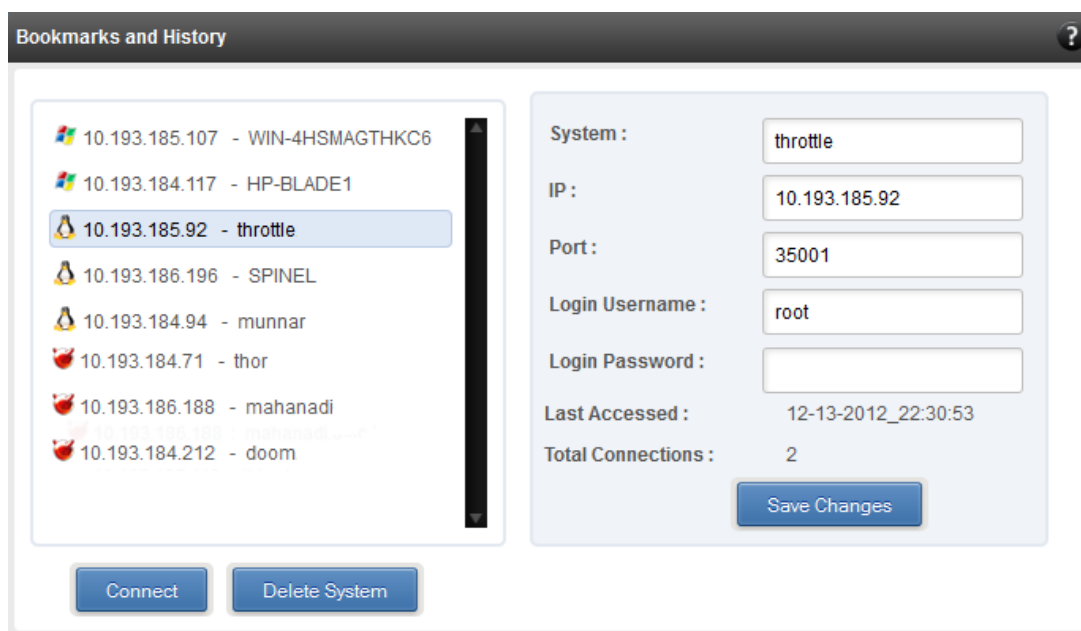


Figure 89 - Bookmarks and history module

- **Connecting to a system**

Select the system from the Bookmark list and click *Connect*. Once successfully connected, the system will appear on the left pane with different related modules on the right to view and manage.

- **Deleting a system**

Select the system from the Bookmark list and click *Delete system* to remove it.

Note Once removed, the system will no longer appear in the Bookmarks and History module. If you wish to manage that system again, you will have to use the “Add system” option.

- **Service Discovery**

Using this module, all the Unified Wire Manager agents connected in the same or different subnet can be discovered. One can choose to discover agents based on OS type or search for a particular agent if the agent's IP or hostname is known. Select the appropriate discovery method and provide the relevant information. For example, to search using hostname, select *Hostname* as the **Input Type** and provide the agent's hostname in the **Search for Hostname/IP** field. Finally click **Discover Agents**.

The **Add Agents** button adds the selected system to the list of discovered agents in the **Bookmarks and History** module. The **Clear Agents** button resets the list of discovered agents.

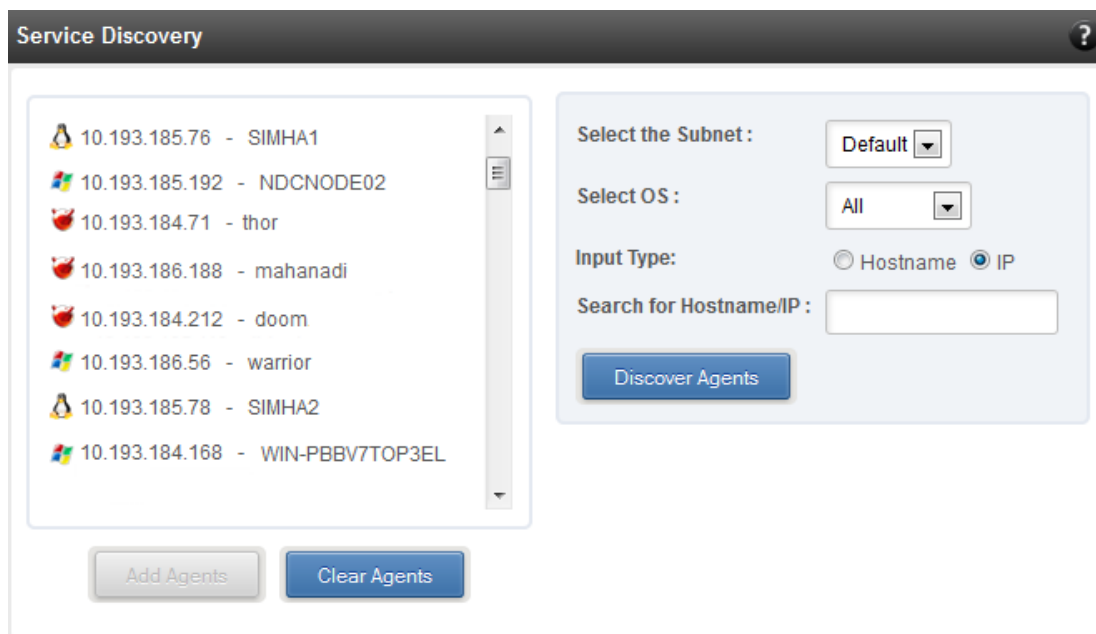


Figure 90 - Services Discovery module

• Bulk Driver Installation

This module allows you to install drivers for multiple systems simultaneously. Drivers available for installation for a particular system may differ depending on the network adapter (T5, T4 or T3) and operating system selected.

• Installing Driver

- i. In the **Choose the card** fields, select T3 or T4/T5 depending on the chip revision of the network card.
- ii. Select the operating system for which drivers are to be installed in the **Choose the OS Type** field. All the systems with the selected operating system will be displayed in the list below.
- iii. Select a system or systems from the list and choose the driver to be installed in the **Driver Installation** section.
- iv. Download the appropriate driver from Chelsio's Download Center, service.chelsio.com.
- v. Locate the driver package.
- vi. Click **Install** button to install the driver.

Figure 91 - Bulk Driver Installation module

Note Agents that report errors or whose passwords are not stored, will be automatically skipped during the driver installation.

8.4.2. Add System

Use this option to connect to new Agents using their IP or Hostname. The TCP port for connection is by default 35001. You will have to provide correct user credentials for the agent in order to connect successfully.

After connecting to the Agent, the menu bar on the left will display the connected system and its related modules.

If you deselect the 'Remember Password' option, you will be asked to enter the password every time you try to connect to the system.

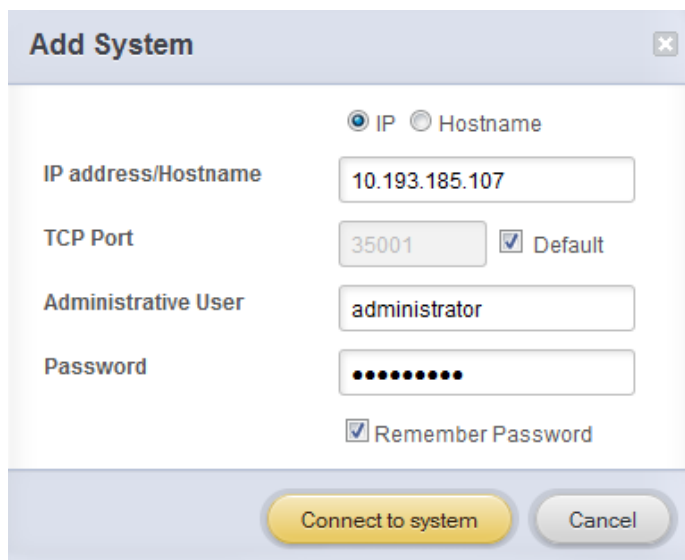
A screenshot of the 'Add System' dialog box. It has a title bar with the text 'Add System' and a close button. Inside, there are two radio buttons: 'IP' (selected) and 'Hostname'. Below them is a text field for 'IP address/Hostname' containing '10.193.185.107'. There is a 'TCP Port' field with '35001' and a checked 'Default' checkbox. Below that is an 'Administrative User' field with 'administrator'. A 'Password' field is shown with masked characters. At the bottom, there is a checked 'Remember Password' checkbox. Two buttons, 'Connect to system' and 'Cancel', are at the bottom right.

Figure 92 - Adding a UM Agent

8.4.3. Remove System

Use this option to disconnect an Agent. To remove an agent, click on the name of the system in the tree menu in the left and click *Remove System*. Then click *Yes* to confirm.

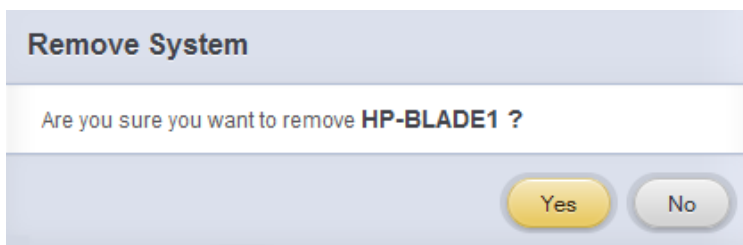
A screenshot of the 'Remove System' dialog box. It has a title bar with the text 'Remove System'. The main area contains the question 'Are you sure you want to remove HP-BLADE1 ?'. At the bottom right, there are two buttons: 'Yes' and 'No'.

Figure 93 - Removing a UM Agent

8.4.4. Refresh

This option can be used to reload the Web GUI or UM Agent.

To reload the Web GUI, navigate to the Home page (by clicking on the “Home” button and click Refresh. You can use this option to refresh Home page panes (Bookmarks and History, Service Discovery and Bulk Driver Installation).

To reload an Agent, click on the name of the system in the tree menu in the left and click “Refresh”. You can use this option to update any changes made to system settings like load/unload drivers.

8.4.5. Subscribe (Email Alerts)

This feature is available only on the Web Management Interface.

Using this option, you can receive email alerts regarding the link status of a Chelsio Network Interface Card. This feature sends email notifications regarding the port and the card, on which the link up/down event has occurred. Not only can you configure multiple email addresses to receive notifications, but also customize the email id of the sender for troubleshooting purposes.

To subscribe to **Email Alerts**, enter the sender’s email address in the *Email address* field. It should be in the format of <name>@<domain>.<extension>. You can enter multiple email addresses for the *Recipients* field separated a comma. Enter Mail server details and ensure that the “Enable email Alerts” field is enabled. Select the Agent(s), for which you want to receive alerts and Click on **Save**.

The screenshot shows the 'Email Alert' configuration window. It includes the following fields and options:

- Email address:** email_id@abc.com
- Recipients:** administrator1@chelsio.com,administrat
- Mail Server:** mailserver.abc.com
- SMTP Port:** 25
- Services:** ☒ Network Services
- Enable email alerts:** ☒ Enable
- Select Systems:** A list of systems with checkboxes:
 - ☐ 10.193.185.107 - WIN-4HSMAGTHKC6
 - ☒ 10.193.184.117 - HP-BLADE1
 - ☐ 10.193.185.92 - throttle
 - ☐ 10.193.186.196 - SPINEL
 - ☐ 10.193.184.94 - munnar
 - ☐ 10.193.184.211 - eastend
 - ☒ 10.193.184.71 - thor

At the bottom right, there are 'Save' and 'Close' buttons. The 'Save' button is highlighted in yellow.

Figure 94 - Subscribing to Email Alerts

8.4.6. Bulk Configuration

The **Bulk Configuration** page allows you to execute common configuration changes to multiple agents and their network adapters simultaneously. You can conveniently perform bulk operations like installing option ROM, setting MTU and VLAN ID, changing adapter and port parameters on various devices, without having to access multiple modules and thus saving considerable amount of administration time.

Various configurable parameters have been categorized into several modules like **Boot Configuration** module to install and erase option ROM, **Network Configuration** module to set MTU and VLAN ID, **Card Configuration** module to change driver parameters, etc.

Before accessing these modules, you will have to create **groups** and then add **members** to that group. Once done, you can select the group in the modules and the new setting will be applied to all members of that particular group.

- **Manage Groups**

This is where you can add, delete and manage groups. Use the **Create a Group** section to create a group by specifying agent's platform and group type. There are various types of groups to choose from depending on the type of configuration setting you want to change. For example, to change the MTU size of a network interface (in the Network Configuration module), create a group with group type *Network*. To install or erase option ROM on a Chelsio T4 adapter (in the Boot Configuration module), create a group with group type *t4adapter*.

Here is a list of available configuration modules and corresponding group type:

- **Boot Configuration:** t3adapter, t4adapter, t5adapter
- **Network Configuration:** Network
- **Card Configuration:** t3adapter, t4adapter, t5adapter
- **Port Configuration:** t3port, t4port, t5port
- **Bypass Configuration:** Network

After the group has been created, add members to that group using the **Add a member row** button. Depending on the group type selected, you may be asked to provide additional details for the new member. Use the **Fetch Details** button to do so and finally click **Save a member** button to add the member to the group.

To delete a group, select it from the **Select a Group** drop-down list, and click **Delete Group**. To delete a member from a group, select the group to which the member belongs, select the radio button corresponding to the member to be deleted in the **SNO** field and finally click **Delete Member(s)**.

Create a Group

Group Name:

Os Type :

Group Type :

Figure 95 - Creating a group

Manage Group

Select a Group:

OS Type: WINDOWS

Group Type: t4adapter

SNO	HOSTNAME / IP	USERNAME	USERNAME	DETAILS
<input type="radio"/> 1	10.193.185.107	administrator	*****	Adpater Idx : 0 [T422;CR ; PCI Location: 01:00:04]
<input type="radio"/> 2	10.193.185.86	administrator	*****	Adpater Idx : 0 [T422;CR ; PCI Location: 02:00:04]

Figure 96 - Managing a group

- **Boot Configuration**

Using this module, you can install option ROM or erase option ROM on Chelsio network devices. The **Set Default Boot Settings** button will reset the adapter to factory boot settings.

Boot Configuration ?

Boot Configuration

Select a group:

Figure 97 - Boot Configuration module

• Network Configuration

In the **Network Configuration** module, you can set Maximum Transfer Unit (MTU), Virtual LAN (VLAN) ID and change the IP address type for the members (network interfaces) of the *Network* group. MTU can be set between 1500-9000 bytes. VLAN id can be set for an adapter within the range 0-4094 (enter 0 to disable it). The IP type can be static or DHCP.

The screenshot shows the 'Network Configuration' window. It has a title bar with a question mark icon. Inside, there's a 'Refresh' button with a circular arrow icon. Below that, a section titled 'Network Configuration' contains a 'Select a group:' dropdown menu with 'group_network' selected. To the right of this are three rows of settings: 'MTU:' with a text input '1650' and a 'Set MTU' button; 'VLAN:' with a text input '4' and a 'Set VLAN' button; and 'IP Type:' with a dropdown menu showing 'DHCP' and a 'Set IP Type' button.

Figure 98 - Network Configuration module

• Card Configuration

The **Card Configuration** module allows you to set various adapter settings including TCP Offload. Offload settings are only available when using the TOE capable drivers (*t3_tom* and *toecore* for T3 cards; *t4_tom* and *toecore* for T4 cards).

The screenshot shows the 'Card Configuration' window. It has a title bar with a question mark icon. Inside, there's a 'Refresh' button with a circular arrow icon. Below that, a section contains a 'Select a Group:' dropdown menu with 'group_win_t4adapter' selected. To the right of this, it shows 'Group Type: t4adapter' and 'OS Type: WINDOWS'. Further right, there's a 'Note:' section with two lines of text: 'MIN = Minimun value a variable of type int can assume' and 'MAX = Maximun value a variable of type int can assume'. Below this is a table with three columns: 'DESCRIPTION', 'RANGE', and 'VALUE'. The table has one row with 'Max VM' in the first column, '[0,16]' in the second, and a text input with '4' in the third. At the bottom, there are two buttons: 'Set Card Properties' and 'Discard Changes'.

DESCRIPTION	RANGE	VALUE
Max VM	[0,16]	4

Figure 99 - Card Configuration module

• Port Configuration

In the **Port Configuration** module, you can set various port settings like enabling Tx checksum and TCP segmentation offload, setting Link speed and link duplex mode, etc. The settings depend on the device driver installed.

Port Configuration

?

Select a Group:

group_t4port

Group Type:

t4port

OS Type:

WINDOWS

Refresh

Note:

MIN = Minimun value a variable of type int can assume

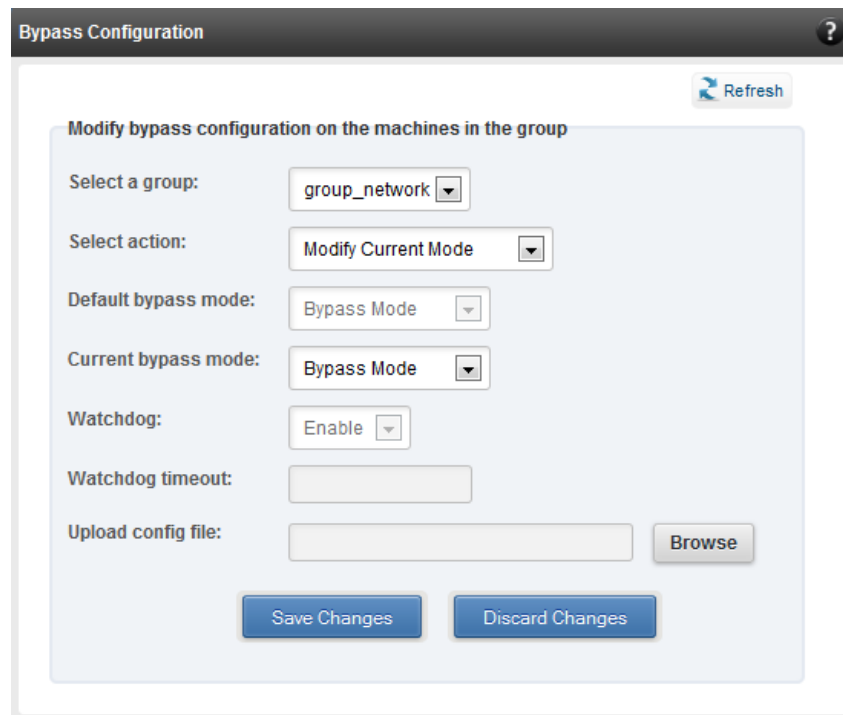
MAX = Maximun value a variable of type int can assume

DESCRIPTION	RANGE	VALUE
Link speed and link duplex	auto 100-full 1000-full	auto
Enable Disable LSO IP v4	0 1	1
Enable Disable LSO Ip v6	0 1	0
FlowControl	[0,3]	1
IP CheckSum Offload	[0,3]	2
Enable Disable Virtual Machine Queue	0 1	
Enable Disable VMQLookAheadSplit	0 1	
Enable Disable VMQVLanFilter	0 1	
TCP CheckSum Offload v4	[0,3]	
TCP CheckSum Offload v6	[0,3]	
UDP CheckSum Offload v4	[0,3]	
UDP CheckSum Offload v6	[0,3]	
Max Number of Response Queue	[1,8]	
RSS load balancing profile	[0,4]	

Figure 100 - Port Configuration module

- **Bypass Configuration**

Use the **Bypass Configuration** module to configure Chelsio's bypass adapters like B420-SR and B404-BT.



