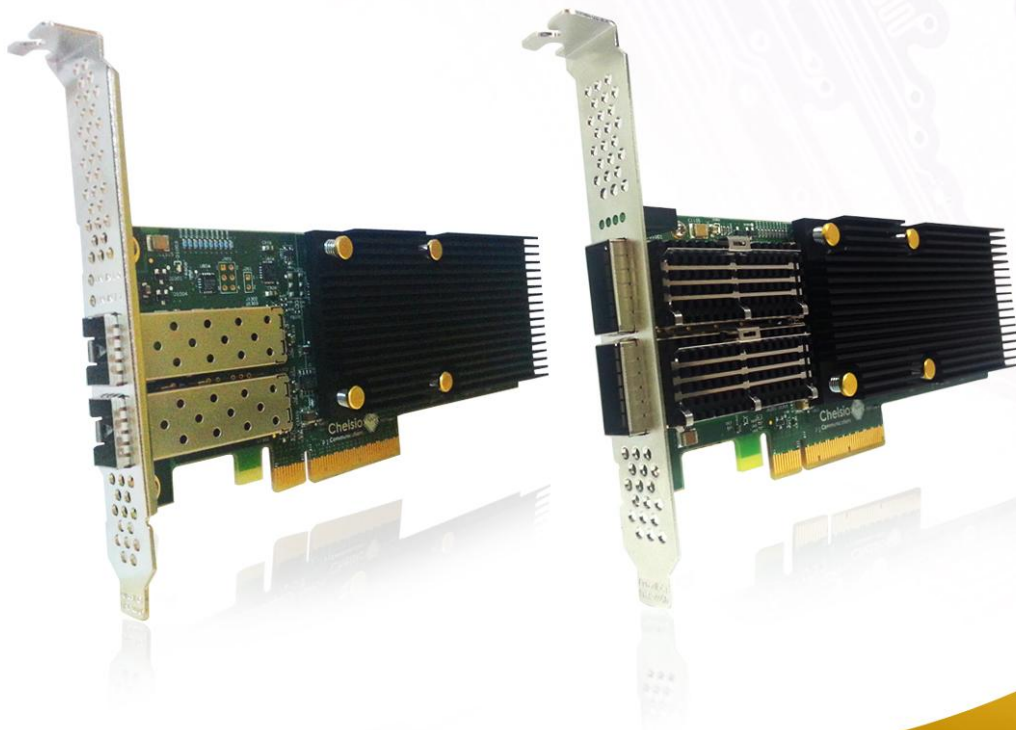




Chelsio T5/T4 Unified Wire for Windows

Installation and User's Guide



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I. Chelsio Unified Wire

1. Introduction

Thank you for choosing Chelsio T5/T4 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 40/10GbE 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.

The T4 adapters can fully offload TCP, UDP, iSCSI, iWARP and FCoE over a single Unified Wire. The adapters also fully support SR-IOV, EVB/VNTag, DCB, Traffic Management and Filtering.

Ideal for all data, storage and high performance clustering applications, the T5/T4 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/T4 adapters bring a new level of performance metrics and functional capabilities to the computer networking industry.

1.1. Features

Chelsio's T5/T4 Unified Wire package contains Chelsio's NDIS function driver. The driver supports NIC and NDK functionalities. The software package also contains management tool, UM for Win PE (Windows Preinstallation Environment).

1.2. Hardware Requirements

The Chelsio T5/T4 Unified Wire supports all x64 architectures supporting PCIE (x4, x8) slots.

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



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.

1.3. Software Requirements

Chelsio T5/T4 Unified Wire 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 to their respective sections.

1.4. Package Contents

Chelsio T5/T4 Unified Wire driver package contains driver files, UM installer, UM for Win PE application and support documentation (*docs* folder).

2. Hardware Installation

1. Shutdown/power off your system.
2. Power off all remaining peripherals attached to your system.
3. Unpack the Chelsio adapter and place it on an anti-static surface.
4. Remove the system case cover according to the system manufacturer's instructions.
5. Remove the PCI filler plate from the slot where you will install the Ethernet adapter.
6. For maximum performance, it is highly recommended to install the adapter into a PCIE x8 slot.
7. Holding the Chelsio adapter by the edges, align the edge connector with the PCI connector on the motherboard. Apply even pressure on both edges until the card is firmly seated. It may be necessary to remove the SFP (transceiver) modules prior to inserting the adapter.
8. Secure the Chelsio adapter with a screw, or other securing mechanism, as described by the system manufacturer's instructions. Replace the case cover.
9. After securing the card, ensure that the card is still fully seated in the PCIE x8 slot as sometimes the process of securing the card causes the card to become unseated.
10. Connect a fiber cable, multi-mode for short range (SR) optics or single-mode for long range (LR) optics, to the 10Gb Ethernet adapter or regular Ethernet cable for the 1Gb Ethernet adapter.
11. Power on your system.
12. Verify if the adapter was installed successfully. To do so, open **Device Manager** in **Control Panel**.
13. 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

14. 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 network interface. However, for T420-BT adapter, the association of physical ethernet ports and their corresponding network device names is opposite. For this adapter, the port nearest to the motherboard will appear as the first network interface.

3. Software/Driver Installation

Chelsio Unified Wire can be installed using **Windows Update** or **Chelsio's Unified Wire Installer**. Alternatively, you can install or remove driver files in an offline Windows image using procedures mentioned in 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>

4. Firmware Update

The driver will auto-load the T5 and T4 firmwares if an update is required. The firmware version can be verified using *cxgbtool*:

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

5. Software/Driver Update

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

Please visit Chelsio support web site <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/T4 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

The following are the currently shipping Chelsio Adapters that are compatible with Chelsio NDIS driver:

- T520-CR
- T420-CR
- T440-CR
- T422-CR
- T420-SO-CR*
- T404-BT
- T440-LP-CR
- T420-BT
- T420-LL-CR
- T420-CX

* NDK Functionality not supported

1.2. Software Requirements

1.2.1. Windows Requirement

Currently Chelsio T5/T4 NDIS Function driver is available for Windows server 2012 R2.

2. Software/Driver Configuration and Fine-tuning

2.1. Assigning IP address to the Chelsio Network Adapter

1. Double click on the Network Connections icon and choose the Chelsio card entry and double click it.
2. Click on the Properties button from the Local Area Connection X Status.
3. Select "Internet Protocol (TCP/IP)" from the list and click on Properties button below it.
4. 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).
5. Click on Ok and close on the other window.
6. Check to see if you can ping to some other address on this subnet.

2.2. 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.

2.2.1. VBD Driver Parameters

To see all tunable VBD driver parameters, open the **Device Manager** (Control Panel -> System & Security-> System -> Device Manager), click on the **System Devices**, double click on the **Chelsio T5/T4 40G/10G Bus Enumerator**, and then click the **Advanced** tab.

- **Max VMQueues:**


- *Description:* Specifies the maximum number of virtual machine queues.
- *Value:* 0-16
- *Default:* 4

- **Nic Port x:**

- *Description:* Enables/Disables the Nic port x.
- *Value:* Enabled | Disabled
- *Default:* Enabled

- **Port x Speed & Duplex:**

- *Description:* Specifies the Port x operation speed and mode.
- *Value:*
 - 100Mbps/Full Duplex
 - 1Gbps/Full Duplex
 - Auto Detect
- *Default:* Auto Detect

 **Note** *This parameter is valid only for 1G port. User can specify any of the above 1G or 100M full duplex modes. If Auto-Detect is selected, the 1G port will do auto-negotiation.*

- **iScsi Port x:**

- *Description:* Enables/Disables the iScsi port x.
- *Value:* Enabled | Disabled
- *Default:* Disabled

2.2.2. NDIS Miniport Driver Parameters

To see all tunable NDIS Miniport Driver parameters, open the **Device Manager** (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.

- **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:*
 - Disabled
 - Rx & Tx Enabled
 - Rx Enabled
 - Tx Enabled
- *Default:* Rx & Tx Enabled

- **IPv4 Checksum Offload:**

- *Description:* Allows 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:* Specifies the Maximum Transmission Unit (MTU) value.
- *Value:* 1500-9000
- *Default:* 1500

- **Large Send Offload V2 (IPv4):**

- *Description:* Allows for configuring Large Send Offload (LSO) using version 2 for the IPv4 traffic.
- *Value:* Enabled | Disabled
- *Default:* Enabled

- **Large Send Offload V2 (IPv6):**

- *Description:* Allows for configuring Large Send Offload (LSO) using version 2 for the IPv6 traffic.
- *Value:* Enabled | Disabled
- *Default:* Enabled

- **Locally Administered Address:**

- *Description:* Specifies 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 Queues:**

- *Description:* For changing the number of RSS Queues.
- *Value:* 1-8
- *Default:* 4

- **NetworkDirect Functionality:**

- *Description:* For enabling or disabling Network Direct Functionality.
- *Value:* Enabled | Disabled
- *Default:* Enabled

- **NetworkDirect Interrupt Moderation:**

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

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

- **Receive Side Scaling (RSS):**

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

- **Recv Segment Coalescing (IPv4):**

- *Description:* Enables or Disables 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 10Gb network environment where CPU can be the bottleneck.
- *Value:* Enabled | Disabled
- *Default:* Enabled

- **Recv Segment Coalescing (IPv6):**

- *Description:* Enables or Disables 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 10Gb network environment where CPU can be the bottleneck.
- *Value:* Enabled | Disabled
- *Default:* Enabled

- **RSS load balancing profile:**

- *Description:* This parameter controls the RSS load balancing profile.
- *Value:* Closest Processor | Closest Processor Static | Conservative Scaling | NUMA Scaling | NUMA Scaling Static
- *Default:* Closest Processor


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

- **Rx Ethernet Queue Size:**

- *Description:* This parameter is used to set different Rx Queue sizes. Driver ships with reasonable defaults.
- *Value:* 512-4096
- *Default:* 3072

- **Rx Offload Queue Size:**

- *Description:* This parameter is used to set different Offload Rx Queue sizes. Driver ships with reasonable defaults.
- *Value:* 256-2048
- *Default:* 512

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

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


- *Description:* This parameter enables or disables 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:* This parameter enables or disables computation of TCP checksum by the adapter for IPv6 packets.
- *Value:*
 - Disabled
 - Rx & Tx Enabled
 - Rx Enabled
 - Tx Enabled
 - *Default:* Rx & Tx Enabled

- **TCP Offload:**

- *Description:* Controls the enable or disable of TCP Offload.
- *Range:* Enabled | Disabled
- *Default:* Disabled


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

- **Tx Ethernet Queue Size:**

- *Description:* This parameter is used to set different Tx Queue sizes. Driver ships with reasonable defaults.
- *Value:* 512-4096
- *Default:* 1024

- **Tx Offload Queue Size:**

- *Description:* This parameter is used to set different Offload Tx Queue sizes. Driver ships with reasonable defaults.
- *Value:* 256-4096
- *Default:* 512

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

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

- *Description:* This parameter enables or disables 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:* This parameter enables or disables computation of UDP checksum by the adapter for IPv6 packets.
- *Value:*
 - Disabled
 - Rx & Tx Enabled
 - Rx Enabled
 - Tx Enabled
- *Default:* Rx & Tx Enabled

- **Virtual Machine Queues:**

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

- **VLAN Identifier:**

- *Description:* Specifies the VLAN ID to be inserted.
- *Value:* 0-4094
- *Default:* 0

- **VMQ LookAhead Split:**

- *Description:* Enable or disable the ability to split receive buffers into lookahead and post-lookahead buffers.
- *Value:* Enabled | Disabled
- *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:* Enabled | Disabled
- *Default:* Enabled

2.3. Enabling SMB Direct

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

You can use the following PowerShell command `Get-NetAdapterRdma` to get a list of RDMA capable interfaces in your system.



Note

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. Disable firewall for Chelsio adapters when using SMB.

2.4. Verifying RDMA

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

2.4.1. Verify active connections using PowerShell

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

2.4.2. Use Event Viewer

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

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

2.5. Troubleshooting

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

- Operating system version should be Windows Server 2012 R2.
- 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.



Note

Please configure the Microsoft firewall to allow traffic between the SMB clients and server.

III. 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 anytime 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.

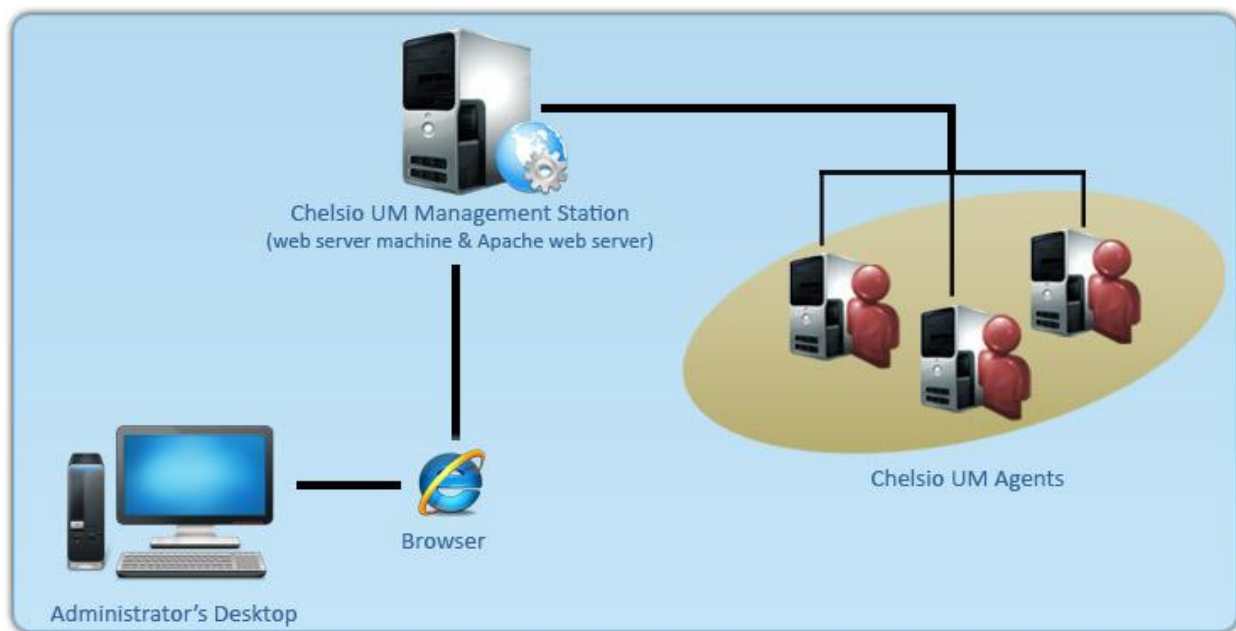


Figure 1.2 – Chelsio Unified Wire Manager with web interface (Web GUI)

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:

- **T5 Adapters**
 - T520-CR
- **T4 Adapters**
 - T420-CR
 - T440-CR
 - T422-CR
 - T404-BT
 - T420-BT
 - T420-LL-CR
 - T440-LP-CR
 - T420-CX
 - T420-SO-CR

2.2. Platform/Component Matrix

The table below lists the Windows version and the 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/T4 driver(s) and their supported versions:

| Chelsio driver | Version |
|----------------|----------|
| NIC | 5.1.29.0 |

3. Installing Unified Wire Manager

3.1. Pre-requisites

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

3.1.1. 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

3.1.2. Management Station

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

1. Install **Python 2.6.6 (32-bit)**. (Download from <http://www.python.org/ftp/python/2.6.6/python-2.6.6.msi>)
2. Ensure that the path to python binary (typically "C:\Python26"), is added to PATH system variable.
3. Install **Apache HTTP Server 2.2** with SSL. (Download from http://www.apache.org/dist/httpd/binaries/win32/httpd-2.2.25-win32-x86-no_ssl.msi)
4. If the Apache Server is running, it should be stopped before starting the installation process.

3.2. Installation

The following section describes the procedure to install UM. If an older version of the software exists, the Installer will upgrade it to the current version.

1. Run the **UnifiedWireManager-x.x.xx-x64** installer application.
2. Click the **Next** button for the Chelsio End User License Agreement Window.