The screenshot shows the 'Bypass Configuration' window. At the top right is a 'Refresh' button with a circular arrow icon. Below it is a header 'Modify bypass configuration on the machines in the group'. The main area contains several configuration options: 'Select a group:' with a dropdown menu showing 'group_network'; 'Select action:' with a dropdown menu showing 'Modify Current Mode'; 'Default bypass mode:' with a dropdown menu showing 'Bypass Mode'; 'Current bypass mode:' with a dropdown menu showing 'Bypass Mode'; 'Watchdog:' with a dropdown menu showing 'Enable'; 'Watchdog timeout:' with an empty text input field; and 'Upload config file:' with an empty text input field and a 'Browse' button to its right. At the bottom are two buttons: 'Save Changes' and 'Discard Changes'.


Figure 101 - Bypass Configuration module

8.5. System page

The system page is displayed, when the system hostname / IP address is selected in the tree menu on the left. On adding a system, this item is automatically selected, and this page is displayed. The system page contains generic system and support modules which are discussed below:

8.5.1. System summary

This module lists the system Hostname, Operating System, platform and also gives the count of the Chelsio cards found.

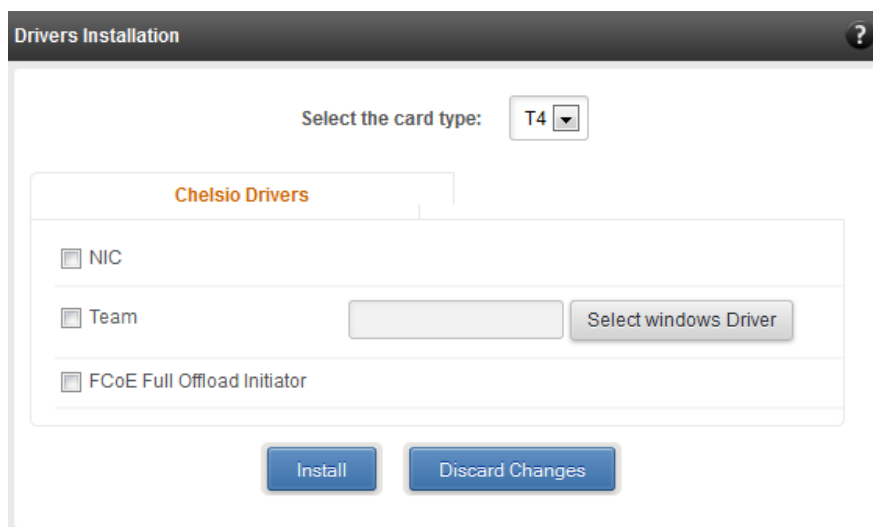
The image shows a window titled "System Summary" with a question mark icon in the top right corner. It contains a table with two columns: "PROPERTY" and "VALUE".

PROPERTY	VALUE
Hostname	shambu-dc
Connected IP:Port	10.193.184.168:35001
Chelsio Cards	1
Operating system	Windows Server 2012
Platform	x86_64 (amd64 / x64)

Figure 102 - System Summary module

8.5.2. Drivers Installation

Using this module, one can install various Chelsio drivers for different operating systems.

The image shows a window titled "Drivers Installation" with a question mark icon in the top right corner. It contains a form with a "Select the card type:" label and a dropdown menu showing "T4". Below this is a section titled "Chelsio Drivers" with three checkboxes: "NIC", "Team", and "FCoE Full Offload Initiator". The "Team" checkbox is selected, and there is a "Select windows Driver" button next to it. At the bottom, there are two buttons: "Install" and "Discard Changes".

Select the card type: T4

Chelsio Drivers

☐ NIC

☒ Team

☐ FCoE Full Offload Initiator

Figure 103 - Drivers Installation module connected to Windows Agent

8.5.3. Driver Details

A list of Chelsio device drivers with related information like driver description, version, current load status and installation date is shown in this module. To load or unload a particular driver, select the appropriate option (Yes to load, No to unload) in the corresponding cell of the *Loaded* column and click **Load/Unload Driver** button. Click **Refresh** if changes are not reflected immediately. To reject the load/unload option selected, click **Discard Changes**.

Driver Details ?				
<div>Refresh</div> <div>Load / Unload Driver Discard Changes</div>				
DRIVER	LOADED	VERSION	DATE	DESCRIPTION
ch_vbd	No	N/A	N/A	Chelsio T3 Ethernet Function Enumerator
cxge3	No	N/A	N/A	Chelsio T3 Ndis Function driver
chteamp	No	N/A	N/A	Chelsio NIC Teaming Driver
chiscsi	No	N/A	N/A	Chelsio T3 iSCSI Driver
chiwarp	No	N/A	N/A	Chelsio T3 iWarp interface Driver
ChelsioT4	Yes	4.3.8.0	2-14-2013	Chelsio T4 Driver
cht4vbd	Yes	4.3.8.0	2-14-2013	Chelsio T4 Virtual Bus Driver
csiofcoe	Yes	1.3.0.4	2-27-2013	Chelsio T4 FCoE Driver

Figure 104 - Driver Details module

8.5.4. System Diagnostics

Using this module, you can run various diagnostic tests on Chelsio adapters to troubleshoot adapter related issues. Select the adapter(s) from the list for which you want to run the test, select the operation (type of test; you can run more than one test at a time) and click **Run Test**. After the tests are completed, the results will be displayed in a tabular format.

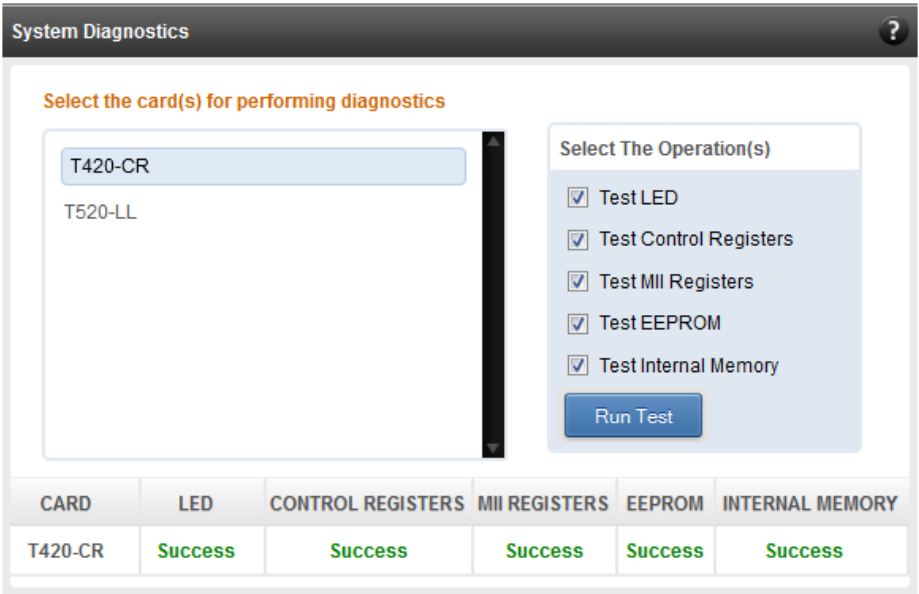


Figure 105 - System Diagnostics module for a T4 CNA

8.5.5. Unified Wire Manager Component Versions

A list of the Unified Wire Manager agent components installed on the managed system is shown in this module. The versions of the components are useful in case of reporting an issue to support.

Unified Wire Manager Component Versions	
COMPONENT	VERSIONS
Server	2.4.29
msiscsi	1.1.6
winchiscsi	2.0.0
win_net	2.0.0
winteam	2.0.0
winhwlib	2.0.3
winosapi	2.0.0

Figure 106 - Unified Wire Manager Component Versions module

8.5.6. VM Configurations

The VM Configurations module allows you to view UUID and Power and Health state of Virtual Machines. You can perform various system power options like enable (start VM), disable (stop VM), reboot (restart VM), pause and suspend (save VM state).

You can perform similar actions on multiple virtual machines. To do so, click on the machine names in the list. The properties box will display the domain state of the machines selected. Now, click on any of the system power actions provided at the bottom.

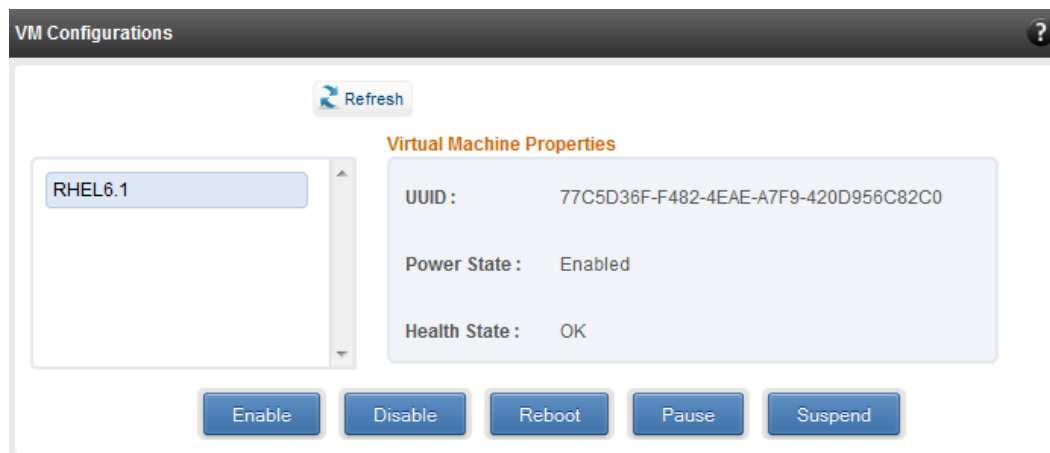


Figure 107 - VM Configurations module

8.5.7. Managed system application logs

The management agent logs its activities and any errors that occur, in `/var/log/chelsio` in *Linux* and FreeBSD and in the Event log, in Windows. This log can be obtained in this module. Only 20 entries can be obtained and viewed at a time. Logs can be viewed by either choosing from a list of fixed range or by specifying a custom starting point.

Use the **Get Logs** button to retrieve, and **Hide Logs** button to clear the log entries. The **Delete Logs** button will remove the logs permanently from the agent.

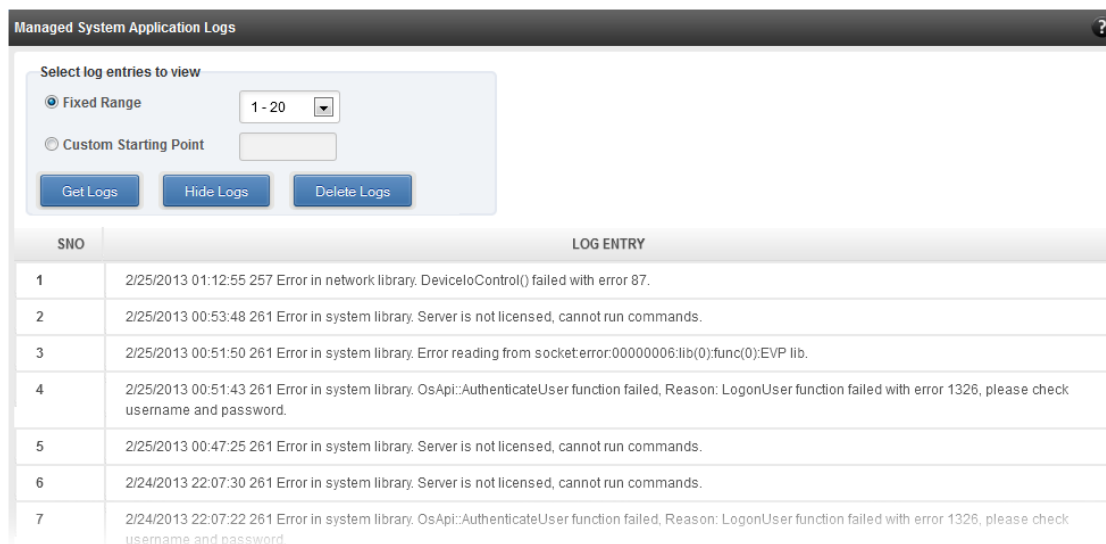


Figure 108 - Managed System Application Logs module for Windows Agent

8.6. Network page

8.6.1. Network summary

The **Network Summary** module provides the total number of Chelsio adapters present, including the number of T5, T4 and T3 adapters. It also provides the total number of Network interfaces including corporate and Chelsio interfaces and VLANs.

Network	
PROPERTY	VALUE
No. Of Chelsio Cards	2
No. Of T4 Cards	1
No. Of T3 Cards	1
No. Of Network Interfaces	7

Figure 109 - Network Summary module

8.6.2. Chelsio card page

When a Chelsio card is selected in the tree menu on the left, this page is displayed. It provides details of the card and associated settings. It also displays any card specific statistics that the hardware provides. The modules available on this page are as below:

- **Card summary**

This module provides PCI, firmware and other details of the card. The card's serial number and factory MAC address are also provided for inventory purposes.

Card Summary ?	
PROPERTY	VALUE
PCI ID (Vendor : Device)	1425 : 4403
PCI bus location (Bus : Device : Function)	01:00:04
Card Serial Number	PT18111222
Factory MAC address	00:07:43:10:71:80
Firmware Version	1.8.3.0
Ethernet Ports	4
Offload Support	Chelsio T440-CR 10G Ethernet Function Enumerator
In maintenance mode	No
Hardware is TCP Chimney offload enabled	No
Connector	10G SFP+

Figure 110 - Card Summary module for a Windows Agent

• TCP Offload settings (Linux & FreeBSD)

The TCP offload settings applicable to the card are shown here. These settings are only available when using the TOE capable drivers (*t3_tom* and *toecore* for T3 cards; *t4_tom* and *toecore* for T4 cards). On changing the settings, the changed settings may not reflect immediately on refreshing the data. Highlight the system item in the tree menu on the left, and click "Refresh", to refresh data from the system, in case the updated settings are not being shown.

TCP Offload Settings (Offload Card and Offload Summary Only) ?

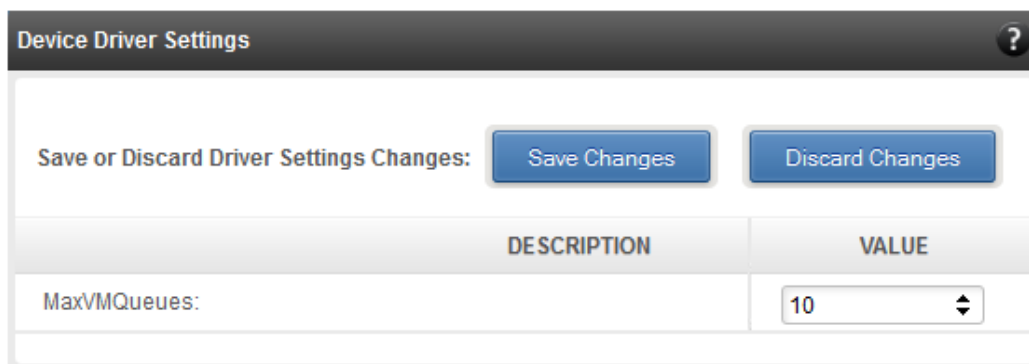
Save or Discard Driver Settings Changes:

DESCRIPTION	VALUE
TCP offload engine enabled (activated):	Yes <input type="button" value="v"/>
Direct data placement (ddp):	Yes <input type="button" value="v"/>
Soft listen backlog limit (soft_backlog_limit):	Yes <input type="button" value="v"/>
Max offloaded connections (max_conn):	40960 <input type="button" value="v"/>
Delayed ACK (delack):	0 <input type="button" value="v"/>
Max Tx payload size (mss):	-1 <input type="button" value="v"/>
Max host send buffer per socket (max_host_sndbuf):	1 <input type="button" value="v"/>
Threshold payload size in bytes for Tx (tx_hold_thres):	1048576 <input type="button" value="v"/>
Min Rx credits for RX_DATA_ACK (rx_credit_thres):	0 <input type="button" value="v"/>
Min Rx payload size in bytes for DDP activation (ddp_thres):	15360 <input type="button" value="v"/>
DDP wait for push flag (ddp_push_wait):	Yes <input type="button" value="v"/>
DDP receive coalescing (ddp_rcvcoalesce):	No <input type="button" value="v"/>

Figure 111 - TCP Offload Settings module for a FreeBSD Agent

• Device Driver settings (Windows)

The device driver settings applicable to the card are shown here. For Chelsio T5 and T4 adapters, only the *MaxVMQueues* field will be displayed. On changing the settings, the changed settings may not reflect immediately on refreshing the data. Highlight the system item in the tree menu on the left, and click **Refresh**, to refresh data from the system, in case the updated settings are not being shown.

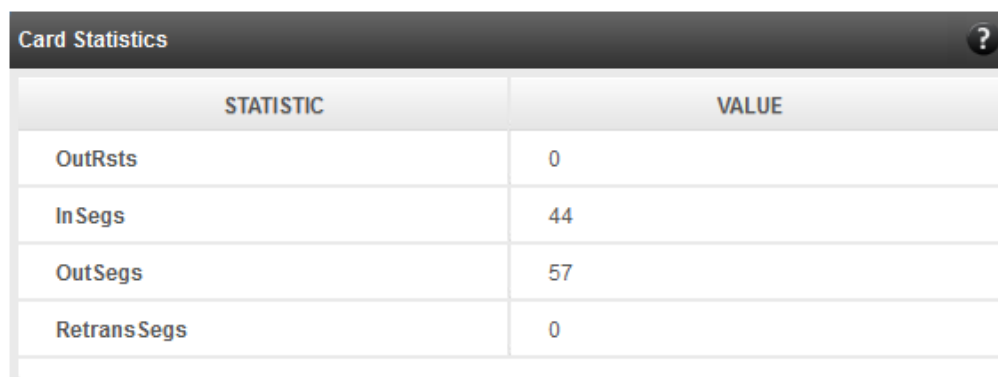


DESCRIPTION	VALUE
MaxVMQueues:	10

Figure 112 - Device Driver Settings module for a Windows Agent

• Card statistics

Certain statistics are maintained on a per card basis (instead of a per port basis), since the card has a TCP/IP offload capability. The statistics are for TCP and IP protocol processing done in the card's hardware. These statistics may only be applicable if the card is TOE enabled.



STATISTIC	VALUE
OutRsts	0
InSegs	44
OutSegs	57
RetransSegs	0

Figure 113 - Card Statistics module

8.6.2.1. Chelsio card's port

The port page is displayed on selecting a port of a Chelsio card listed in the tree menu on the left. It provides details of the port and port settings. It also displays any port specific statistics that the hardware provides. The modules available on this page are as below:

- **Port summary**

The port details such as the Ethernet adapter name and link details are shown in this module.

Port Summary	
PROPERTY	VALUE
Port Name	Local Area Connection 89
Link	Link up

Figure 114 - Port Summary of T4 CNA

- **Port settings**

Port settings such as MTU, Link speed and others can be set in this module. The settings depend on the device driver installed.

Port Settings	
Save or Discard Port Settings Changes: <input type="button" value="Save Changes"/> <input type="button" value="Discard Changes"/>	
DESCRIPTION	VALUE
MTU (in bytes):	1500
Link speed and duplex operation:	10Gb/s Full duplex
Tx checksum offload enabled:	No
Rx checksum offload enabled:	No
Tx pause frame support enabled:	No
Rx pause frame support enabled:	No
Receive side scaling enabled:	Yes
VLAN ID:	0
Large segment offload V2 (IPv4):	Yes
Large segment offload V2 (IPv6):	Yes
Flow control:	Tx and Rx Enabled
IPv4 checksum offload:	Tx and Rx Enabled
VMQ:	Yes
VMQ look ahead split:	Yes
VMQ V2 and V3 offload:	Yes

Figure 115 - Port Settings of T4 CNA

- **Port statistics**

Ethernet statistics and additional hardware statistics for the port are displayed in this module.