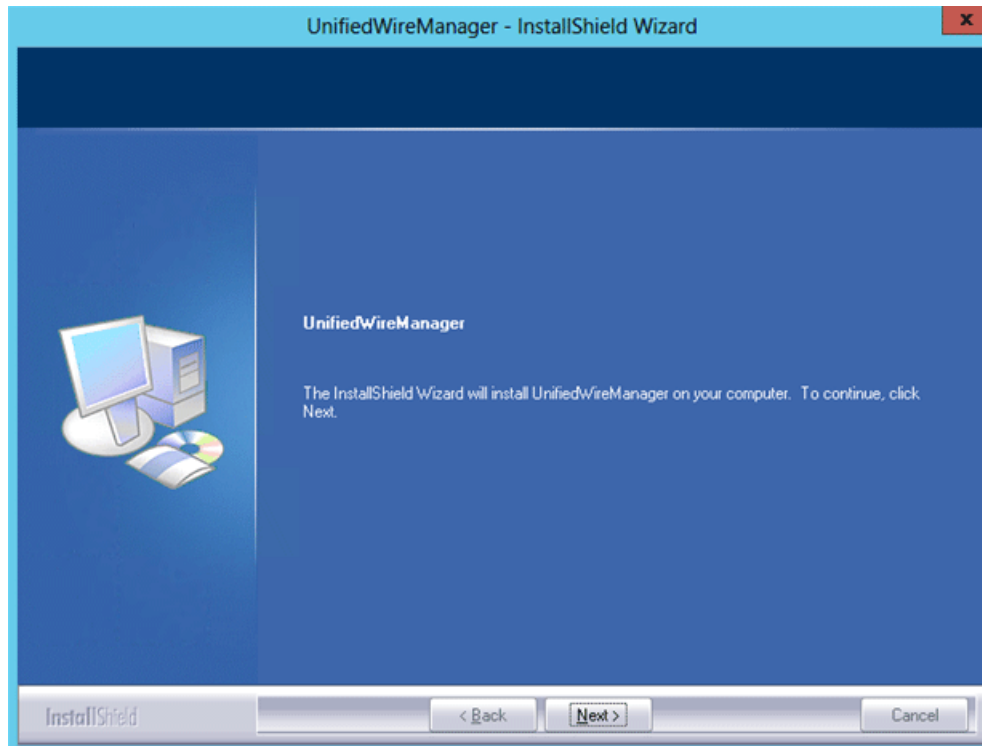


Figure 3.2 (a) – UM installer welcome window

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

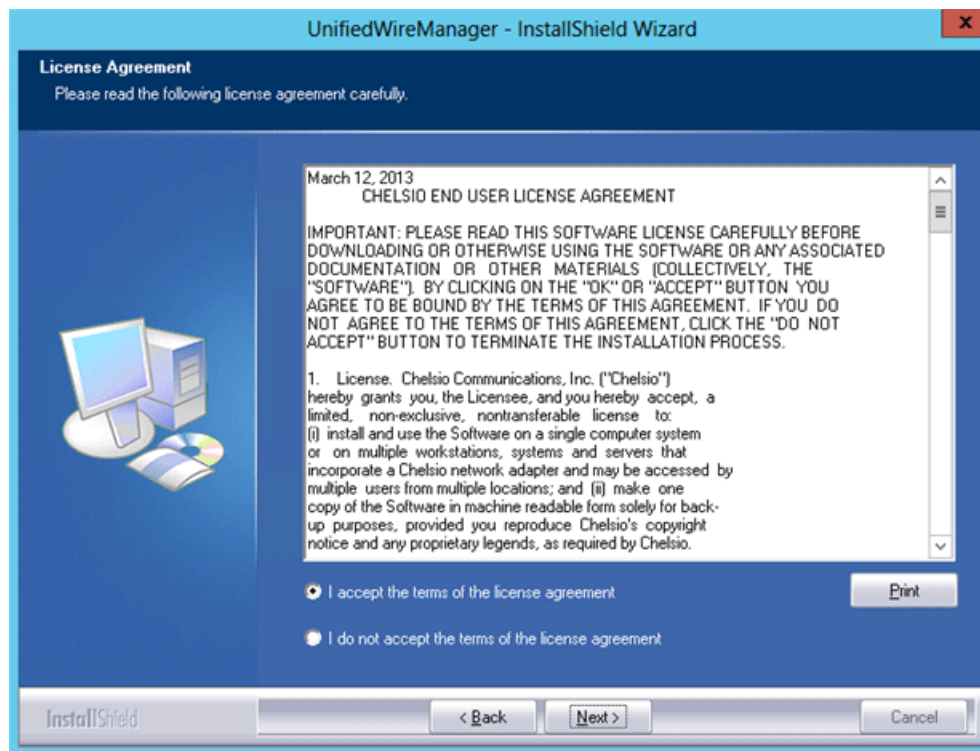


Figure 3.2 (b) – Chelsio EULA window

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

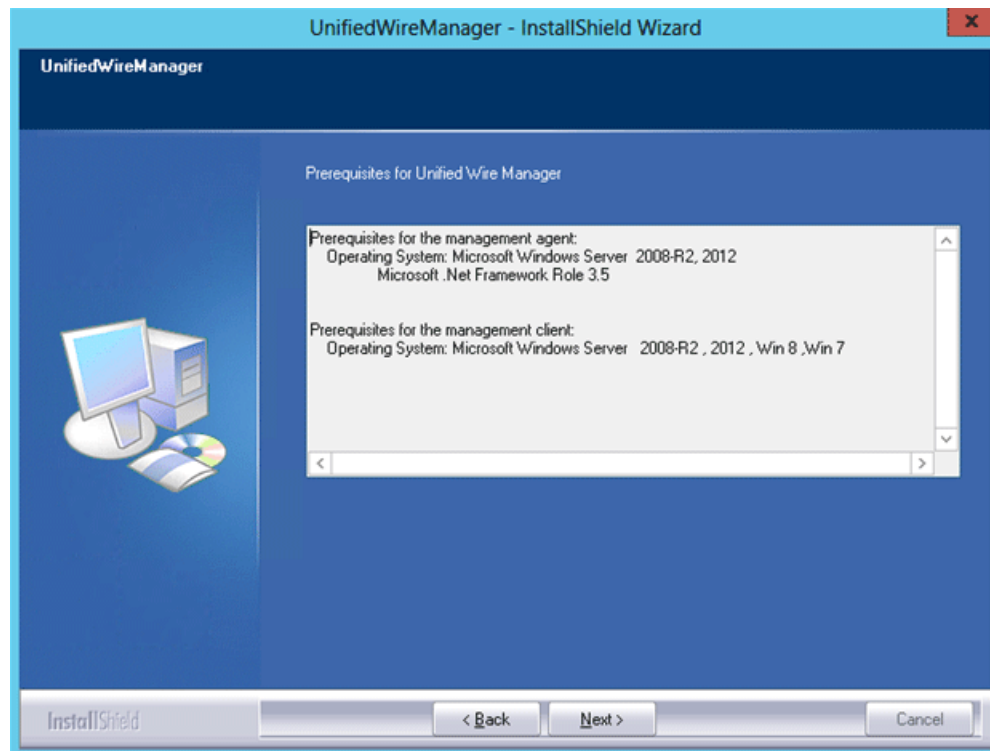


Figure 3.2 (c) – UM prerequisites window

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

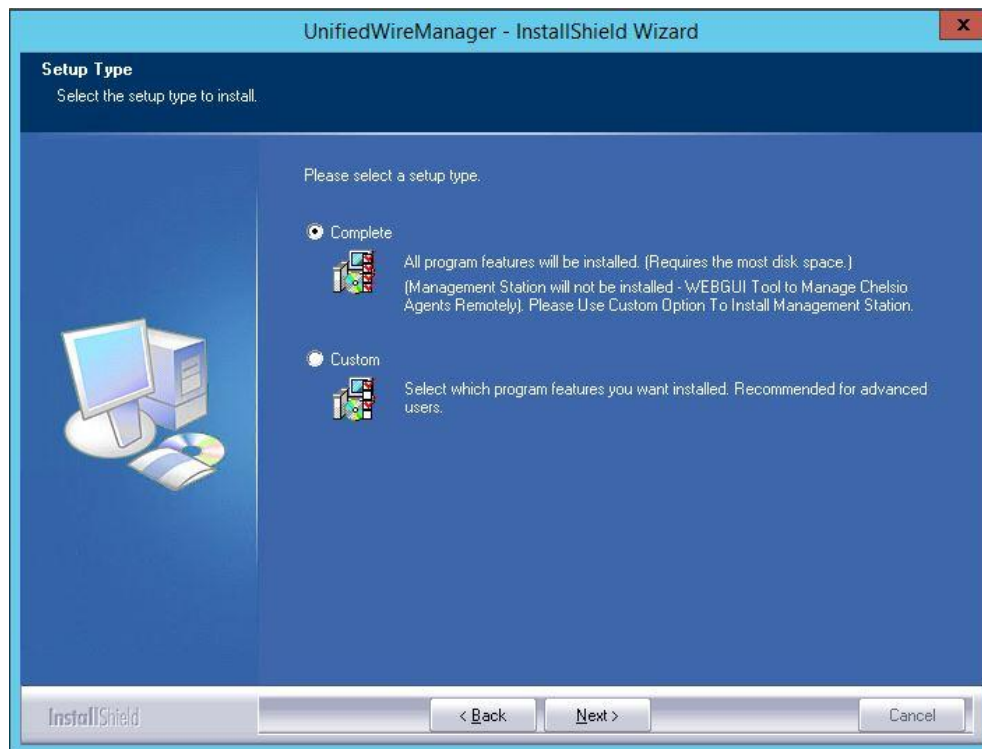


Figure 3.2 (d) – Select setup (installation) type

- i. 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.

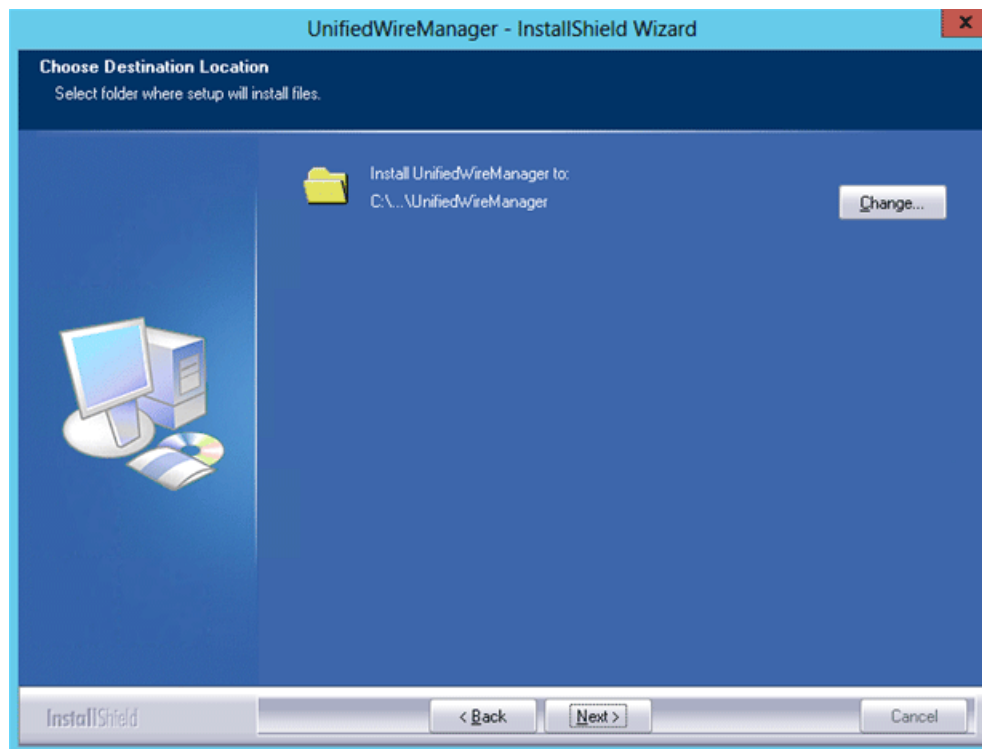


Figure 3.2 (e) – Changing UM installation path

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

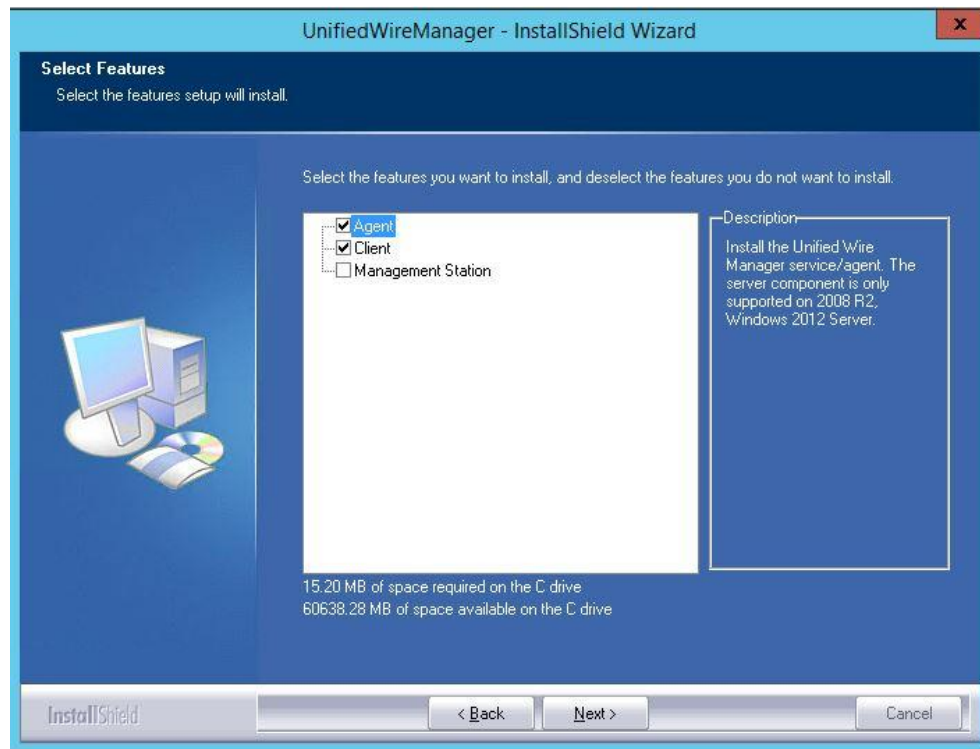
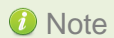


Figure 3.2 (f) – Selecting UM components to install



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.