Port Statistics ?	
STATISTIC	VALUE
tx_octets	0
tx_frames	0
tx_bcast_frames	0
tx_mcast_frames	0
tx_ucast_frames	0
tx_error_frames	0
tx_frames_64	0
tx_frames_65_127	0
tx_frames_128_255	0
tx_frames_256_511	0
tx_frames_512_1023	0
tx_frames_1024_1518	0
tx_frames_1519_max	0
tx_drop	0

Figure 116 - Port Statistics of T4 CNA on Windows Agent

8.6.3. Networking Management page

The system networking configurations are shown on this page. IP addresses, MTU, VLAN Ids, DNS and default gateway settings can be viewed and modified here. Network adapters can also be enabled or disabled as required. The modules available on this page are as below:

- **System Network configuration**

The list of network adapters on the system is displayed in a list on the left. The icon for the adapter indicates whether it is administratively enabled and if it is connected to the network. The primary IP address (IPv4) can be set for the adapter, when it is selected. There is an option to add/modify/delete additional IP addresses or aliases for the specified adapter. Use the option to add additional IP addresses with caution, since multiple IP addresses configured on the same adapter, for the same network, may result in unpredictable behavior of the system's networking

stack. Maximum Transfer Unit (MTU) can be set between 1500-9000 bytes. VLAN id can also be set for an adapter within the range 0-4094 (enter 0 to disable it).

You can use the View/Set IP addresses option to add, modify or delete IP aliases.

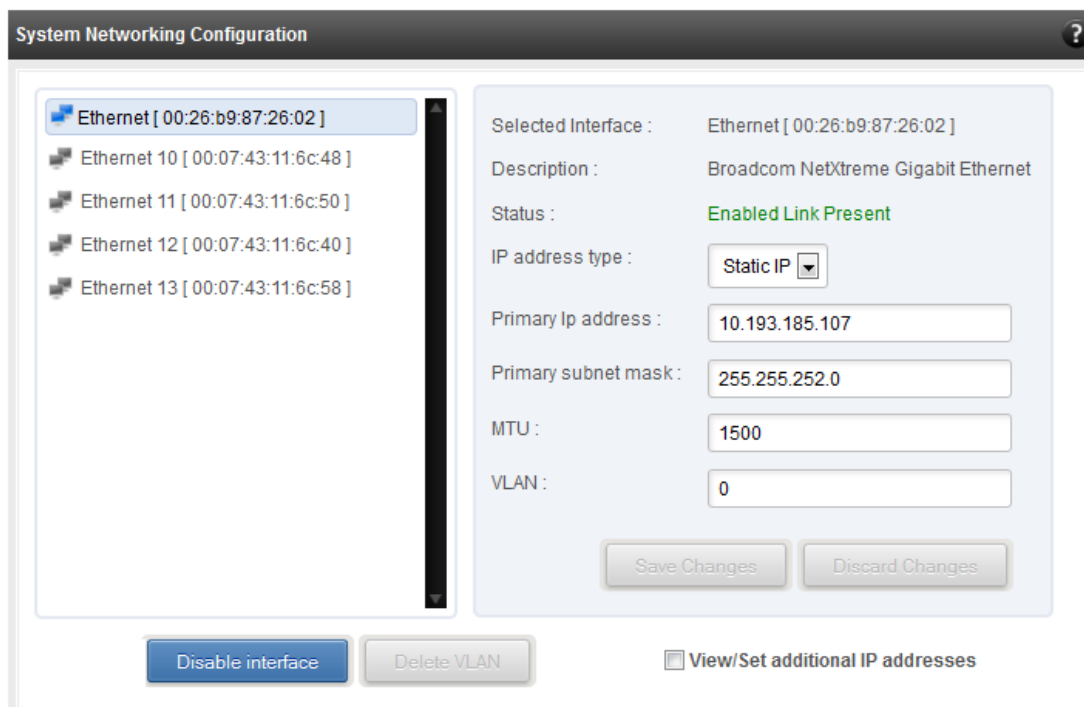


Figure 117 - System network configuration module

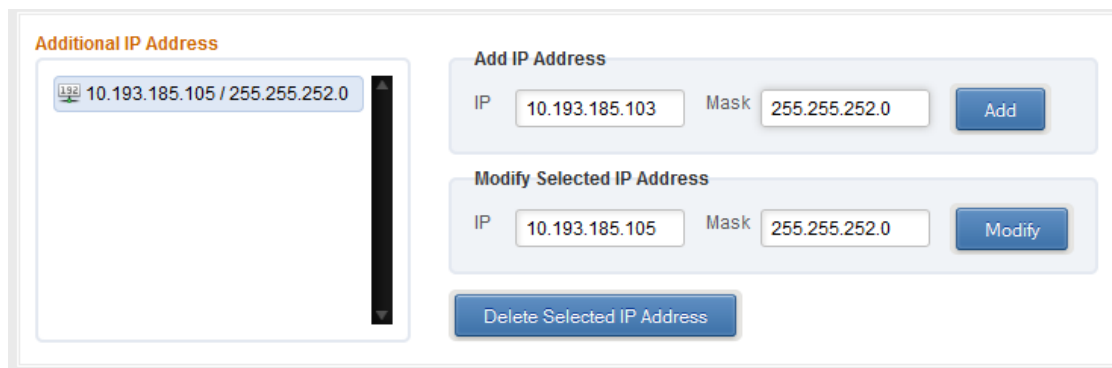


Figure 118 - Managing IP aliases

• System network statistics

Using this module, one can generate reports based on Throughput pkts/sec and Throughput Mbs (Receive, Transmit, Bi-direction) in Table and Graph format for a network adapter. A report for hardware statistics can be generated based on different parameters, only in the Table view in the **Advanced NIC characteristics**. The **polling time** field sets the average time (in seconds) based on which the table/graph updates the report.

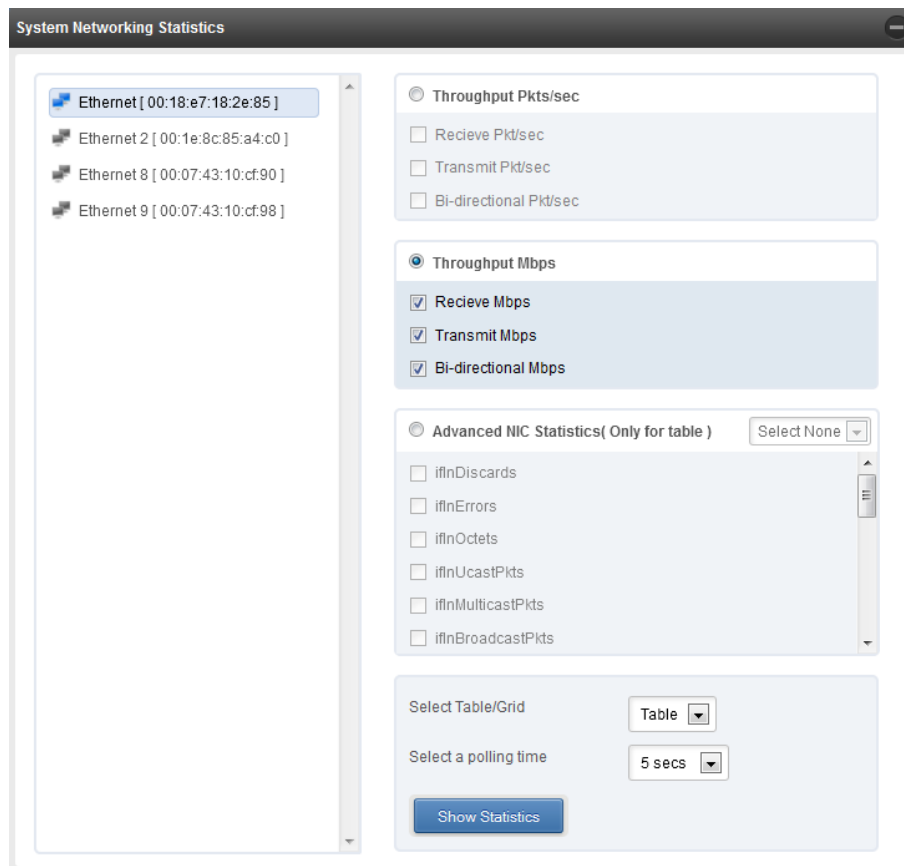


Figure 119 - System network statistics module

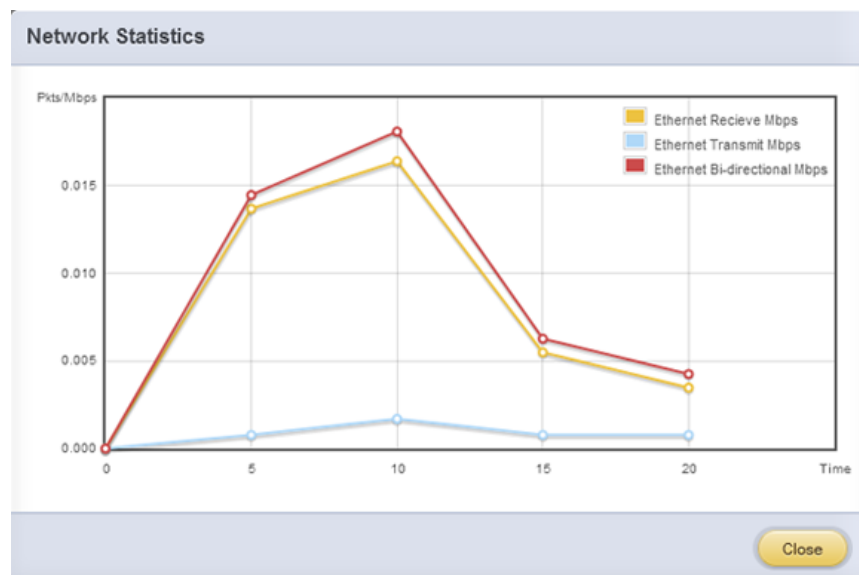


Figure 120 - Network Throughput Vs Time instant Graph

Network Statistics	
	Ethernet
Recieve Mbps	0.0023536
Transmit Mbps	0.000912
Bi-directional Mbps	0.0032656

Figure 121 - Network Throughput Vs Time instant Table

- **Default Gateway and DNS configuration**

The DNS servers list can be set here. The default gateway for remote networks and the Internet can also be set here. On Linux and FreeBSD, only one default gateway is allowed. On Windows, you may set multiple default gateways. Use the option to set multiple default gateways with caution, since it may cause the system to stop communicating with external networks.

Figure 122 - Default gateway and DNS configuration module for a Windows Agent

- **Create a network team/bond device (Linux and FreeBSD)**

A list of regular network adapters is provided here, to create a Network Team / Bond device. The available modes for the team depend on the OS teaming / bonding driver in use. On Linux the

team may be created with a DHCP or Static IP address. Please check with the driver documentation for the supported modes for creating a team / bond, with offload enabled Chelsio cards. All modes may not be available with all configurations / combinations. Also, the team members can only be 2 ports of a single offload-enabled card, and not across Chelsio cards. Do not mix third party cards and offload-enabled Chelsio cards in a single team.

The screenshot shows a window titled "Create a Network Team/Bond Device" with a help icon in the top right. On the left, under "Select Team Members", there is a list of network interfaces: eth9 [00:07:43:ab:cd:ef], eth10 [00:07:43:ab:cd:f7], eth0 [00:30:48:b8:51:9a], and eth1 [00:30:48:b8:51:9b]. The last two are selected. A "Refresh" button is above the list. On the right, the "Driver Status" is "Teaming/bonding driver is offload-capable". Below this, the "Team Name" field is empty. The "Team Mode" is set to "Round-Robin". The "Team Priority" list shows "1. eth0" and "2. eth1". The "IP Address Type" is set to "DHCP". There are empty fields for "Static IP Address" and "Static Subnet Mask". A "Create Team" button is at the bottom right.

Figure 123 - Create a network team/bond device module for Linux Agent

• Network troubleshooting

This module allows detecting and troubleshooting various network connectivity issues. The Ping utility helps to contact a system by specifying IP address, Number of ICMP packets to send and packet timeout. The result of the ping can be viewed by clicking on the **Ping Result** button.

Using **TraceRoute** one can determine the route taken by packets across an IP network.

Use the **GetConnections** utility to view currently active TCP/UDP connections. Offload status for each connection is also displayed if protocol offload hardware is available. This is useful for troubleshooting any connectivity issues for clients to various services.

Ping

Destination :

No. Of ICMP Packets to send :

ICMP Packet timeout in seconds :

Pkts Send: 4 , Pkts Recvd: 4 , AVgRtt: 5 ms [Clear](#)

Figure 124 - Ping Utility

TraceRoute

Destination :

Hop Count	Round Trip Time	Ipv4 Address
1	2 ms	10.193.184.1
2	0 ms	10.193.177.3
3	5 ms	111.93.129.157
4	8 ms	121.241.196.101
5	3 ms	121.240.1.242
6	23 ms	172.29.250.33
7	24 ms	180.87.38.5
8	131 ms	80.231.217.17
9	130 ms	80.231.217.6
10	131 ms	80.231.154.17
11	132 ms	208.178.58.109
12	274 ms	208.178.63.114
13	272 ms	72.13.84.18

[Hide](#)

Figure 125 - TraceRoute Utility

GetConnections

[GetConnections](#)

PROTOCOL	LOCAL ADDRESS	REMOTE ADDRESS	STATE	OFFLOAD
TCP	0.0.0.0:135	0.0.0.0	Listening	In host
TCP	0.0.0.0:445	0.0.0.0	Listening	In host
TCP	0.0.0.0:3389	0.0.0.0	Listening	In host
TCP	0.0.0.0:35001	0.0.0.0	Listening	In host
TCP	0.0.0.0:47001	0.0.0.0	Listening	In host
TCP	0.0.0.0:49152	0.0.0.0	Listening	In host
TCP	0.0.0.0:49153	0.0.0.0	Listening	In host
TCP	0.0.0.0:49154	0.0.0.0	Listening	In host
TCP	0.0.0.0:49155	0.0.0.0	Listening	In host
TCP	0.0.0.0:49156	0.0.0.0	Listening	In host

Figure 126 - GetConnections Utility

8.6.3.1. Hypervisor

• Virtual Network Manager

This module allows you to view and manage virtual networks. The left pane displays a list of different virtual networks created. Clicking on a virtual network name will display related properties on the right.

If a virtual network is added to a virtual machine, a “+” link appears. Expanding the link will display the virtual machines to which the network is attached. Click on the virtual machine names to view their properties on the right.

To delete a virtual network, click on the network name and then click “Delete Switch”. If it is attached to a virtual machine, you will have to detach the virtual machine first. To do so, click on the virtual machine and click “Detach”. Similarly, detach all the virtual machines and then use the “Delete Switch” to delete the virtual network.

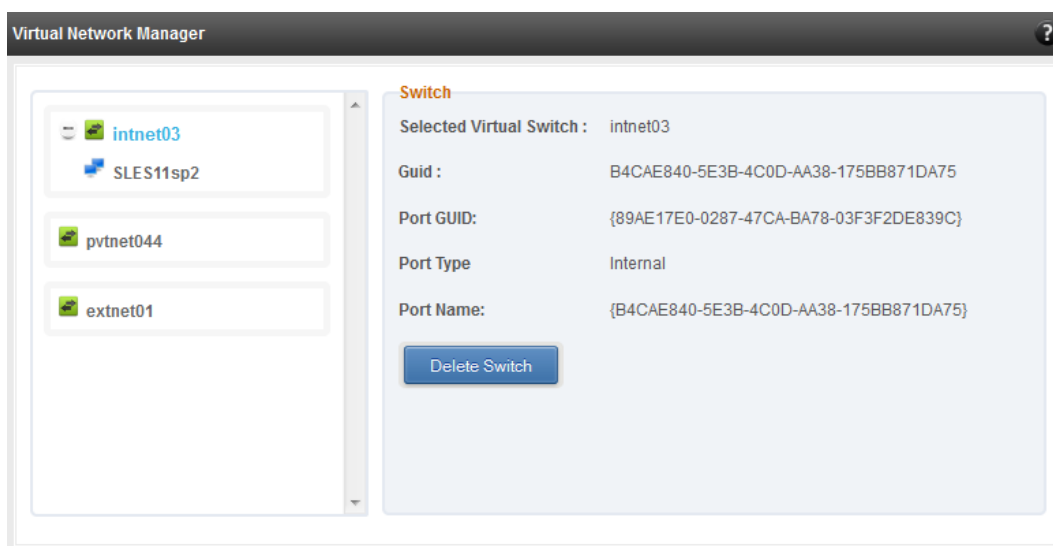


Figure 127 - Virtual Network Manager module

• Add Virtual Network Configuration

There are three kinds of virtual networks you can create using this module:

- **External network:** Using this type, you can provide virtual machines access to external networks and vice versa via a physical network adapter in the host system. The virtual machines can also communicate with each other on the same virtual network.
- **Internal Network:** This type allows communication between virtual machines in the same virtual network and also between the virtual machines and the host. This type of virtual network is not bound to any physical network adapter and no access to external networks is provided.

- **Private Network:** A Private Network is similar to Internal Network in that physical adapter is not required for setup and access to external networks is not provided. However, unlike Internal Network, guest operating systems can only communicate with guest operating systems in the same private network and not with the host. The host operating system cannot access the virtual machines on private network.

Once created, you can manage the virtual networks in the **Virtual Network Manager** module.

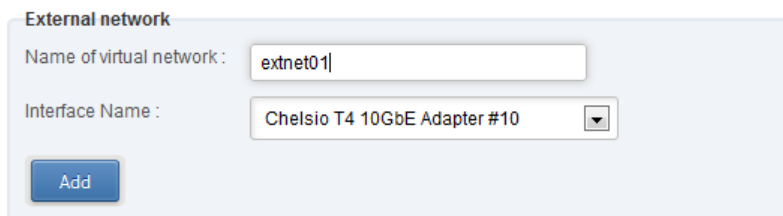


Figure 128 - Creating external virtual network

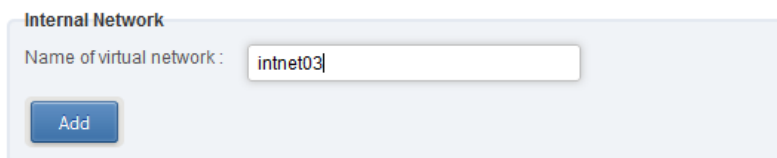


Figure 129 - Creating internal virtual network

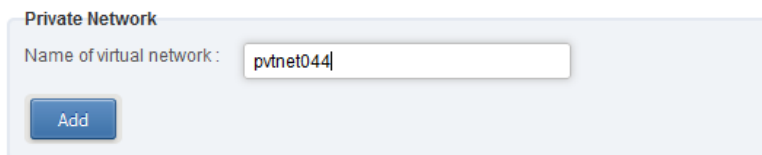


Figure 130 - Creating private virtual network

• Virtual Network Settings

To attach a virtual network to a virtual machine, select the virtual network from the **Virtual Network** list and the virtual machine from the **VM** list. Finally click *Attach*.

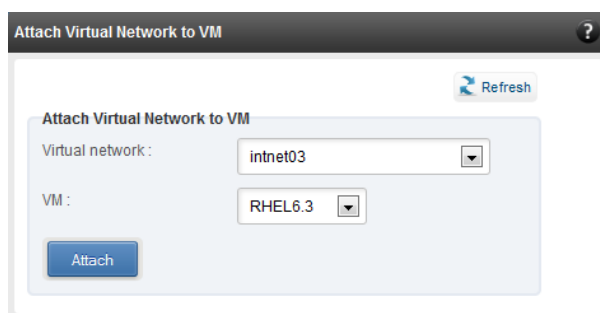


Figure 131 - Attaching Virtual Network to VM

8.6.4. iWARP

- **iWARP Settings**

On Linux Agents, iWARP parameter settings for Chelsio's RDMA capable NICs can be set using this module. These settings can be set only when iWARP driver (*iw_cxgb4* for T4 and T5; *iw_cxgb3* for T3) is loaded. If you set any parameter for a T5 adapter, it applies for all the T5 adapters present. Same applies for T4 and T3 adapters.

On Windows Agents, only T3 HBAs are supported currently. Parameters can be set per port.

On FreeBSD Agents, only T4 CNAs are supported. iWARP parameter settings can be set only when *iw_cxgbe* driver is loaded.

?

iWarp Settings

Select a Driver:

iw_cxgbe

Save Changes

Discard Changes

DESCRIPTION	VALUE
peer2peer	No
ep_timeout_secs	60
mpa_rev	1
markers_enabled	No
crc_enabled	Yes
rcv_win	262144
snd_win	131072
db_delay_usecs	1
ocqp_support	Yes
db_fc_threshold	2000
fastreg_support	No
dack_mode	1
c4iw_max_read_depth	8
enable_tcp_timestamps	No
enable_tcp_sack	No
enable_tcp_window_scaling	Yes
c4iw_debug	Yes
p2p_type	1

Figure 132 - iWARP settings for T4 CNA for FreeBSD Agent

The iWarp Settings window displays a configuration interface for the `iw_cxgb4` driver. At the top, there is a 'Select a Driver:' dropdown menu with `iw_cxgb4` selected. Below this are two buttons: 'Save Changes' and 'Discard Changes'. The main area contains a table with two columns: 'DESCRIPTION' and 'VALUE'.

DESCRIPTION	VALUE
peer2peer	No
ep_timeout_secs	60
mpa_rev	1
markers_enabled	No
crc_enabled	Yes
rcv_win	262144
snd_win	32768
nocong	No
cong_flavor	1

Figure 133 - iWARP settings for T4 CNA for Linux Agent

8.7. Storage

• Storage Summary

The **Storage** module lists the status of configuration modules under Storage section, running on the agent.

The Storage Summary window displays a table with two columns: 'PROPERTY' and 'VALUE'. It lists the status of three storage-related services.

PROPERTY	VALUE
FCoE service on server	Enabled
iSCSI Initiator service on server	Enabled
iSCSI Target service on server	Enabled

Figure 134 - Storage Summary Module

8.7.1. FCoE Initiator (Linux, Windows, XenServer)

All supported Chelsio FCoE initiators available on the operating system can be managed from this page. FCoE support is extended on Linux, Windows and XenServer platforms. Please refer [Platform/Driver Matrix](#) section on the list of operating systems that are supported.

- **FCoE Initiator Summary**

This module provides details about the driver installed; such as driver name and its version. The module also gives information about the number of FCoE enabled cards that are present on the machine.



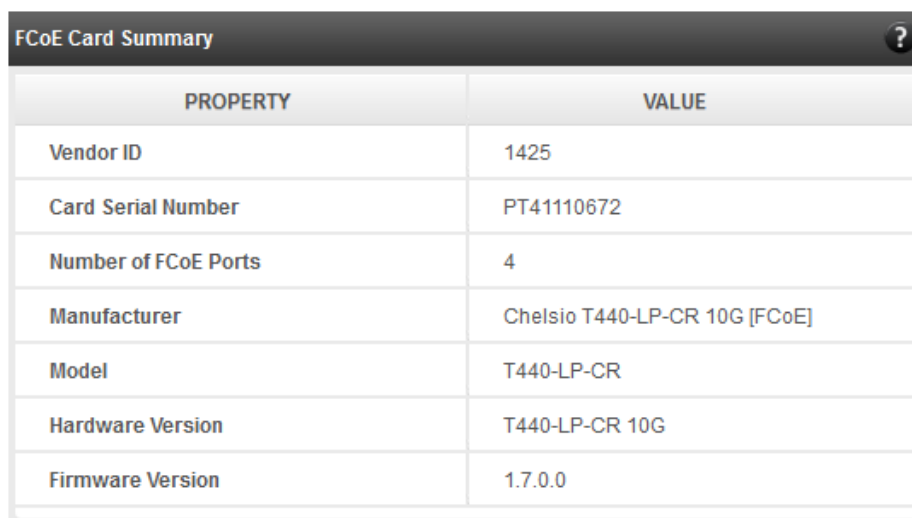
FCoE Initiator Summary	
PROPERTY	VALUE
FCoE Driver	csistor (1.1.0.9)
No. of FCoE enabled cards	2
No. of FCoE Ports	6

Figure 135 - FCoE Initiator Summary module for Linux Agent

8.7.1.1. FCoE Initiator Card

- **FCoE Card Summary**

Details pertaining to the card used such as model, firmware/hardware version etc, are provided in this module.



FCoE Card Summary	
PROPERTY	VALUE
Vendor ID	1425
Card Serial Number	PT41110672
Number of FCoE Ports	4
Manufacturer	Chelsio T440-LP-CR 10G [FCoE]
Model	T440-LP-CR
Hardware Version	T440-LP-CR 10G
Firmware Version	1.7.0.0

Figure 136 - FCoE Card Summary module

- **FCoE Attributes**

Information such as Interrupt modes (MSI/MSI-X/INTx), SCSI mode and the card state are provided in this module.

FCoE Attributes ?	
PROPERTY	VALUE
Interrupt Mode	MSI-X
SCSI Mode	Initiator
State	READY

Figure 137 - FCoE Attributes module

8.7.1.2. FCoE Port

This is an actual N_Port which communicates with the fabric and performs FIP and FCoE device discovery. This page lets the user to retrieve all the FCoE specific port information and also extend NPIV management support. It contains the following sections:

- **FCoE Port Summary**

The SCSI adapter name and the underlying ENODE MAC address of the physical port can be found here.

FCoE Port Summary ?	
PROPERTY	VALUE
Adapter Name	/dev/csiostor0
ENode MAC	00:07:43:04:63:9F

Figure 138 - FCoE Port Summary module for Linux Agent

- **FCoE Port Attributes**

This module provides details about link status and port identifiers such as WWPN, WWNN, FC ID and NPort MAC Address. The module also contains fabric information such as fabric name, VLAN on which the FCoE service is currently running and the number of SCSI targets that are being discovered by this port. Port speed being mentioned in this section varies on the card type (10G/1G) being used. Note that only class 3 service is supported by the initiator for now and the frame size is fixed to 2128 bytes as per spec.

FCoE Port Attributes ?	
PROPERTY	VALUE
State	Operational
NodeWWN	50:00:74:30:46:39:F0:00
PortWWN	50:00:74:30:46:39:F0:80
NPort MAC Address	0E:FC:03:53:00:23
Vlan ID	2
Fabric Name	20:02:00:05:73:D5:7A:C1
NPort ID	53:00:23
Type	NPort
Supported Class of Service	3
OS Device Name	/sys/class/fc_host/host119
Speed	10 GBPS
Maximum Frame Size	2128
No. of SCSI Targets	0

Figure 139 - FCoE Port Attributes module for Linux Agent

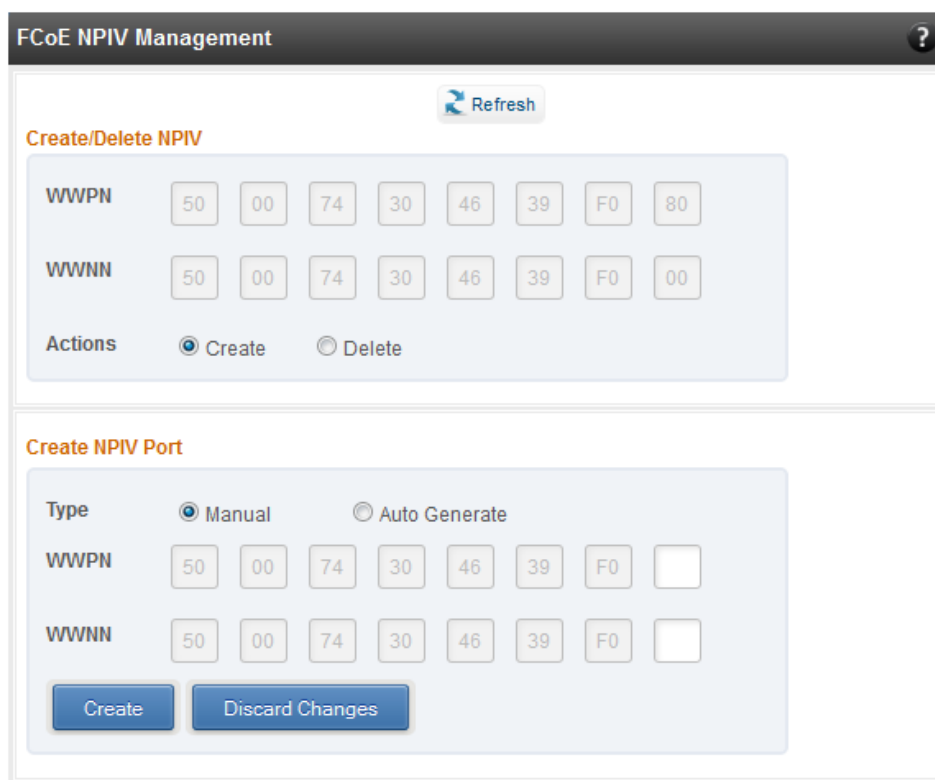
• FCoE NPIV management

NPIV is a fibre channel facility allowing multiple N_Port IDs to share a single physical N_Port. This module allows the user to manage virtual ports on the corresponding FCoE Port.

To create a virtual port, select the option **Create** and the GUI allows two ways of creating a virtual port.

- Manual: Where the user can manually create a virtual port by providing a value to the WWPN and WWNN fields.
- Auto-generate: Where the FCoE function auto-generates a WWPN and WWNN for the virtual port.

To delete a virtual port, select the option **Delete** and select the virtual port WWPN which you want to delete and click on **delete**.



The screenshot shows the 'FCoE NPIV Management' window. It has a 'Refresh' button at the top right. Below it is the 'Create/Delete NPIV' section, which contains two rows of input fields for WWPN and WWNN. The WWPN row has values 50, 00, 74, 30, 46, 39, F0, 80. The WWNN row has values 50, 00, 74, 30, 46, 39, F0, 00. Below these is an 'Actions' section with radio buttons for 'Create' (selected) and 'Delete'. The second section is 'Create NPIV Port', which has a 'Type' section with 'Manual' (selected) and 'Auto Generate' radio buttons. Below this are WWPN and WWNN input fields. The WWPN row has values 50, 00, 74, 30, 46, 39, F0, and an empty field. The WWNN row has values 50, 00, 74, 30, 46, 39, F0, and an empty field. At the bottom are 'Create' and 'Discard Changes' buttons.

Figure 140 - FCoE NPIV management module

8.7.1.3. FCoE Remote Port

Remote ports are the SCSI targets that are discovered by their respective N_port/virtual ports. The GUI conveys the same via a tree structure so that the end user knows the initiator-target mapping.

- **FCoE Remote Port Attributes**

This module provides details about the discovered target such as target's FC ID, WWPN and WWNN so that the user can identify the discovered target accordingly.

FCoE Remote Port Attributes	
PROPERTY	VALUE
FC ID	54:00:53
State	Operational
NodeWWN	20:01:00:11:0D:56:29:00
PortWWN	20:01:00:11:0D:56:29:00

Figure 141 - FCoE Remote Port Attributes module

• FCoE Remote Port Lun Details

This module provides the LUN information such as size of the LUN, SCSI address, and LUN address. For Linux, the SCSI address is displayed in H:C:T:L (Host:Channel:Target:Lun) format and for Windows, it is displayed in P:B:T:L(SCSI Port:Bus:Target:Lun) format.

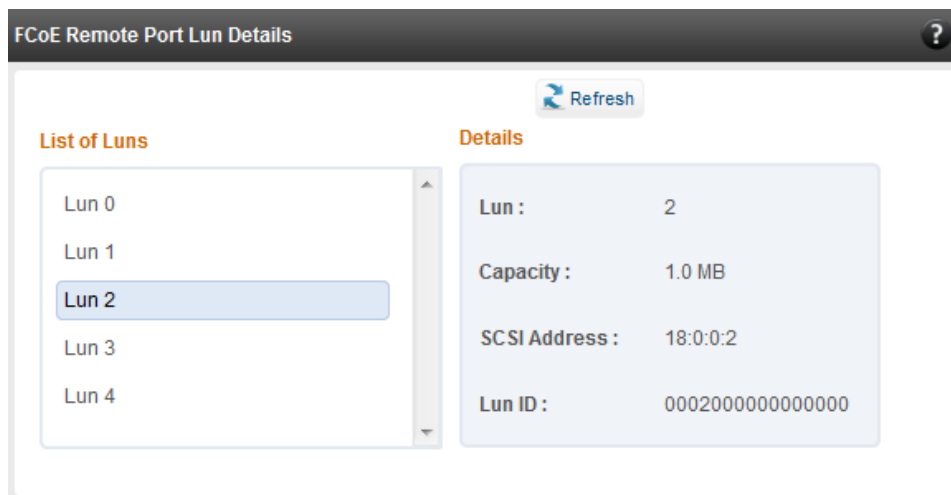


Figure 142 - FCoE Remote Port Lun Details module

8.7.1.4. FCoE Virtual Port

A virtual port allows multiple Fibre Channel initiators to occupy a single physical port, easing hardware requirements in SAN design, especially where virtual SANs are called for. The virtual ports appear under their respective N_Ports after creation and the GUI conveys it via a tree structure so that the end user knows the N_port-VN_Port mapping. It contains the following modules:

• FCoE Virtual Port Summary

The SCSI adapter name and the underlying ENODE MAC address of the physical port can be found here.

FCoE Virtual Port Summary	
PROPERTY	VALUE
Adapter Name	/dev/csiostor0
ENode MAC	00:07:43:04:63:A7

Figure 143 - FCoE Virtual Port Summary module for Linux Agent

• FCoE Virtual Port Attributes

The module provides details about link status and port identifiers such as WWPN, WWNN, FC ID and Virtual NPort MAC Address. The module also contains fabric information such as fabric name, VLAN on which the FCoE service is currently running and the number of SCSI targets that are being discovered by this virtual port. Port speed being mentioned in this section varies on the card type (10G/1G) being used. Note that only class 3 service is supported by the initiator for now and the frame size is fixed to 2128 bytes as per spec.

FCoE Virtual Port Attributes ?	
PROPERTY	VALUE
State	Operational
NodeWWN	50:00:74:30:46:3A:71:09
PortWWN	50:00:74:30:46:3A:71:89
NPort MAC Address	0E:FC:03:77:00:1D
Vlan Id	5
Fabric Name	20:05:00:05:73:D5:7A:C1
Nport ID	77:00:1D
Type	VN_Port
Supported Class Of Service	3
OS Device Name	/sys/class/fc_host/host127
Speed	10 GBPS
Maximum Frame Size	2128
No. of SCSI Targets	1

Figure 144 - FCoE Virtual Port Attributes module

• FCoE Remote Port Attributes

This module provides details about the discovered target for remote port associated with virtual port. Details such as target's FC ID, WWPN and WWNN are provided so that the user can identify the discovered target accordingly.

FCoE Remote Port Attributes ?	
PROPERTY	VALUE
FC ID	54:00:53
State	Operational
NodeWWN	20:01:00:11:0D:56:29:00
PortWWN	20:01:00:11:0D:56:29:00

Figure 145 - FCoE Remote Port Attributes module

• FCoE Remote Port Lun Details

This module provides LUN information for remote port associate with virtual port. Details such as size of the LUN, SCSI address, and LUN address are provided. For Linux, the SCSI address is displayed in H:C:T:L (Host:Channel:Target:Lun) format and for Windows, it is displayed in P:B:T:L(SCSI Port:Bus:Target:Lun) format.

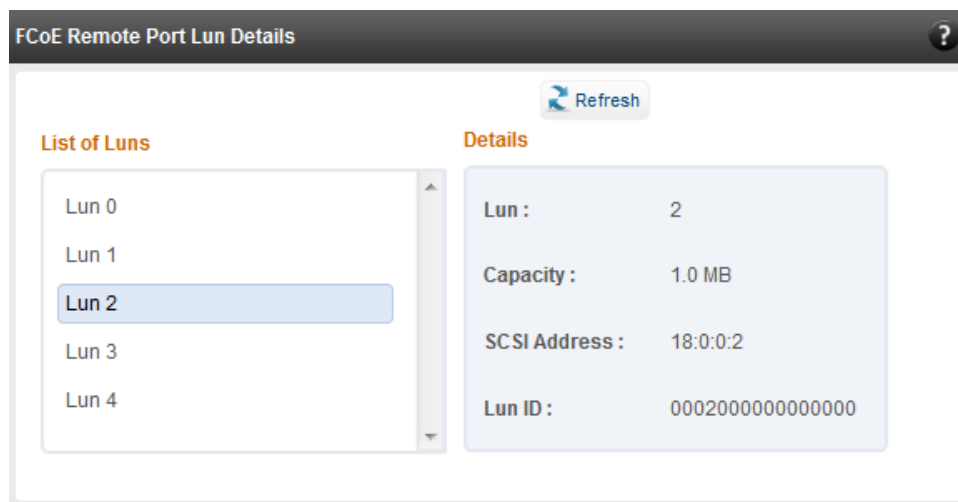


Figure 146 - FCoE Remote Port Lun Details module

8.7.2. iSCSI initiator (Linux, Windows)

All supported iSCSI initiators can be managed from this page. The supported initiators on Windows are Microsoft and Chelsio iSCSI initiator (T4 adapters). On Linux, Open iSCSI initiator is supported. The modules available on this page are:

• Initiator nodes

This module lists the initiator nodes / virtual adapters configured in the initiator stack. The node can be enabled or disabled (Chelsio node cannot be disabled in Windows), and its properties can be viewed and edited in this module. In the Chelsio Linux stack, new initiator nodes can be created too. Disabling the initiator causes it to log out of any iSCSI targets that it is connected to, thus removing any disks provided by the iSCSI targets that were connected. Use the **Disable** option with caution. The CHAP authentication secret should be between 12 and 16 characters in length, and the initiator's IQN name should start with "iqn.".