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

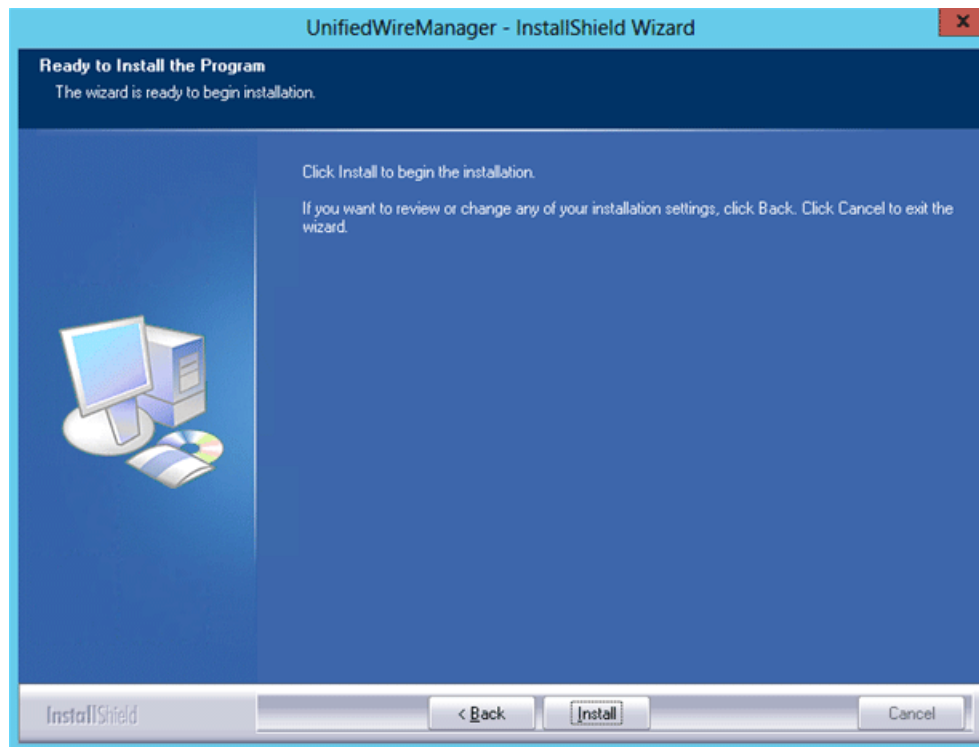


Figure 3.2 (g) – Starting UM installation

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

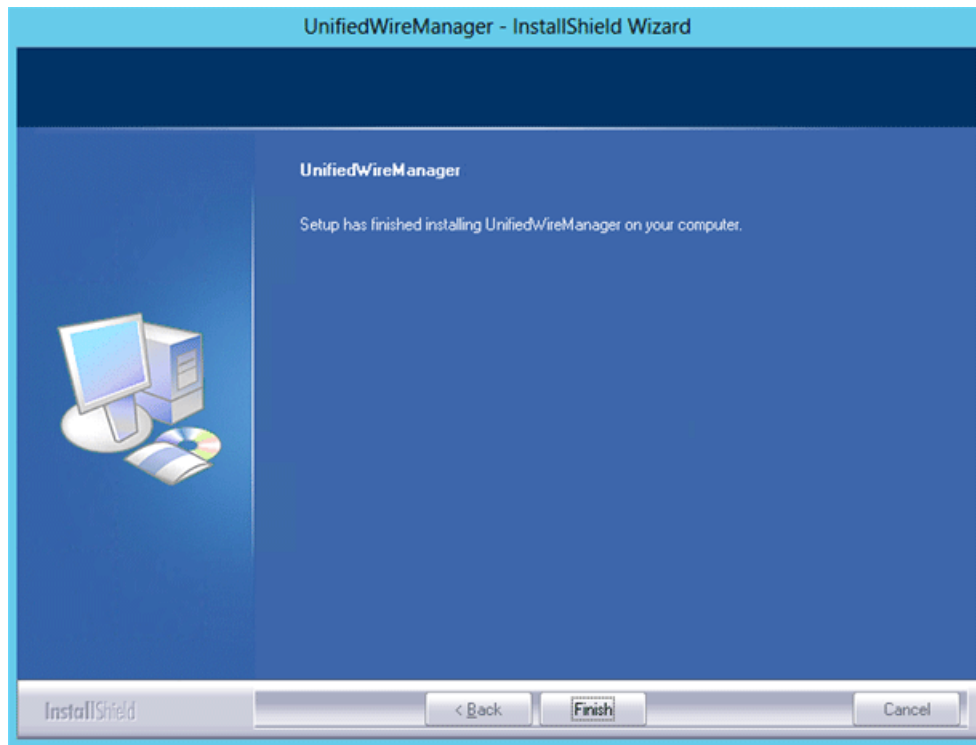


Figure 3.2 (h) – Finishing UM installation

4. Configuring Unified Wire Manager

4.1. Configuring Management Station

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

4.1.1. Apache HTTP Server

1. 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
```

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


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

4.1.2. SSL Certificate

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

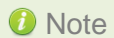
```
cd "C:\Program Files (x86)\Apache Software Foundation\Apache2.2\conf"
..\bin\openssl req -config openssl.cnf -new -out blarg.csr -keyout blarg.pem
..\bin\openssl rsa -in blarg.pem -out blarg.key
..\bin\openssl x509 -in blarg.csr -out blarg.crt -req -signkey blarg.key -
days 365
```

2. Browse to the following location:

C:\Program Files (x86)\Apache Software Foundation\Apache2.2\conf\extra

1. Open the file *httpd-ssl.conf* and make the following modifications:

- i. Modify "SSLCertificateFile" to "C:\Program Files (x86)\Apache Software Foundation\Apache2.2\conf\blarg.crt"
- ii. 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

- i. *Uncomment the following line*
SSLSessionCache "dbm:C:/Program Files (x86)/Apache Software Foundation/Apache2.2/logs/ssl_scache"
- ii. *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

1. 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.

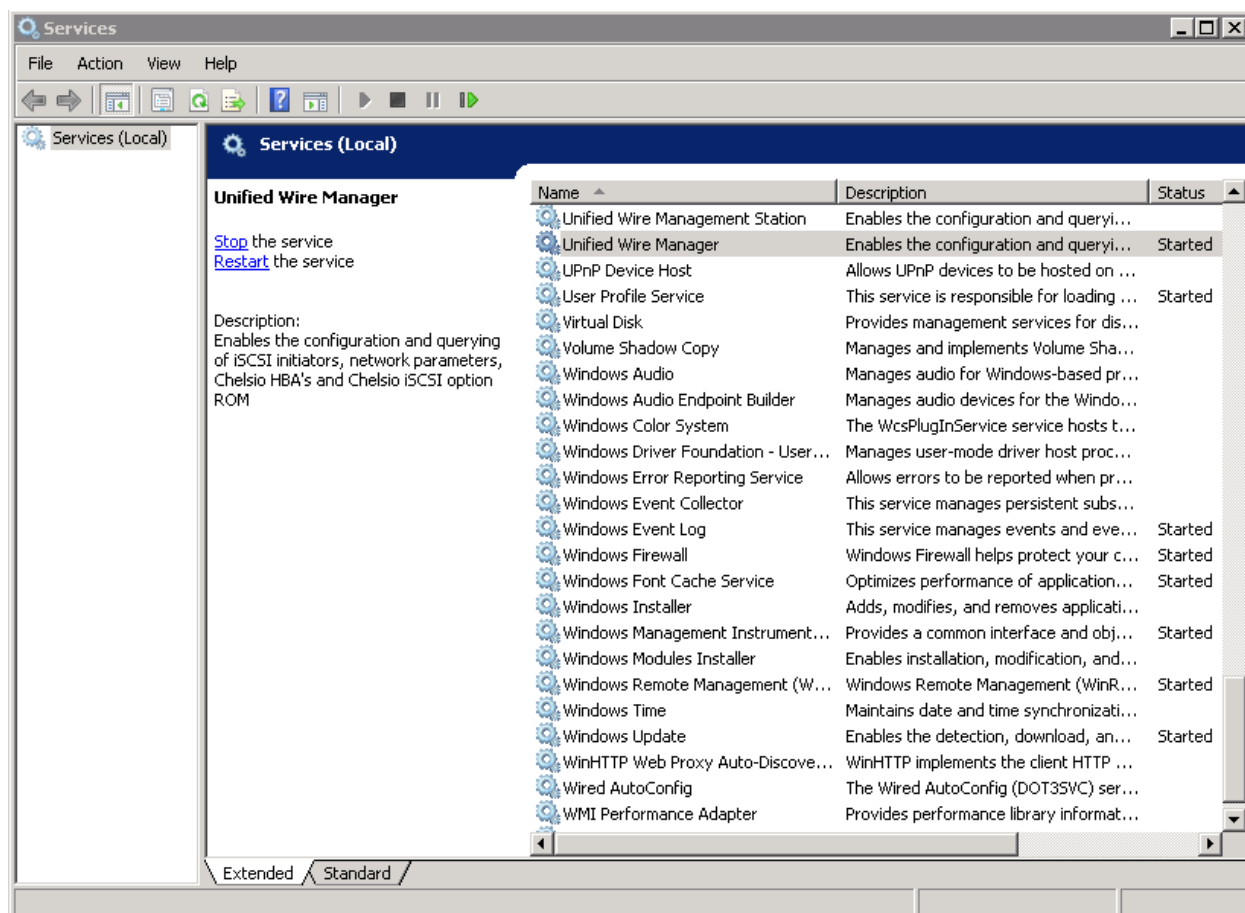


Figure 5.1(a) – Windows Services

2. 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.

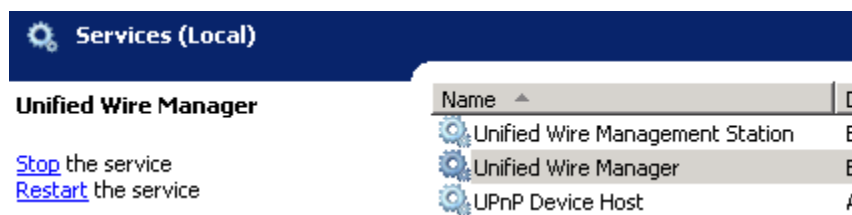


Figure 5.1(b) – Actions available for Unified Wire Manager service

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

1. Launch **Services** from the Control Panel. You can also type *services.msc* in the **Run** command. This will open the **Services** window.