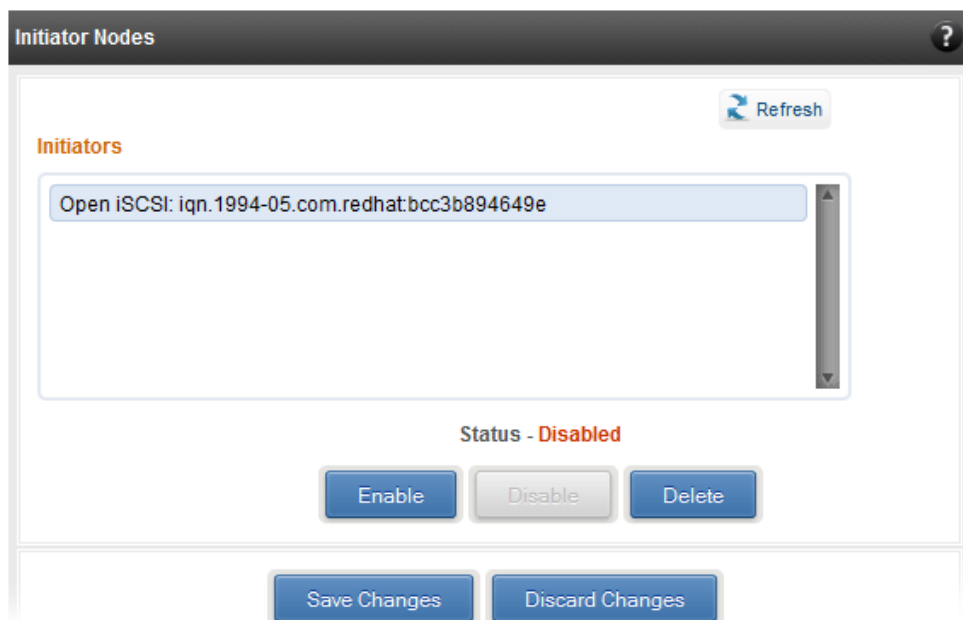


Figure 147 - Open iSCSI initiator

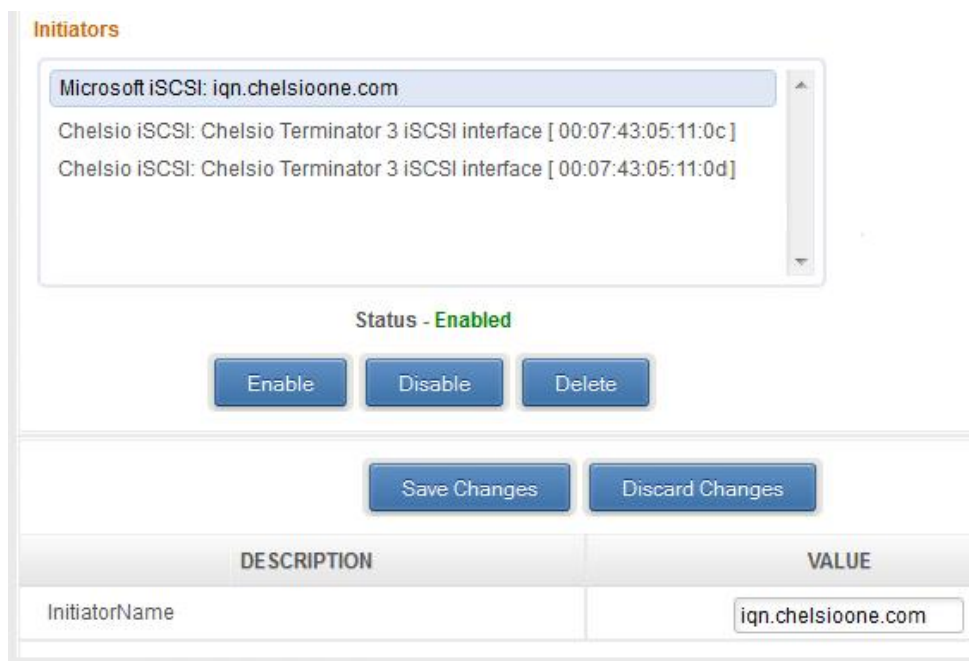
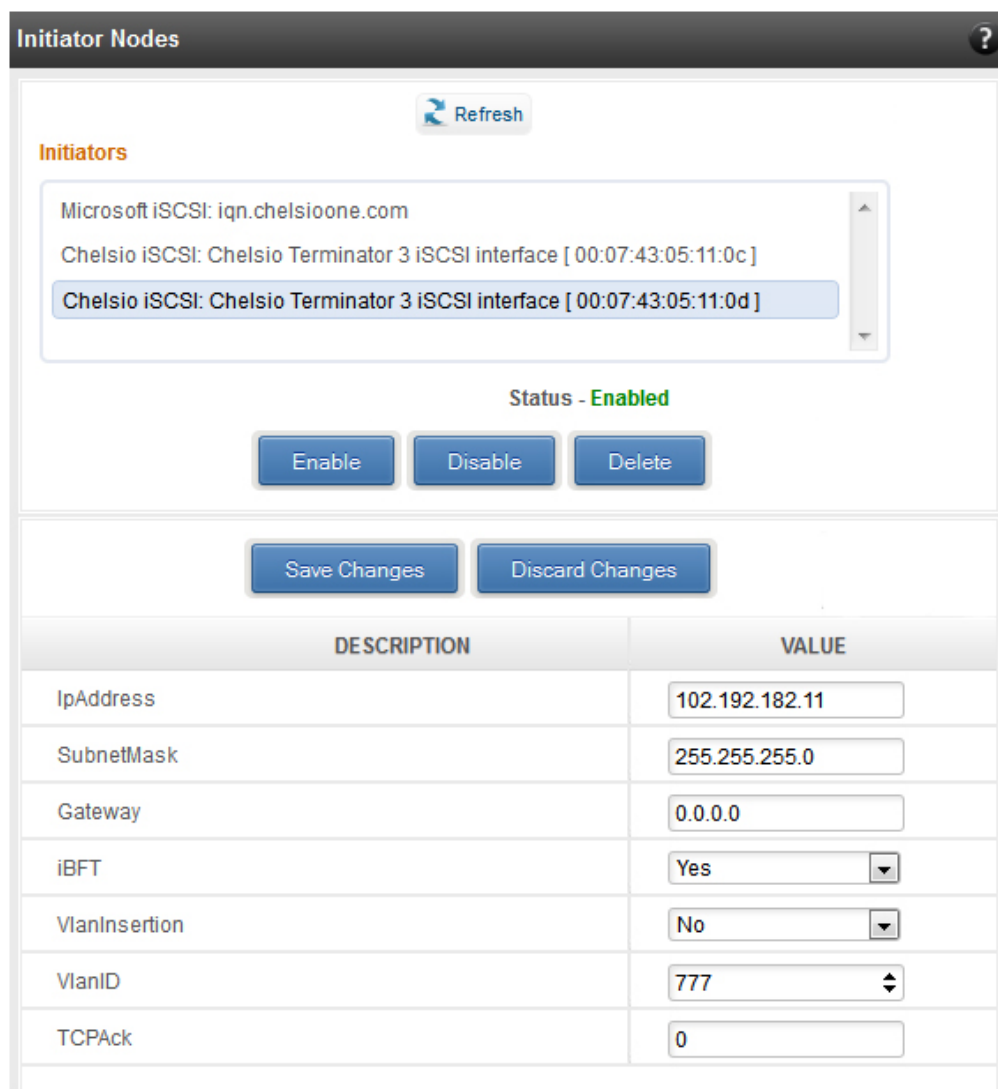


Figure 148 - Microsoft iSCSI initiator



Initiator Nodes

Refresh

Initiators

Microsoft iSCSI: iqn.chelsioone.com

Chelsio iSCSI: Chelsio Terminator 3 iSCSI interface [00:07:43:05:11:0c]

Chelsio iSCSI: Chelsio Terminator 3 iSCSI interface [00:07:43:05:11:0d]

Status - **Enabled**

Enable Disable Delete

Save Changes Discard Changes

DESCRIPTION	VALUE
IpAddress	102.192.182.11
SubnetMask	255.255.255.0
Gateway	0.0.0.0
iBFT	Yes
VlanInsertion	No
VlanID	777
TCPAck	0

Figure 149 - Chelsio iSCSI initiator

Discover targets

iSCSI targets can be discovered by providing the IP address and TCP port (usually 3260) of the target. The discovery operation fetches the targets found at that Portal (combination of IP address and TCP port). The discovery operation also fetches all the other Portals that the target(s) are listening on. The discovered target can be deleted if required. Please note that all the Portals that the target sent are listed. The delete operation will not work on all the portals, only on the original discovery portal (the IP address and TCP Port specified when discovering the target).

Note *If there are any pre-existing iSCSI sessions established to the target, deletion of the target Portal from the discovered targets list will fail.*

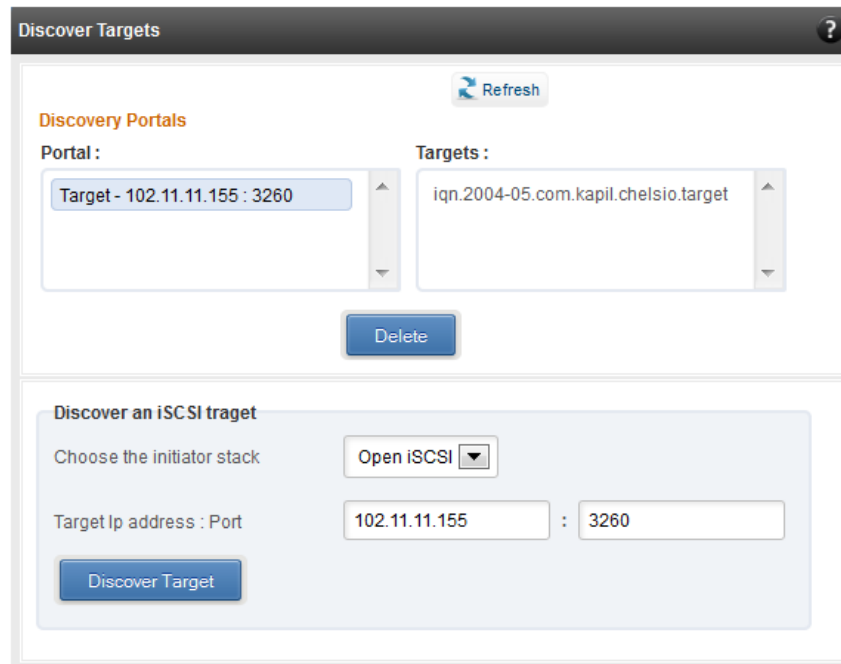


Figure 150 - Discover targets module

• Targets

The iSCSI targets that have been discovered, or are currently connected, are listed here. You may login, logout and delete the target from the initiator's configuration. If a target is connected, the sessions and connections to the target, and the disks provided by the target will be listed.

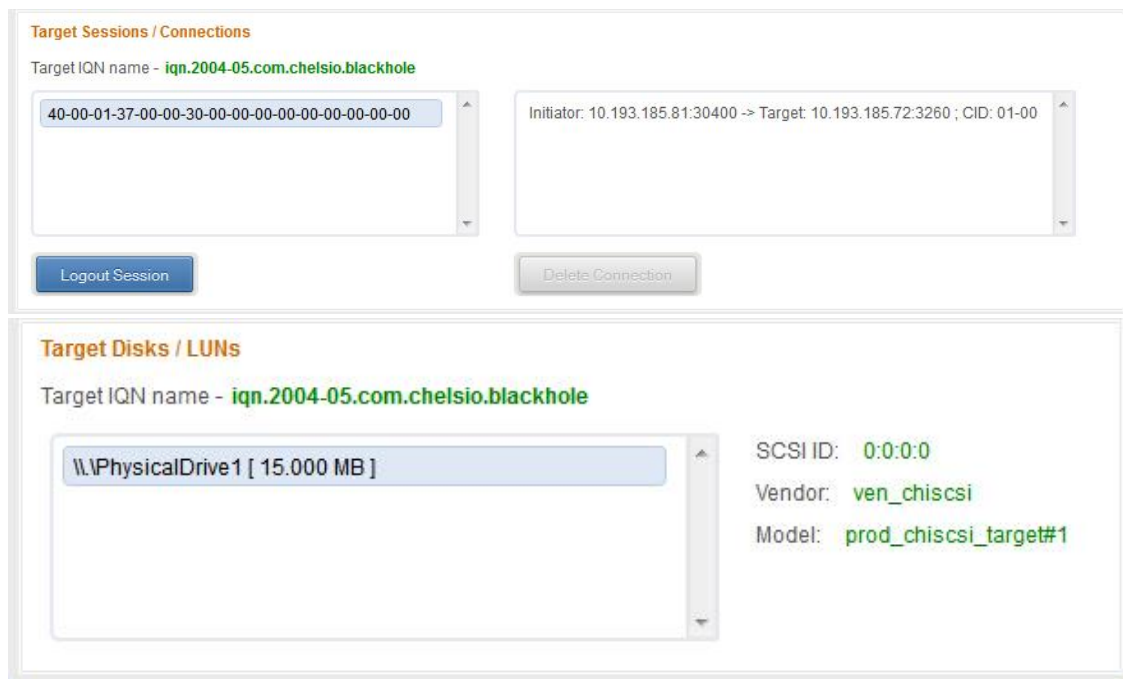
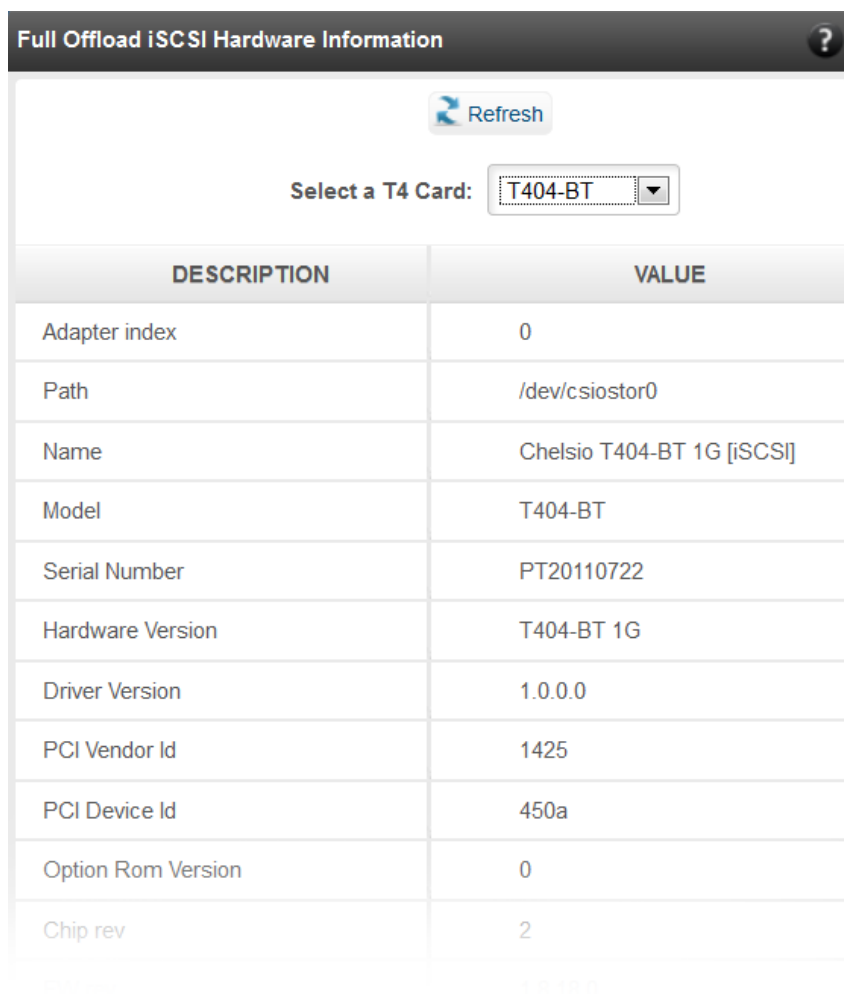


Figure 151 - Targets module after logging in

8.7.3. FO iSCSI Initiator (Linux)

- **Full Offload iSCSI Hardware Information**

PCI, firmware and other adapter related details are provided in this module. Select the Chelsio adapter for which you want to view properties from the **Select a T4 Card** drop-down list and the module will expand to display related properties. You can also view details like link id, status, enode mac, etc of all the ports of the selected adapter.



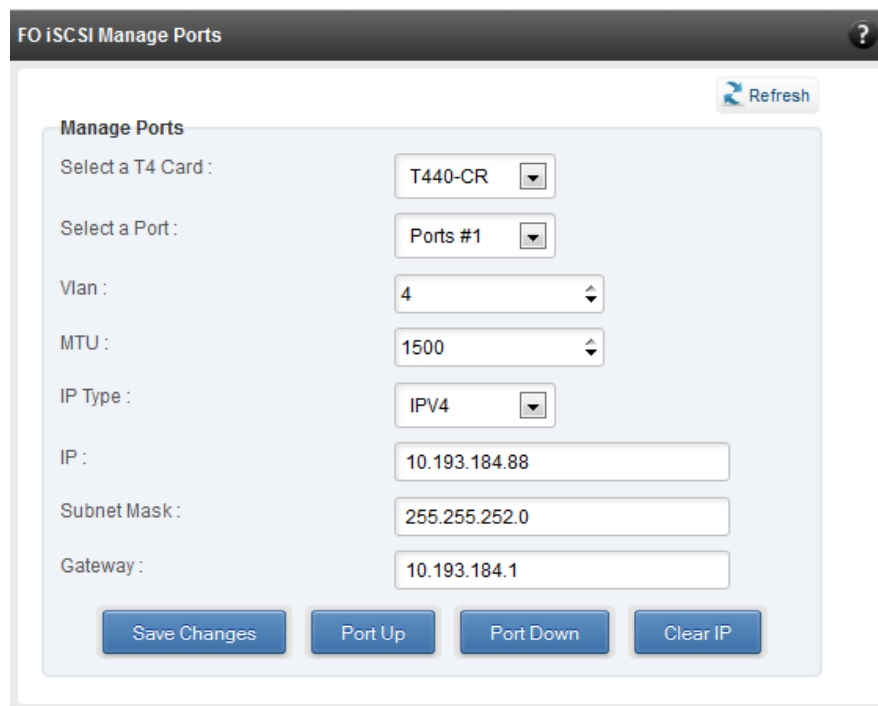
DESCRIPTION	VALUE
Adapter index	0
Path	/dev/csiostor0
Name	Chelsio T404-BT 1G [iSCSI]
Model	T404-BT
Serial Number	PT20110722
Hardware Version	T404-BT 1G
Driver Version	1.0.0.0
PCI Vendor Id	1425
PCI Device Id	450a
Option Rom Version	0
Chip rev	2

Figure 152 - Full Offload iSCSI Hardware Information module

- **FO iSCSI Manage Ports**

Here you can configure various port settings like VLAN id, Maximum Transmission Unit (MTU) and IP. Select a Chelsio adapter from **Select a T4 Card** drop-down list and then select the port for which you want set any of the aforementioned properties. MTU can be set between 1500-9000 bytes. VLAN id can be set within the range 0-4094 (enter 0 to disable it). The IP type can be *IPv4* (static) or *DHCP*.

The **Port Up** and **Port Down** buttons will enable and disable the selected port respectively. The **Clear IP** button deletes values set for the IP Type, IP, Subnet Mask and Gateway properties and resets them.



The screenshot shows the 'FO iSCSI Manage Ports' window. It features a 'Refresh' button in the top right corner. The main area is titled 'Manage Ports' and contains several configuration fields: 'Select a T4 Card' (dropdown menu showing 'T440-CR'), 'Select a Port' (dropdown menu showing 'Ports #1'), 'Vlan' (text input showing '4'), 'MTU' (text input showing '1500'), 'IP Type' (dropdown menu showing 'IPv4'), 'IP' (text input showing '10.193.184.88'), 'Subnet Mask' (text input showing '255.255.252.0'), and 'Gateway' (text input showing '10.193.184.1'). At the bottom, there are four buttons: 'Save Changes', 'Port Up', 'Port Down', and 'Clear IP'.