2. 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.

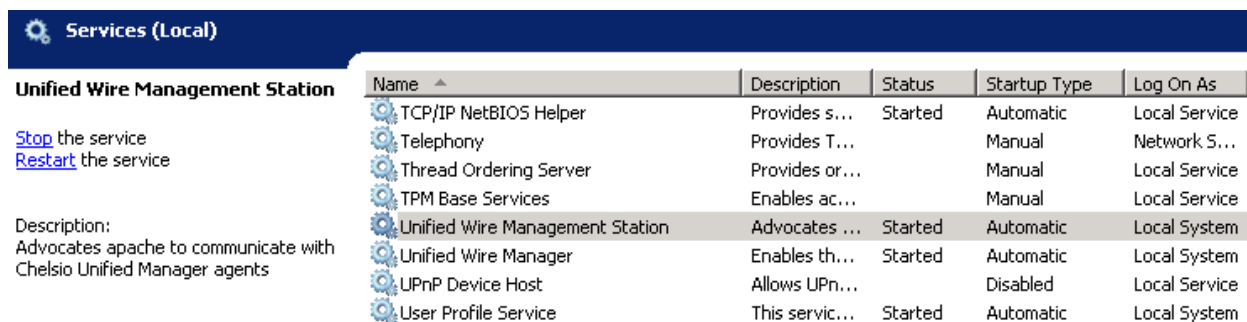


Figure 5.3 – Verifying Management Station service status



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:

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

6.2.2. Service start/stop/restart

1. Launch **Services** from the Control Panel. You can also type `services.msc` in the **Run** command. This will open the **Services** window.
2. Scroll and highlight the "Unified Wire Manager" service.
3. 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

1. Open command prompt by typing `cmd` in the **Run** command.
2. 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

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

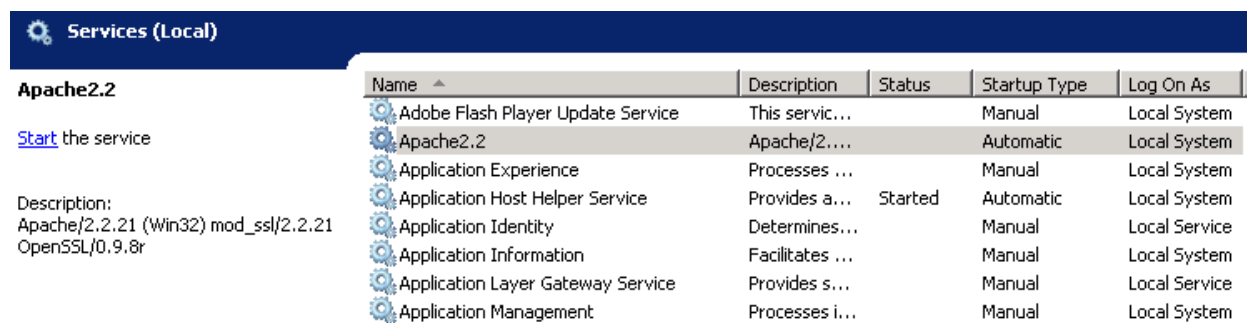


Figure 8.1.1 (a) – Starting Apache HTTP server

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

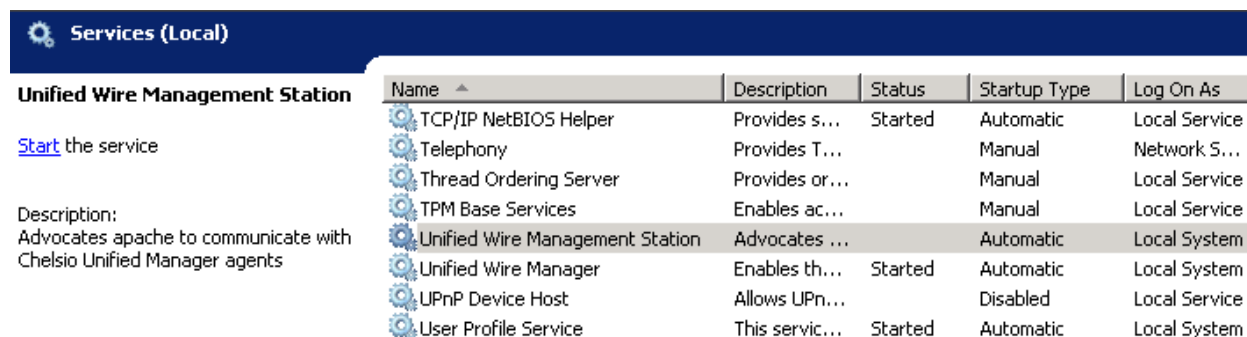


Figure 8.1.1(b) – Starting Management Station service

8.2. Accessing Web Management Interface

1. To access the Web GUI, type in the URL https://<management station IP address> in a web browser.
2. 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.

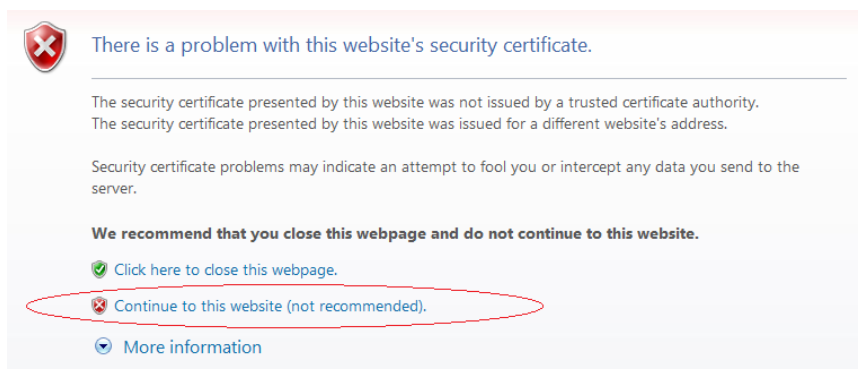


Figure 8.2 (a) - Security Certificate prompt in Internet Explorer

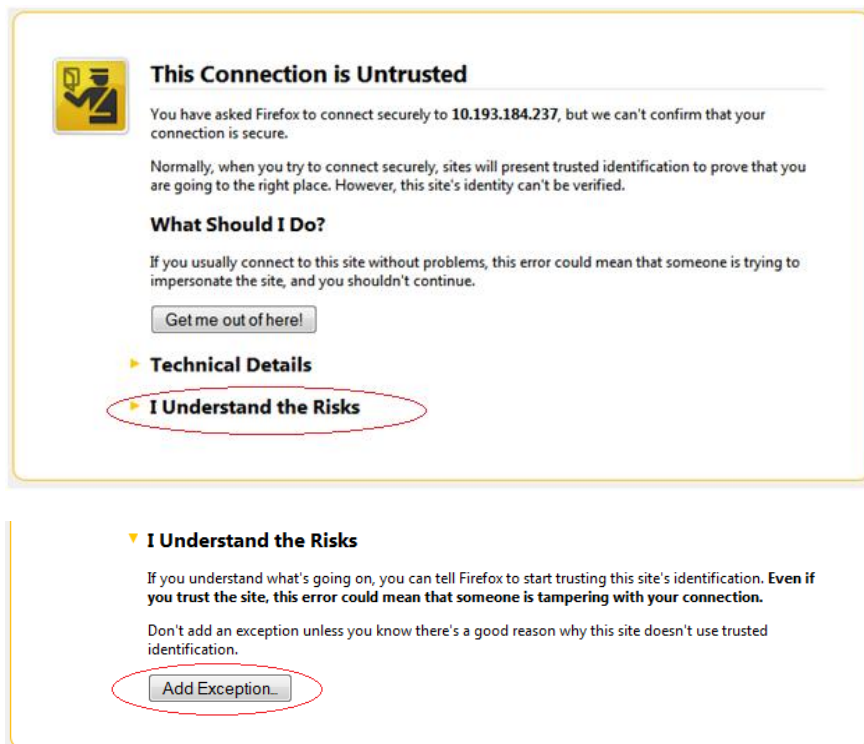


Figure 8.2 (b) - Security Certificate prompt in Mozilla Firefox

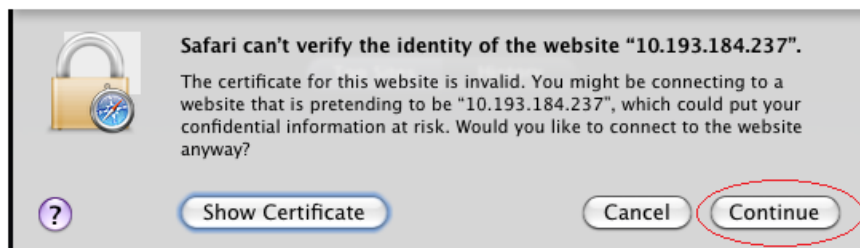


Figure 8.2 (c) - Security Certificate prompt in Apple Safari

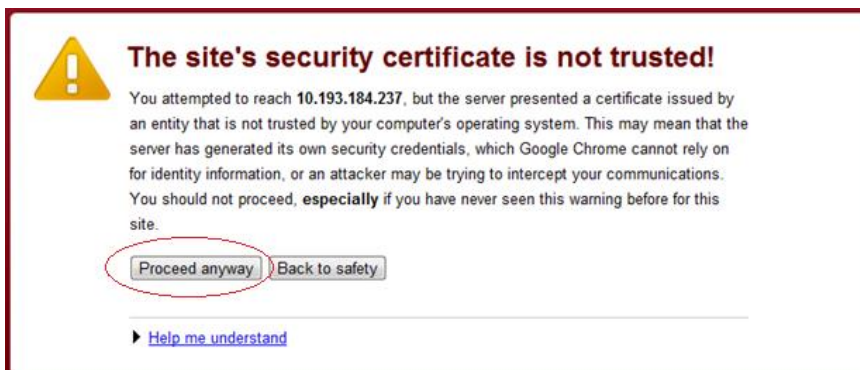


Figure 8.2 (d) - Security Certificate prompt in Google Chrome

3. The web interface requires password authorization to be accessed. Enter the username and corresponding password that was set up on the management station system and click on the *Login* button.

A screenshot of a web GUI login page. The page has a title "Login". Below the title, there are two input fields: "Username" and "Password". The "Username" field contains the text "user1". The "Password" field contains masked characters (dots). Below the input fields is a blue button labeled "Login".