Figure 153 - FO iSCSI Manage Ports module

• FO iSCSI Initiator Properties

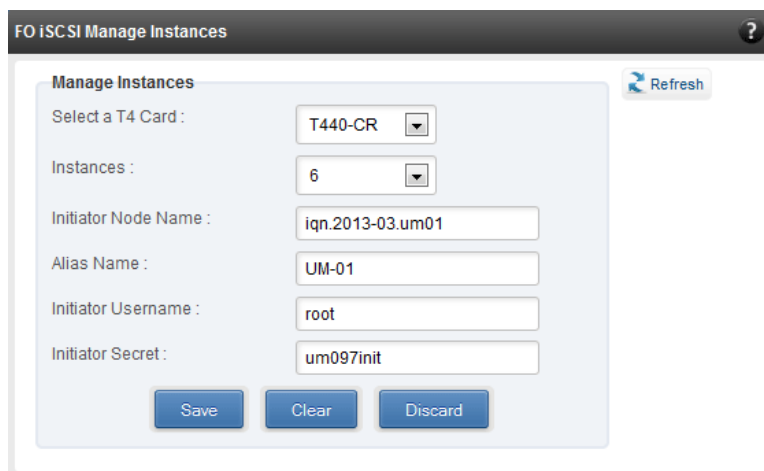
In the **FO iSCSI Initiator Properties** module, you can configure FO iSCSI Initiator by setting different properties like enabling/disabling CHAP authentication, setting Header and Data digest, etc.

DESCRIPTION	VALUE
DataSequenceInOrder	Yes
DataPDUInOrder	Yes
ImmediateData	No
InitialR2T	Yes
ErrorRecoveryLevel	0
MaxConnections	1
DefaultTime2Wait	20
DefaultTime2Retain	20
MaxBurstLength	8192
FirstBurstLength	8192
HeaderDigest	None,CRC32C
DataDigest	None,CRC32C
MaxRecvDataSegmentLength	8192
PingTimeout	15
AuthPolicy	Mutual
AuthMethod	None
UserName	fof_username

Figure 154 - FO iSCSI Initiator Properties

• FO iSCSI Manage Instances

The FO iSCSI Initiator service maintains multiple instances of a target depending on the discovery method. In this module, you can set upto 8 instances. Configurable parameters include initiator node name (IQN), alias (friendly) name, Initiator (CHAP) Username and password.

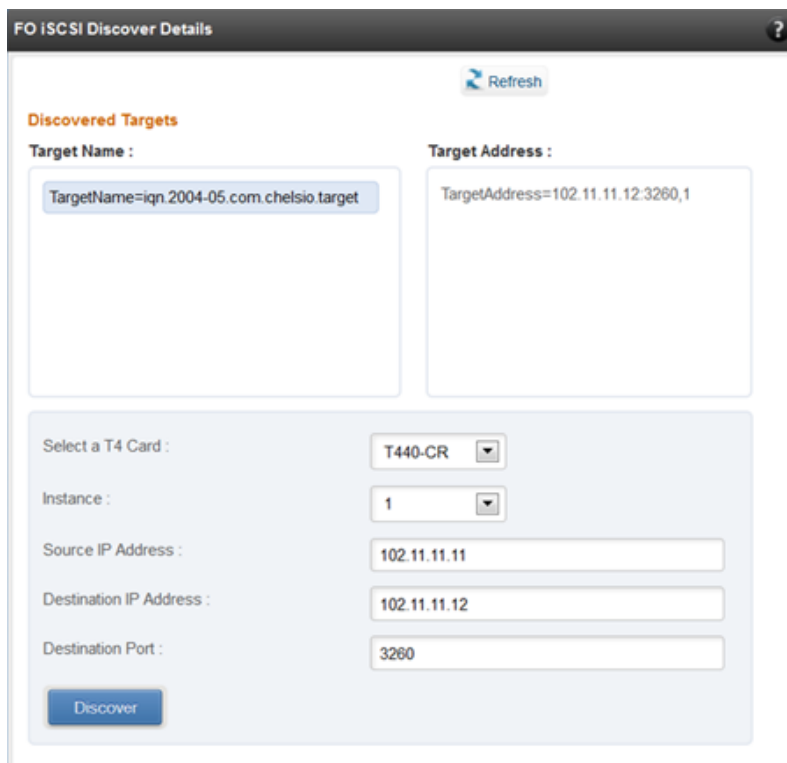


The screenshot shows the 'FO iSCSI Manage Instances' window. It has a title bar with a question mark icon. Inside, there's a 'Manage Instances' section with a 'Refresh' button. Below this, there are several input fields: 'Select a T4 Card' (dropdown menu showing 'T440-CR'), 'Instances' (dropdown menu showing '6'), 'Initiator Node Name' (text box with 'iqn.2013-03.um01'), 'Alias Name' (text box with 'UM-01'), 'Initiator Username' (text box with 'root'), and 'Initiator Secret' (text box with 'um097init'). At the bottom of this section are three buttons: 'Save', 'Clear', and 'Discard'.

Figure 155 - FO iSCSI Manage Instances module

• FO iSCSI Discover Details

iSCSI Targets can be discovered using this module. Select a Chelsio adapter and initiator instance using which you want to discover targets. Next, provide the source (initiator) and destination (target) IP. Finally, click **Discover**. After successful discovery, all the discovered targets will appear in the **Discovered Targets** section. To view more details, click on the Target name.



The screenshot shows the 'FO iSCSI Discover Details' window. It has a title bar with a question mark icon. Inside, there's a 'Refresh' button. Below it, there's a 'Discovered Targets' section. This section contains two large text boxes: 'Target Name' (containing 'TargetName=iqn.2004-05.com.chelsio.target') and 'Target Address' (containing 'TargetAddress=102.11.11.12:3260,1'). Below these, there's another section with input fields: 'Select a T4 Card' (dropdown menu showing 'T440-CR'), 'Instance' (dropdown menu showing '1'), 'Source IP Address' (text box with '102.11.11.11'), 'Destination IP Address' (text box with '102.11.11.12'), and 'Destination Port' (text box with '3260'). At the bottom of this section is a 'Discover' button.

Figure 156 - FO iSCSI Discover Details module

- **FO iSCSI Session Details**

The FO iSCSI Session Details module can be used to log onto targets and view details of established iSCSI sessions. You can also logout from a target

Use the **Login** section to connect to a target. *Adapter, (initiator) instance, Target Name, Source (Initiator) IP, Destination (Target) IP and Destination Port* are mandatory. After providing values for these fields, click **Login**.

By default, no authentication mechanism is used while connecting to a target. You can however configure CHAP for a secure iSCSI connection. **One-way** (target authenticates the initiator) and **Mutual** (target and initiator authenticate each other) authentication methods are supported.

Login

Select a T4 Card :	T440-CR
Instances :	1
Target Name :	2004-05.com.chelsio.target
Source IP :	102.11.11.11
Destination IP :	102.11.11.12
Destination Port :	3260
Auth Type :	None
Policy :	Select One..
Target Username :	
Target Secret :	
<input type="button" value="Login"/>	

Figure 157 - FO iSCSI Session Details module: Login

After successful login, details of the established iSCSI session will be displayed under the **Established sessions** section. Select the adapter and session id. Details of the selected session will be displayed. To end the session, click **Logout**.

Established Sessions

Select a T4 Card :	T440-CR ▼
Session Id :	1 ▼
Node Id :	1 ▼
Source IP :	102.11.11.11
Target IP :	102.11.11.12
Target TCP Port :	3260
Target Portal Group Tag :	0
Port :	0
State :	1
Target Name :	iqn.2004-05.com.chelsio.target
Target Alias :	

[Logout](#)

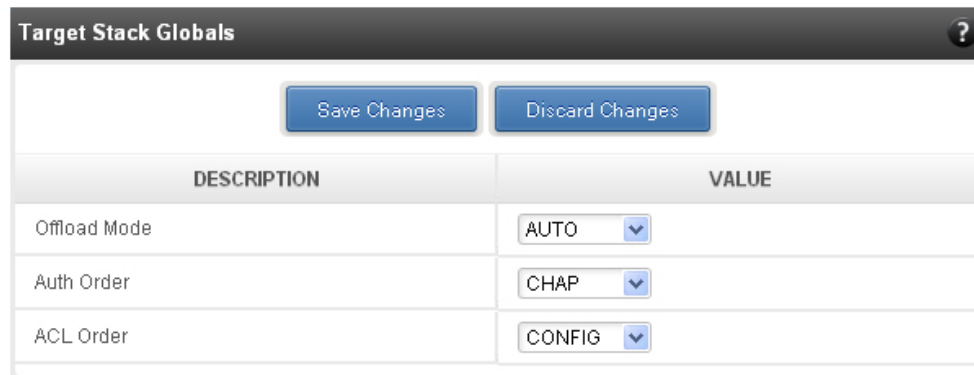
Figure 158 - FO iSCSI Session Details module: Established Sessions

8.7.4. iSCSI Target page (Linux)

This page allows to create new Targets and manage them (add/delete portals, add/delete LUNs, add/delete ACLs). It also provides information on Session details. Viewing and modifying Target properties is also available. The modules available on this page are as below:

- **Target Stack Globals**

This module displays various global properties of a currently connected iSCSI target. Authentication priority between CHAP and ACL can be set here.



DESCRIPTION	VALUE
Offload Mode	AUTO
Auth Order	CHAP
ACL Order	CONFIG

Figure 159 - Target Stack Globals module

- **Target properties**

Properties such as Target name and Alias, Max Data Receive Length, Authentication mode related to a specific iSCSI target can be viewed and modified here. iSCSI targets can be started/stopped or deleted.

Target Properties

iSCSI Targets : iqn.2004-05.com.chelsio.ROTO

Target Status

STARTED

Start Stop Delete

Actions

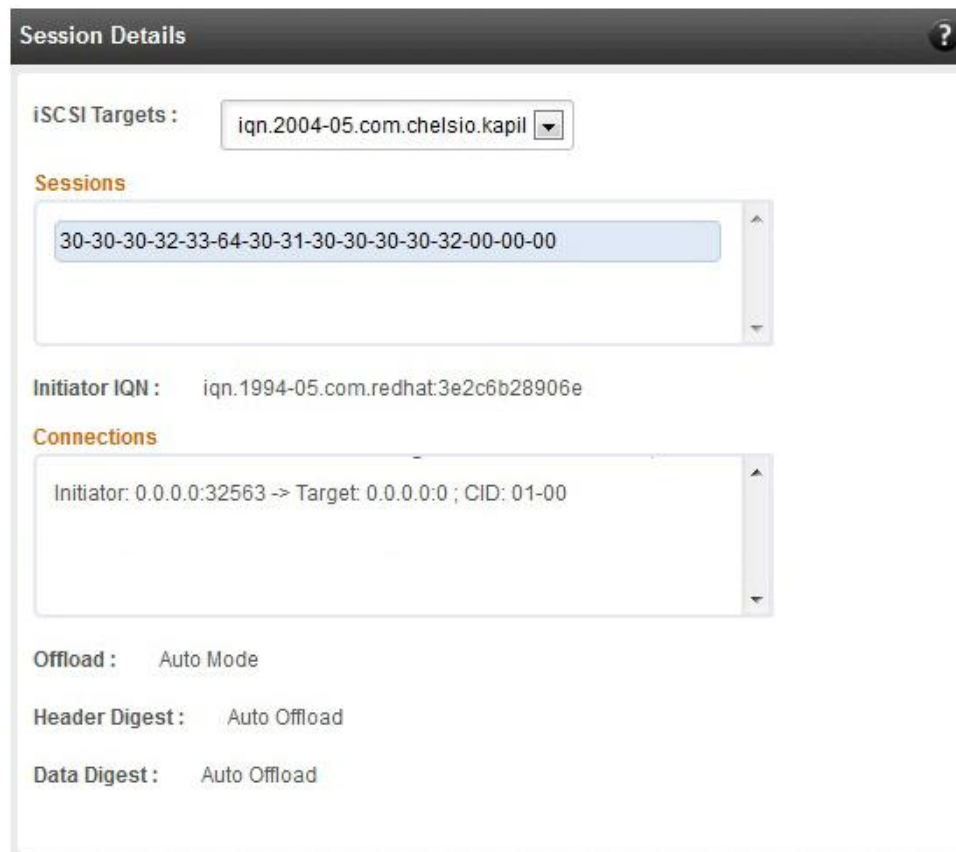
Save Changes Discard Changes

PROPERTY	VALUE
Target Name	iqn.2004-05.com.chelsio.ROTO
Target Alias	iscsitarget1
Max Receive Data Segment Length (in Bytes)	8192
Header Digest/Checksum	None,CRC32C
Data Digest/Checksum	None,CRC32C
Send Immediate Data / Unsolicited Data	Yes
Initial Ready To Transmit (InitialR2T)	No
Maximum Outstanding Ready To Transmits (MaxR2T)	1
Max Connections in a session	4
Target CHAP	"target_id1":"target_secret1"
Initiator CHAP	"initiator_id1":"initiator_sec1"

Figure 160 - Target properties module

- **Session details**

Details including Session ID, Initiator IQN and Connections List of all discovered and currently connected iSCSI targets are listed here.

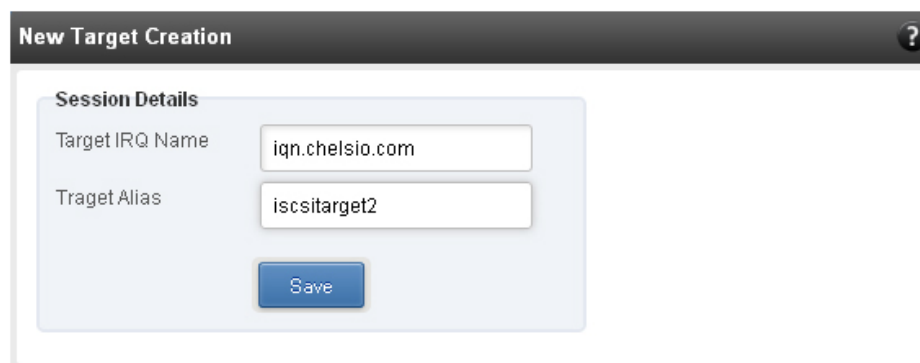


The screenshot shows the 'Session Details' window. At the top, there's a title bar with a question mark icon. Below it, the 'iSCSI Targets' section has a dropdown menu showing 'iqn.2004-05.com.chelsio.kapil'. The 'Sessions' section contains a list box with a single entry: '30-30-30-32-33-64-30-31-30-30-30-30-32-00-00-00'. The 'Initiator IQN' field displays 'iqn.1994-05.com.redhat:3e2c6b28906e'. The 'Connections' section shows a list box with one entry: 'Initiator: 0.0.0.0:32563 -> Target: 0.0.0.0:0 ; CID: 01-00'. At the bottom, there are three settings: 'Offload' set to 'Auto Mode', 'Header Digest' set to 'Auto Offload', and 'Data Digest' set to 'Auto Offload'.

Figure 161 - Session Details module

- **New Target Creation**

New iSCSI target can be created here by specifying the Target IQN and Target Alias name.



The screenshot shows the 'New Target Creation' window. It has a title bar with a question mark icon. Inside, the 'Session Details' section is highlighted. It contains two text input fields: 'Target IQN Name' with the value 'iqn.chelsio.com' and 'Target Alias' with the value 'iscsitarget2'. Below these fields is a blue 'Save' button.

Figure 162 - New Target Creation module

8.7.5. LUNs

Various Logical Units created in an iSCSI Target can be managed here. The modules available on this page are as below:

- **View/Edit iSCSI Target LUNs**

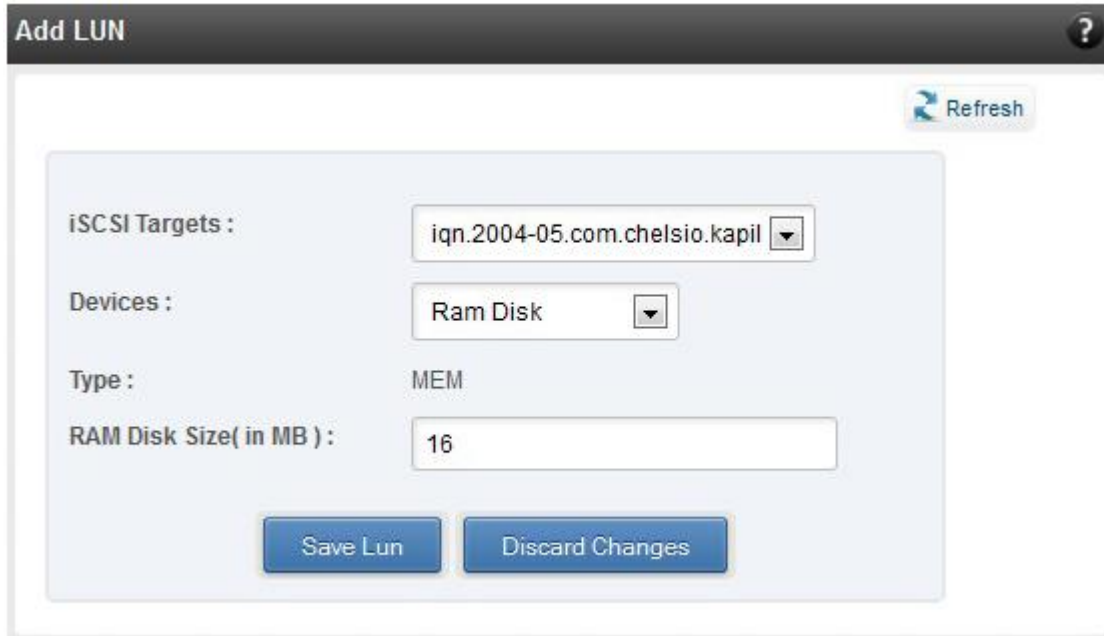
This module displays various Logical Units created in an iSCSI Target. Selected LUNs can be deleted.

The screenshot shows the 'View/Edit iSCSI Target LUNs' window. At the top, there's a title bar with a question mark icon. Below it, the 'iSCSI Targets' section shows a dropdown menu with 'iqn.2004-05.com.chelsio.kapil' selected and a 'Refresh' button. The 'Target Status' is 'STARTED'. The 'LUN List' section on the left contains a single entry '/dev/sda5'. To the right, the 'Edit LUN List' section has 'Move Up', 'Move Down', and 'Delete LUN' buttons. Below that, the 'Edit Selected LUN' section allows editing the selected LUN. It includes fields for 'LUN Name' (set to '/dev/sda5') and 'RAM Disk Size' (set to '12288'). There are three groups of radio buttons: 'Permissions' with 'RO' and 'RW' (RW is selected), 'Device Type' with 'FILE', 'MEM', and 'BLK' (BLK is selected), and 'Options' with 'SYNC', 'NULLRW', and 'NONEXCL' (NONEXCL is selected). At the bottom, there are 'Save Changes' and 'Discard Changes' buttons.

Figure 163 - View/Edit iSCSI Target LUNs module

- **Add LUN**

New LUNs can be added here by providing various parameters like Target Name, Target Device and RAM Disk Size etc. RW (Read-Write) and RO (Read Only) are the two kinds of permissions that can be set. If Ram Disk is selected, then a minimum of 16 MB should be provided.