Figure 8.2 (e) - 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 8.3 – 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.

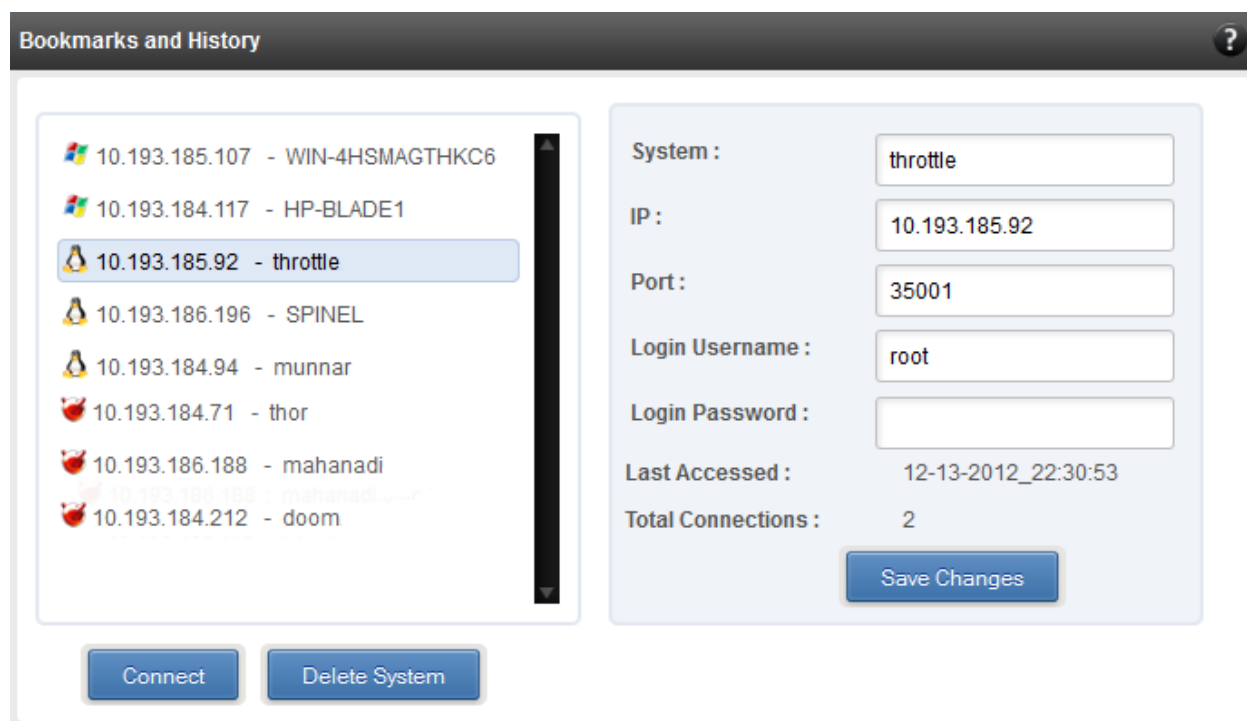


Figure 8.4.1 (a) - Bookmarks and history module

- **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.

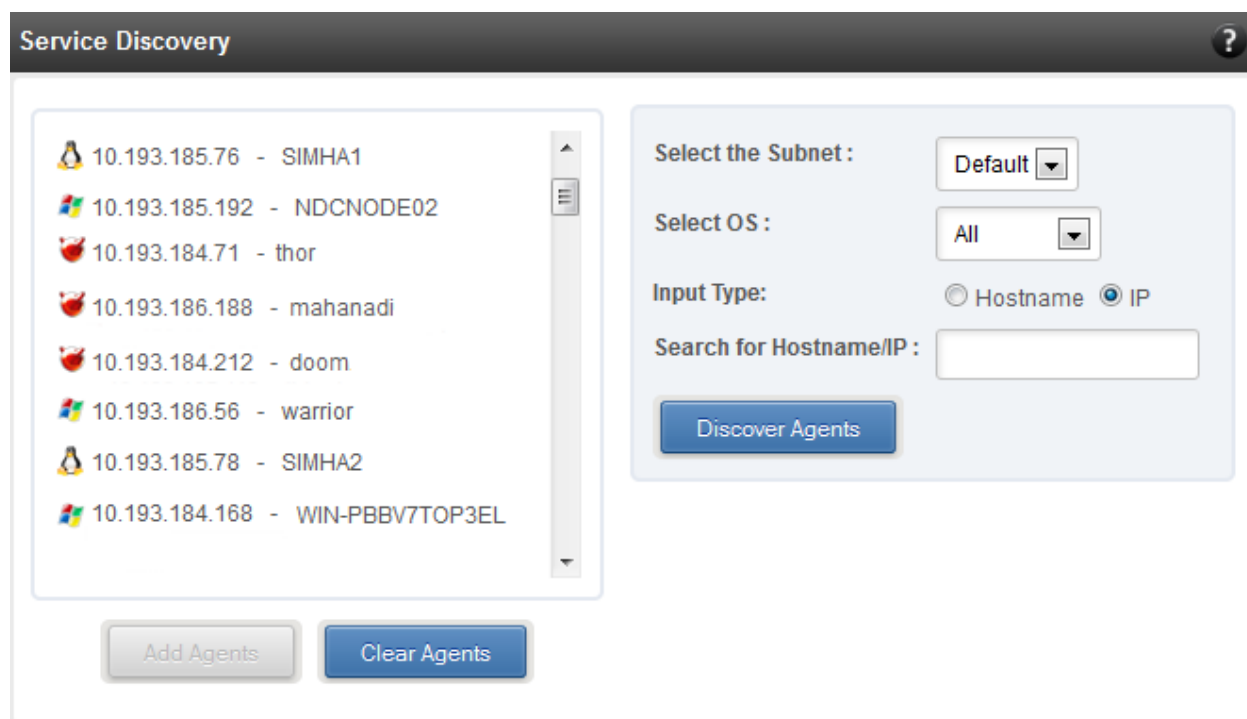


Figure 8.4.1 (b) - Services Discovery module

• 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

1. In the **Choose the card** fields, select T3 or T4/T5 depending on the chip revision of the network card.
2. 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.

3. Select a system or systems from the list and choose the driver to be installed in the **Driver Installation** section.
4. Download the appropriate driver from Chelsio's Download Center, service.chelsio.com.
5. Locate the driver package.
6. Click **Install** button to install the driver.

The screenshot shows the 'Bulk Driver Installation' window. At the top, there are two dropdown menus: 'Choose card type:' set to 'T4/T5' and 'Choose Os type:' set to 'Windows'. Below these is a section titled 'Select system for driver installation' containing a list box with one entry: '10.193.184.62 - SHARK'. To the right of this list is a 'Note' box with four points: 1. Systems from Bookmarks & History with stored login/password will appear here. 2. Connected system will not be listed. 3. System that reports error will be automatically skipped. 4. Systems with incorrect login credentials will also be skipped. Below the system list is a section titled 'Chelsio Drivers' with a list of driver categories: 'NIC' (checked), 'Team', 'FCoE Full Offload Initiator', 'VNIC', and 'ND (Available only for Chelsio Card T420-CR)'. The 'Team' category is selected, showing a text field with 'ChelsioUwire-5.0.0.7.e' and a 'Select windows driver' button. At the bottom of the window are two buttons: 'Install' and 'Discard Changes'.