The screenshot shows a window titled "Add LUN" with a help icon in the top right corner. Inside the window, there is a "Refresh" button with a circular arrow icon. Below this, there is a light blue panel containing the following fields:

- iSCSI Targets :** A dropdown menu showing "iqn.2004-05.com.chelsio.kapil".
- Devices :** A dropdown menu showing "Ram Disk".
- Type :** A text field showing "MEM".
- RAM Disk Size(in MB) :** A text field showing "16".

At the bottom of the panel are two buttons: "Save Lun" and "Discard Changes".

Figure 164 - Adding a new LUN

8.7.6. Portal Groups

Portal details for currently connected iSCSI Targets can be viewed and added here. The modules available on this page are as below:

- **View/Edit iSCSI Target Portals**

Portal List on the left displays details of the portal group on which an iSCSI target is listening and the related info is displayed on the right under Portal Details. Selected portals can be deleted.

The screenshot shows the 'View/Edit iSCSI Target Portals' window. At the top, there's a title bar with a question mark icon. Below it, the 'iSCSI Targets' section has a dropdown menu showing 'iqn.2004-05.com.chelsio.kapil' and a 'Refresh' button. The 'Target Status' is 'STARTED'. The 'Portal List' section on the left shows a single entry '1@102.44.44.155:3260'. To the right, the 'Edit Portal List' section has 'Move Up', 'Move Down', and 'Delete Portal' buttons. The 'Portal Details' section on the right contains input fields for 'Ip Address' (102.44.44.155), 'TimeOut in mSecs' (0), 'Redirect Tag' (1), and 'TCP Port' (3260). There is a checkbox for 'Use default iSCSI service TCP Port' which is unchecked. An 'Update List' button is at the bottom of the details section. At the very bottom of the window are 'Save Changes' and 'Discard Changes' buttons.

Figure 165 - View/Edit iSCSI Target Portals module

- **Add Portal**

New Portals can be added here by choosing the specific target and Portal IP address. The Port number should be 3260.

The 'Add Portal' dialog box has a title bar with a question mark icon. Inside, there's a 'Refresh' button with a circular arrow icon. The main area contains four labeled input fields: 'iSCSI Targets' with a dropdown menu showing 'iqn.2004-05.com.chelsio.kapil', 'IP Address' with the text '102.44.44.155', 'Port' with the text '3260', and 'Redirect Tag' which is empty. At the bottom, there are two blue buttons: 'Save Portal' and 'Discard Changes'.

Figure 166 - Adding a new Portal

8.7.7. ACLs

ACLs configured for currently connected iSCSI Targets can be managed here. The modules available on this page are as below:

- **View/Edit iSCSI Target ACLs**

This module displays details for all the ACLs configured for an iSCSI Target. Selected ACLs can be deleted.

The 'View/Edit iSCSI Target ACLs' module has a title bar with a question mark icon. It features an 'iSCSI Targets' dropdown menu with 'iqn.2004-05.com.chelsio.kapil' selected, a 'Refresh' button, and a 'Target Status' label showing 'STARTED' in green. Below this is an 'ACL List' section. On the left, a box displays an ACL entry: 'iname=iqn.1994-05.com.redhat:KAPIL;sip=102.44.44.193;dip=102.44.44.155;lun=ALL:RW'. On the right, a form allows editing this ACL with fields for 'IQN Name', 'Source IP Address', 'Destination IP Address', and 'LUN Permissions'. A 'Delete' button is located at the bottom center.

Figure 167 - Target ACL operations module

• Add ACL

New ACLs can be configured by specifying Target name, initiator IQN name, IP address and permission type.

Figure 168 - Adding new ACL

8.8. Hardware Features

The **Hardware** module lists the status of configuration modules under Hardware Features section, running on the agent.

Hardware	
PROPERTY	VALUE
Boot service on server	Enabled
Filter service on server	Disabled
Traffic mgmt service on server	Disabled

Figure 169 - Hardware module

8.8.1. Filtering (Linux)

Using this page, one can control the traffic from a specific IP. The module available on this page is as below:

- **T3 Filtering configuration**

T3 Filtering options can be set only when offload driver (*t3_tom*) is not loaded.

This module lists the various parameters which can be set while determining filtering options for a system IP. You can set the maximum number of filters and also add/delete filters. A filter with default values (the **Action** field set to **pass**; the **Protocol** field set to **any**) is created at the time of configuring the filtering module. To remove the default filter, enter 0 in the **Set Maximum Filters** field and click on **Set Filters**. The fields **ifName** and **FilterId** are mandatory. The **Action** field is set to **pass** and the **Protocol** field is set to **any** by default. Other possible values for the **Protocol** field are **tcp**, **udp** and **frag**. The **Priority** field can be used to determine the priority of a filter when Vlan ids are same. **Insert at position** features allows user to add a filter at a specified position.

FILTERID	SRCIP	DESTIP	SRCPORT	DESTPORT	VLAN	PRIORITY	MACIDX	ACTION	PROTO	QUEUE
10	0.0.0.0 / 0	0.0.0.0	0	0	0	0	0	Pass	Any	0

Figure 170 - T3 Filtering Configuration module



Note

Results for actions like adding a new filter or setting maximum filters make some time to reflect. Highlight the system item in the tree menu on the left, and click "Refresh system", to refresh data from the system, in case the updated settings are not being shown.

• T4 Filtering configuration

T4 Filtering options can be set only when offload driver (*t4_tom*) is not loaded.

A list of pre-defined filter selection combinations is displayed. The combination *fragmentation, mpshittype, protocol, vlan, port, fcoe* is active by default. To select a different combination, highlight it in the **Combinations** list by clicking and click “Set Active Combination”.

You can create filter rules for any combination in the list. However, filter rule created only for the Active Combination will apply. To create a new rule, select a combination and click “Add a filter rule”. The **FILTERID** and **T4 CARD** fields are mandatory. After providing appropriate values for the parameters click “Save Changes”.



Note

For a detailed explanation regarding different fields, please refer **cxgbtool** manual by running `man cxgbtool` command on Management Agent CLI.

T4 Filtering Configuration

Refresh

Active Combination : fragmentation, mpshittype, macmatch, vlan, port, fcoe

Combinations

- fragmentation, mpshittype, ethertype, protocol, tos
- ethertype, vlan, port
- fragmentation, mpshittype, macmatch, vlan, port, fcoe - Active Combination
- fragmentation, mpshittype, macmatch, protocol, tos, port, fcoe
- fragmentation, mpshittype, macmatch, ethertype, port, fcoe
- fragmentation, mpshittype, macmatch, vnic_id, port, fcoe
- fragmentation, mpshittype, ethertype, protocol, port, fcoe

FILTERID	T4 CARD	FRAGMENTATION	MPSHITTYPE	MACMATCH	VLAN	PORT	FCOE
7	T420-SO-CR	1	1	005	0000	0	0

Set Active Combination Save Changes Discard Changes Add a Filter row Delete a Filter

Figure 171 - T4 Filtering Configuration module

8.8.2. Traffic Management (Linux)

Using this page, one can add/delete/modify offload policies only in the presence of offload driver (*t3_tom* for T3 adapters; *t4_tom* for T4 adapters).

8.8.3. Traffic Management configuration

The **Chelsio Card** section on the left displays all the cards available in the server and their corresponding policies on the right. Policies can be added and deleted. Policy Details displays the primitives (maximum 8) and actions which can be modified. For more details on creating policies, please refer to COP man pages.

The screenshot displays the 'Traffic Management Configuration' window. It is divided into two main sections: 'Policy List' and 'Policy Details'.

Policy List: This section contains a 'Refresh' button and two lists. The 'Chelsio Cards' list on the left includes 'T404-BT', 'T420-CR', and 'T302E-CU'. The 'TM Policies' list on the right contains 'src port 22 => !offload !ddp'. Below these lists are 'Add New Policy' and 'Delete' buttons.

Policy Details: This section is further divided into 'Rules' and 'Rule Details'. The 'Rules' list on the left contains 'src port 22'. The 'Rule Details' panel on the right shows the 'Primary Expression' as 'port', the 'Qualifier' as 'src', and the 'Value' as '22'. It includes a 'Modify Rule' button and two checkboxes: 'Select to add rule' and 'Select to modify rule'.

Actions: This section at the bottom contains a row of checkboxes and dropdown menus for various actions: 'Offload' (Disable), 'DDP' (Disable), 'Time Stamp' (Enable), 'Sack' (Enable), 'Bind' (random), 'Class' (0), and 'Congestion' (reno). Below these are 'Save Changes' and 'Discard Changes' buttons.

Figure 172 - Traffic Management Configuration module

8.8.4. Boot

- **T4 Save Config File (Linux)**

This module displays the current T4 configuration tuning option selected. You can also change the tuning option by selecting the config file for each option located in `/ChelsioUwire-x.x.x.xx/src/network/firmware`. For instance, to select *Low latency Networking*, locate the file, *t4-config.txt*, in `/ChelsioUwire-x.x.x.xx/src/network/firmware/low_latency_config` directory.

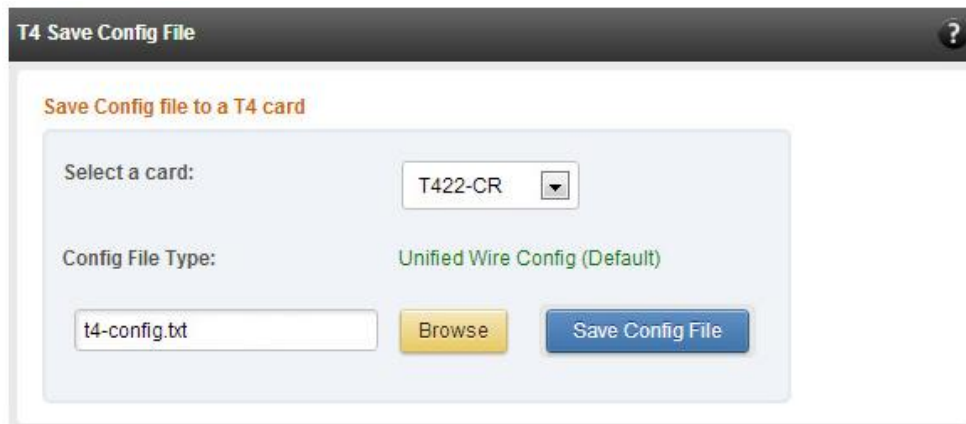


Figure 173 - T4 Save Config File module

8.8.5. T3 iSCSI / T3 PXE Boot Option Rom Management (Linux)

The Chelsio T3 card may be used for PXE or iSCSI boot. This module allows managing the boot capability. The Option ROM (PXE/iSCSI) may be installed to the card, or erased from the card. iSCSI boot Option ROM settings can be configured for the card here. Enable the iSCSI Option ROM only if you are planning to boot the system via iSCSI. Refer the iSCSI boot documentation for more details about its configuration.

T3 iSCSI / T3 PXE Boot Option Rom Management

Select a card: S320E-SR-X

Option ROM Status - iSCSI option rom is installed [2.0 build 202] & iSCSI option rom settings are valid.

Write iSCSI or PXE Option ROM to the card

Browse

Write Option ROM

Erase iSCSI or PXE Option ROM or Settings

Erase Option ROM

Erase iSCSI boot settings

Save Changes

Discard Changes

DESCRIPTION	VALUE
Card is enabled for iSCSI boot	No
Chelsio OS initiator is used for boot	No
Boot initiator IQN name	<input type="text"/>
Prefer header digests if available	No
Prefer data digests if available	No
CHAP authentication Policy	none
Initiator's CHAP username	
Initiator's CHAP secret	

Figure 174 - Option ROM management module for a T3 card

Chelsio T5 Unified Wire for Windows

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8.8.6. T5/T4 Boot Option ROM management

This module allows managing the PXE and FCoE boot capability for Chelsio T5 and T4 cards. The Option ROM (PXE and FCoE) may be installed to or erased from the card. The version of Option ROM flashed can be viewed here.

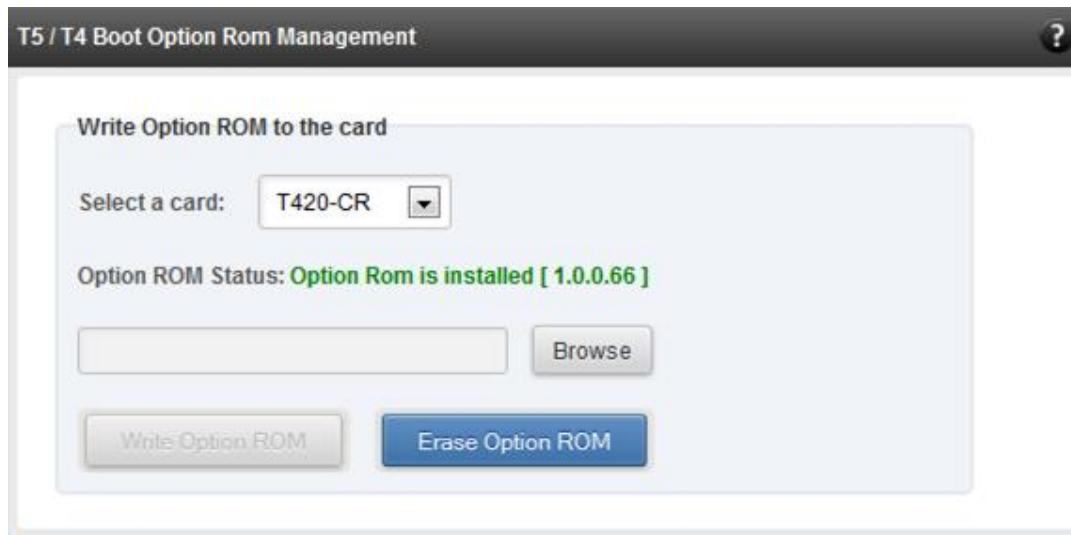


Figure 175 - T5/T4 Option ROM Management module

8.8.7. T5/T4 Boot Configuration

This module can be used to view and configure PXE and FCoE Option ROM settings for Chelsio T5 and T4 cards.

PXE physical functions and order of ports for PXE boot can be selected here. The same module can be used to configure FCoE Option ROM. Here port order for target discovery and discovery timeout can be set. Under the Boot section, LUN can be configured as boot device from the discovered FCoE targets.

Enable the Option ROM only if you are planning to boot the system via PXE or install the operating system on FCoE LUN.

The screenshot displays the 'T5 / T4 Boot Configuration' window. At the top, a dropdown menu 'Select a T4 / T5 card' is set to 'T420-CR'. Below this is the 'Adapter Configuration' section with the following settings: PCI BUS: 01, PCI Device: 00, Initialization Platform: Both, Adapter Bios Status: Disable (selected), Boot mode: Compatibility, EDD: 2.1, EBDA Relocation: Permitted, and a checkbox for 'Default' (Load Boot Default Settings) which is unchecked. 'Save Changes' and 'Discard Changes' buttons are at the bottom. The 'Choose Options to configure' section has radio buttons for PXE (selected), FCOE, and iSCSI. Below is the 'PXE Configuration' section with 'Select Physical Function' set to 00, 'BIOS' set to Disable, and 'Vlan Id' set to 0. It also has 'Save Changes' and 'Discard Changes' buttons. On the right, a 'Details' panel lists: BIOS: 1.0.0.66, Ports: 2, Device Id: 1131, FW: 1.8.24.242, MAC: 00:07:43:11:F9:D0, Func: 00, and Controller Name: T420-CR.

Figure 176 - PXE Boot configuration for T4 CNAs

Choose Options to configure: ☐ PXE ☒ FCOE ☐ iSCSI

FCoE Configuration

Choose Paramter Type : ☒ Function ☐ Boot ☐ Show WWPN

BIOS : ☒ Enable ☐ Disable

Port Order :

Discovery Time Out :

Figure 177 - FCoE Boot configuration for T4 CNAs

Choose Options to configure: ☐ PXE ☐ FCOE ☒ iSCSI

iSCSI Configuration

Choose Paramter Type : ☒ Function ☐ Initiator ☐ Network ☐ Boot Devices

BIOS :

Port Order :

Discovery Time Out :

CHAP Method:

Figure 178 - iSCSI Boot configuration for T4 CNAs

8.8.8. Bypass (Linux)

You can use the **Bypass** page to configure various settings for Chelsio's bypass adapters like setting bypass operation mode, creating rules (filters), starting/stopping BA server, etc. There are two modules available: **Bypass Configuration** and **Redirect Configuration**.

- **Bypass Configuration**

In the **Bypass Configuration** module, you can view the status and start/stop the BA server accordingly. The adapter will redirect packets using the mode specified in the **Default bypass mode** field unless otherwise specified in the **Current bypass mode**.

The **Watchdog** timer is used to ensure that if there is a software failure, the switch will enter the default state. The **Watchdog timeout** value should be provided in milliseconds.

The screenshot shows the 'Bypass Configuration' window. At the top, there's a header 'Bypass Configuration' with a help icon. Below it, a section 'Select a T4 card' contains a dropdown menu currently showing 'B420-SR'. The main configuration area is titled 'Bypass Configuration' and includes several settings: 'BA Server status' is 'Running on eth3' with a 'Stop Server' button; 'Default bypass mode' and 'Current bypass mode' are both set to 'Disconnect Mode' via dropdown menus; 'Watchdog' is set to 'Disable' via a dropdown menu; and 'Watchdog timeout' is set to '0' in a text input field. At the bottom of the configuration area are two buttons: 'Save Changes' and 'Discard Changes'.

Figure 179 - Bypass Configuration module

• Redirect Configuration

In the **Redirect Configuration** module, you can set **rules** (filters), based on which the bypass adapter will redirect packets. You can group **rules** into **tables**. You can save the currently configured tables and rules for a bypass adapter into a shell script using the **Download Configuration** button.

The **Table Configuration** tab displays BA server status and the number of tables created. You can create new tables or perform various actions on the existing ones.

- **Delete table:** Delete the selected table and all the rules present in it.
- **Purge table:** Delete all the rules present in the selected table. This action will not delete the table.
- **Activate table:** Enable the selected table.
- **Deactivate table:** Disable the selected table.
- **Create table:** Create a new table. The new table created will be inactive by default. Use the **Activate table** option to enable it. You can create upto 5 tables.

In the **Rules Configuration** tab, you can add, delete and configure rules. Use the **Add a Filter row** button to add a new rule by specifying the rule id in the *INDEX* field and providing the required parameters. Finally, click **Save Changes**.

To edit an existing rule, select the corresponding checkbox, change the desired parameters and click **Save Changes**.

To delete a rule, select the corresponding checkbox and click **Delete a Filter**. Finally, click **Save Changes**. You can delete multiple rules using this method.

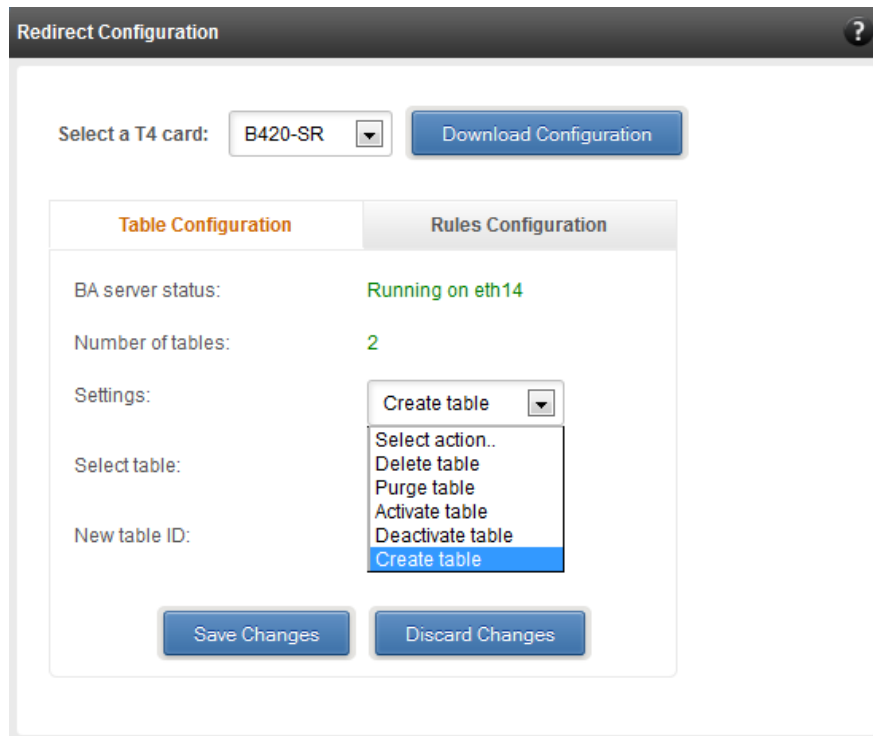


Figure 180 - Redirect Configuration module: Table configuration tab

Redirect Configuration

?

Select a T4 card:

B420-SR

Download Configuration

Table Configuration

Rules Configuration

Select a table :

Table 1 (active)

INDEX	ACTION	PORT	IPV6	PROTOCOL	SOURCE ADDRESS	SO
<input type="checkbox"/> 1	drop	0	disable	udp	102.22.22.155	255.25
<input type="checkbox"/> 2	forward	0	disable	udp	102.22.22.155	255.25
<input type="checkbox"/> 3	input	0	disable	udp	102.22.22.155	255.25
<input type="checkbox"/> 4	drop	0	disable	tcp	102.22.22.155	255.25
<input type="checkbox"/> 5	forward	0	disable	tcp	102.22.22.155	255.25
<input type="checkbox"/> 6	input	0	disable	tcp	102.22.22.155	255.25
<input type="checkbox"/> 7	forward	0	disable	icmp		
<input type="checkbox"/> 8	drop	0	disable	icmp		
<input type="checkbox"/> 9	input	0	disable	icmp		

Save Changes

Discard Changes

Add a Filter row

Delete a Filter

Figure 181 - Redirect Configuration module: Rules configuration tab

8.8.9. T4 Egress Class Schedulers (Linux)

Schedulers can be set only when T5/T4 network driver (*cxgb4*) is loaded.

- **Egress Queue Map**

Using this module, you can bind (map) NIC (non-offloaded) Tx queues to Tx Scheduler classes.

INTERFACE NAME	CLASS ID	TX QUEUE ID	ACTION
eth13	0	0	Map

Interface Name : eth12 >> Class Id : 2 >> Tx Queue Id : 1

Figure 182 - Egress Queue Map module

- **Egress Packet Scheduler**

Using this module you can configure different scheduler hierarchy levels (i.e. Class Rate Limiting, Class Weighted Round Robin and Channel Rate Limiting). Based on the parameters specified, different scheduler levels can be configured.

SCHEDULER	CHANNEL ID	INTERFACE	MODE	RATE MODE	RATE UNIT	MIN RATE	MAX RATE	PACKET SIZE	WEIGHT
0	1	eth12	Flow	Absolute	Bits (in kbps)	0	9000	0	-

Add New Rule Save Changes Discard Changes

Figure 183 - Egress Packet Scheduler module

9. Uninstallation

This section describes the procedure to uninstall UM. For both installer and zip package, the application will have to be uninstalled manually.

- i. For Installer, open **Programs and Features** in the **Control Panel**. Double click on *UnifiedWireManager*.

For zip packages, you can use the **Control Panel** as described above or run the **UnifiedWireManager-x.x.xx-x64** installer application located in *ChelsioUwire-x.x.x.xx/UM* folder.

- ii. Select **Modify** to add or remove features or **Remove** to uninstall the application.

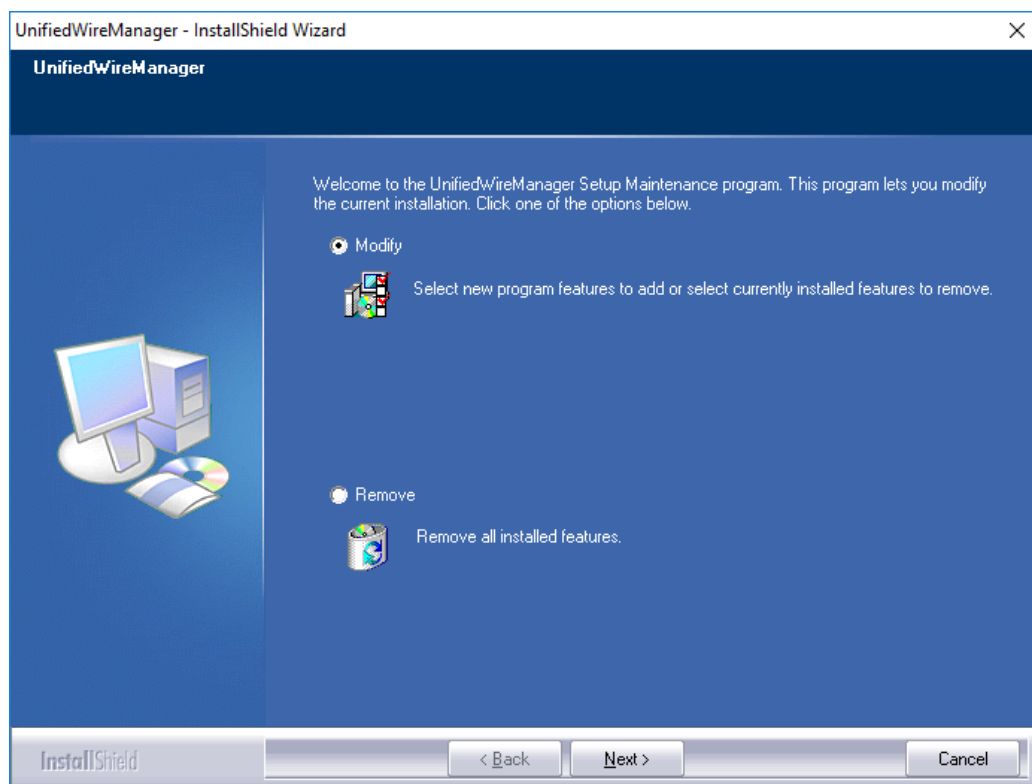


Figure 184 - Selecting maintenance option

- a. If you select **Modify**, you can select the UM component you want to uninstall by deselecting the appropriate checkbox. To install a component that was skipped during installation, select the corresponding checkbox. Click **Next**.

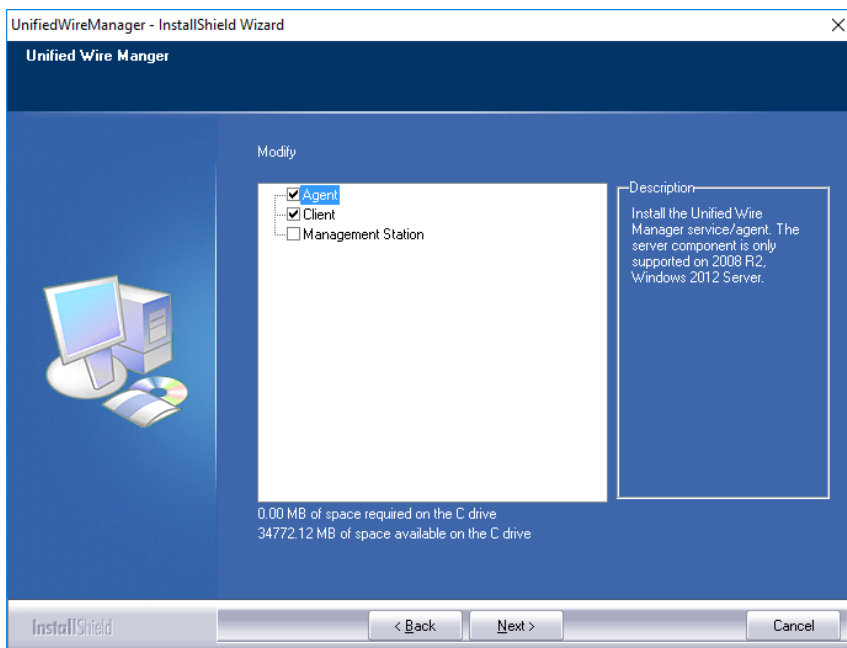


Figure 185 - Modifying UM components

- b. If you select **Remove**, you can uninstall the application completely. Click **Next** and then **Yes** to confirm.

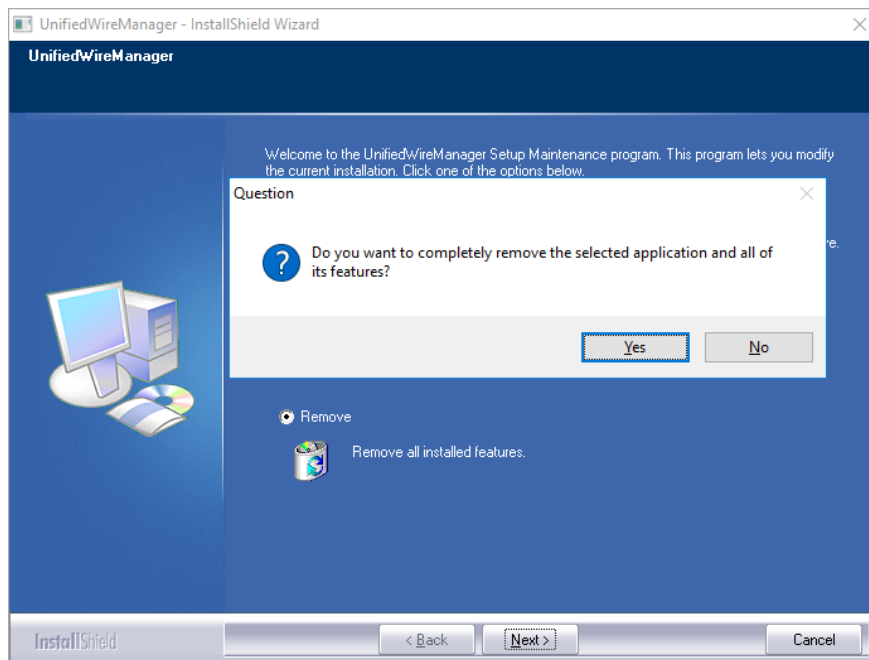


Figure 186 - Uninstalling UM

- iii. Click the **Finish** button to exit from the installer.

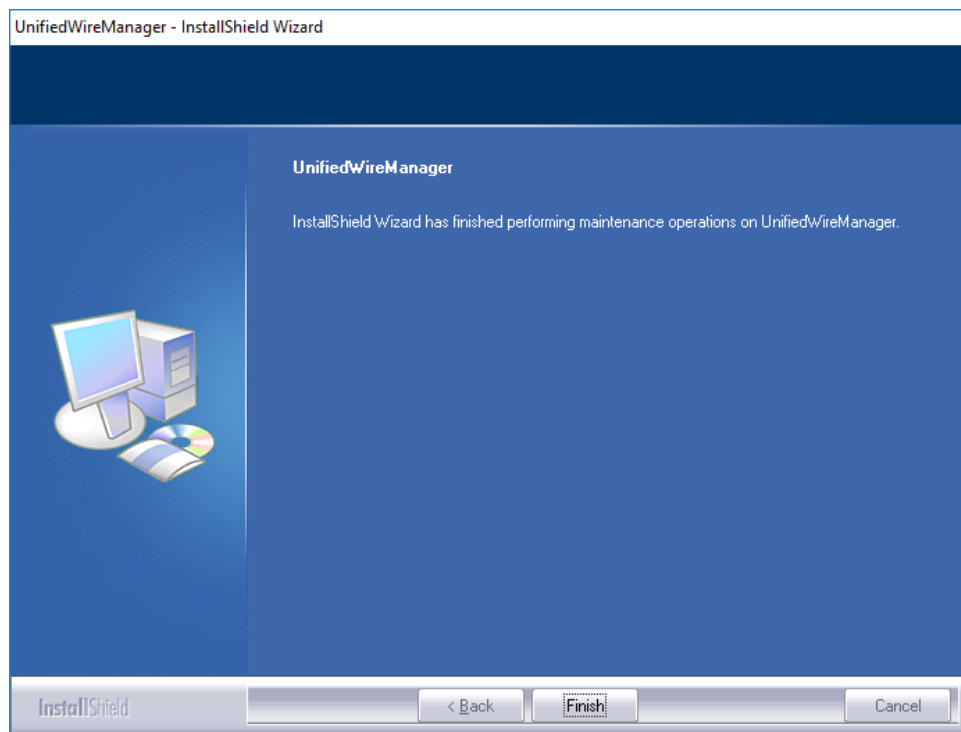


Figure 187 - Finishing uninstallation

VIII. UM for Win PE

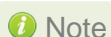
1. Introduction

Chelsio **UM for Win PE** is a light-weight management tool developed for Windows PE (Windows Preinstallation Environment) platform and provides features to view and configure different aspects of the system, including Chelsio adapter installed.

The tool provides command-line options to view system related information like list of drivers installed, Chelsio adapters present, etc. You can also view and configure Chelsio adapter settings like card and port properties, flash and erase option ROM, etc. To view the complete list of commands available, invoke the help by typing `chelsio_uwlite.exe` in the command prompt.

The tool is copied to `<system_drive>\ChelsioUwire\docs\` during Unified Wire installation. In order to use the tool, you will have to add it to boot image when creating bootable Windows PE media.

For more information, visit the following link: <http://technet.microsoft.com/en-us/library/cc749312%28v=ws.10%29.aspx>



Only local systems can be managed currently using this tool.

1.1. Hardware Requirements

1.1.1. Supported Adapters

The following are the currently shipping Chelsio adapters that are compatible with Chelsio UM for Win PE:

- T580-CR
- T580-LP-CR
- T580-SO-CR
- T540-CR
- T520-CR
- T520-LL-CR
- T520-SO-CR
- T440-CR
- T440-LP-CR
- T420-CR
- T422-CR
- T420-LL-CR
- T420-CX
- T420-BT
- T404-BT

1.2. Software Requirements

1.2.1. Windows Requirement

Currently Chelsio UM for Win PE is available for the following Windows version(s):

- Server 2012 R2
- Windows Server 2012 R2

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

1.3. Examples

1.3.1. Viewing help

- Run the following command to view the list of commands available under a service.

```
X:\windows\system32>chelsio_uwlite.exe <service-name>
```

E.g.

To view commands available under the *chelsio* service:

```
X:\windows\system32>chelsio_uwlite.exe Chelsio
```

```

X:\windows\system32>chelsio_uwlite.exe chelsio
-----Usage-----
chelsio_uwlite <Service-Name>
                [StackName] <Command> [SubCommand] [Arguments]
Where
    Service-Name      : SYSTEM!CHELSIO
    Command            : A command supported by the service
                        (see service help for a list of commands)
    Arguments          : Arguments expected by the command
                        (see command help for more details)
Note:
    All arguments should be in the <key=value> format
    eg: <ip=192.168.1.1>
    Required parameters are enclosed within <> brackets
    Optional parameters are enclosed within [] brackets
Service:
    CHELSIO
Commands
-----
    ListAdapters
    ListAdapterProps
    ListPorts
    GetCardStats
    GetPortStats
    SetCardProperty
    SetPortProperty
    GetProperty
    SetProperty
    FlashRom
    EraseRom
    EraseSettings
    Defaultconfig

```

Figure 188 – ‘chelsio’ service commands syntax and usage

- Run the following command to view syntax and usage for a sub-command:

```
X:\windows\system32>chelsio_uwlite.exe chelsio <sub-command> /?
```

E.g. To view syntax and usage of *EraseSettings* sub-command under *chelsio* service:

```
X:\windows\system32>chelsio_uwlite.exe chelsio erasesettings /?
```

```

X:\windows\system32>chelsio_uwlite.exe chelsio erasesettings /?
This command not supported
-----Usage-----
chelsio_uwlite <Service-Name>
                  [StackName] <Command> [SubCommand] [Arguments]
Where
    Service-Name      : SYSTEM!CHELSIO
    Command           : A command supported by the service
                      : <see service help for a list of commands>
    Arguments         : Arguments expected by the command
                      : <see command help for more details>
Note:
    All arguments should be in the <key=value> format
    eg: <ip=192.168.1.1>
    Required parameters are enclosed within <> brackets
    Optional parameters are enclosed within [] brackets
Service:
    CHELSIO
Note:
    <adapter=adapter index> is the Adapter # obtained from the ListAdapters command
chelsio_uwlite
    Chelsio
    EraseSettings
    <adapter=adapter index>
    <force=Boolean>

```

Figure 189 - 'EraseSettings' sub-command syntax and usage

1.3.2. Flashing Option ROM

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

```
X:\windows\system32>chelsio_uwlite.exe chelsio listadapters
```

```

X:\windows\system32>chelsio_uwlite.exe chelsio listadapters
Adapter information:
Adapter #           : 0
Model               : T440-CR
Serial Number       : PT04111342
PCI Vendor ID:Device ID : 1425:1133
PCI Location        : 02:00:04
Factory MAC address  : 00:07:43:AB:CD:EF
Connector           : 10G BP4 AP
PHY                 : No Phy / No information Available
OPROM               : Not Present

```

Figure 190 - Listing Chelsio Adapters

- ii. Now, run the following command to flash option ROM onto the adapter:

```
X:\windows\system32>chelsio_uwlite.exe chelsio flashrom adapter=<idx>
path=<option_rom_image>
```

Here, `idx` is the CNA index found in step i (0 in this case) and `option_rom_image` is the path to Option ROM image file, `cwlb4t4.bin`

```
X:\windows\system32>chelsio_uwlite.exe chelsio flashrom adapter=0 path=cuwlbt4.bin
Flashing the Option ROM...

Success: Boot operation completed sucessfully
```

Figure 191 - Flashing option ROM

1.3.3. Erasing Option ROM

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

```
X:\windows\system32>chelsio_uwlite.exe chelsio listadapters
```

```
X:\windows\system32>chelsio_uwlite.exe chelsio listadapters
Adapter information:
Adapter #           : 0
Model               : T440-CR
Serial Number       : PT04111342
PCI Vendor ID:Device ID : 1425:1133
PCI Location        : 02:00:04
Factory MAC address  : 00:07:43:AB:CD:EF
Connector           : 10G BP4_AP
PHY                 : No Phy / No information Available
OPROM               : Present
Bios Version        : 1.0.3.57
```

Figure 192 - Listing Chelsio Adapters

- ii. Now, run the following command to erase option ROM from the adapter:

```
X:\windows\system32>chelsio_uwlite.exe chelsio eraserom adapter=0 force=1
```

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

```
X:\windows\system32>chelsio_uwlite.exe chelsio eraserom adapter=0 force=1
Erasing the Option ROM...

Success: Boot operation completed sucessfully
```

Figure 193 - Erasing option ROM

IX. Appendix

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