Figure 8.4.1 (c) - Bulk Driver Installation module

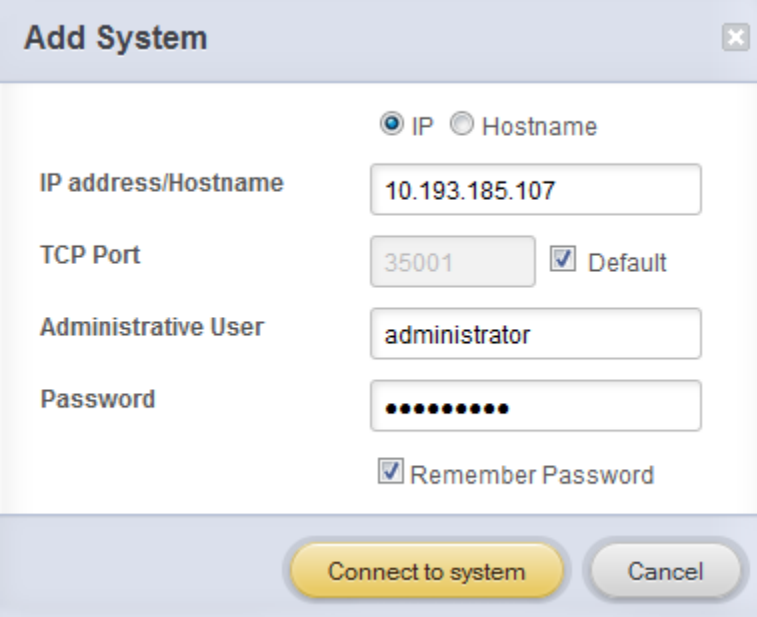
Note Agents that report errors or whose passwords are not stored, will be automatically skipped during the driver installation.

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 a software dialog box titled "Add System" with a close button (X) in the top right corner. The dialog contains several input fields and checkboxes. At the top, there are two radio buttons: "IP" (selected) and "Hostname". Below this, the "IP address/Hostname" field contains the text "10.193.185.107". The "TCP Port" field contains "35001" and has a checked checkbox labeled "Default". The "Administrative User" field contains the text "administrator". The "Password" field is masked with ten black dots. Below the password field is a checked checkbox labeled "Remember Password". At the bottom of the dialog, there are two buttons: "Connect to system" (highlighted in yellow) and "Cancel".

Add System

☒ IP ☐ Hostname

IP address/Hostname: 10.193.185.107

TCP Port: 35001 ☒ Default

Administrative User: administrator

Password:

☒ Remember Password

Connect to system Cancel

Figure 8.4.2 (a) - 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.

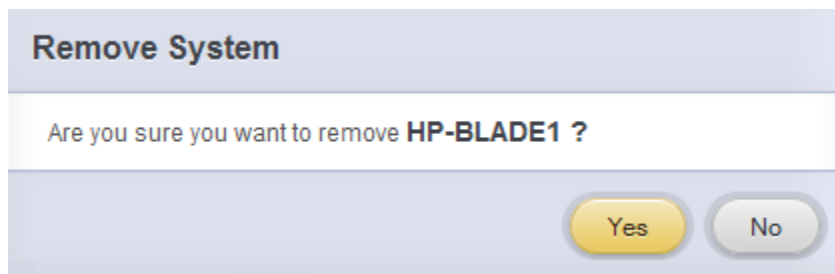


Figure 8.4.3 - Removing a UM Agent

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).

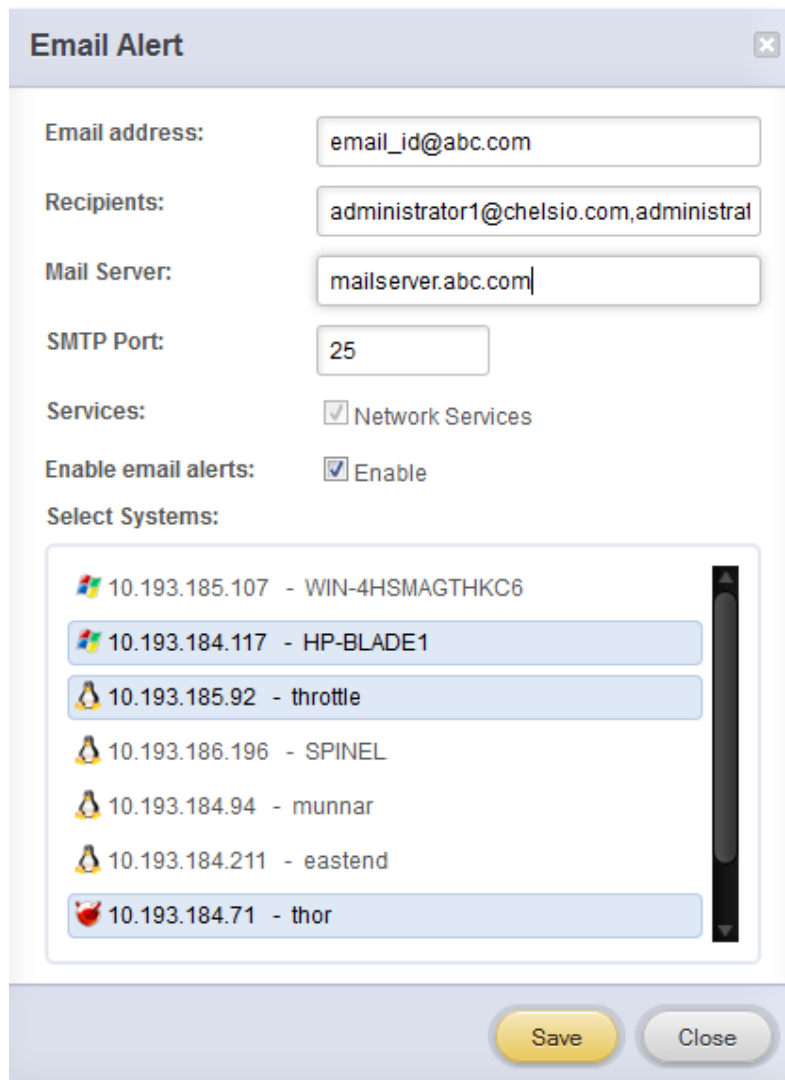
To reload an Agent, click on the name of the system in the tree menu in the left and click “Refresh”. You can use this option to update any changes made to system settings like load/unload drivers.

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 'Email Alert' window is a configuration dialog with a title bar and a close button. It contains several input fields and checkboxes. The 'Email address' field is set to 'email_id@abc.com'. The 'Recipients' field is set to 'administrator1@chelsio.com,administrat'. The 'Mail Server' field is set to 'mailserver.abc.com'. The 'SMTP Port' field is set to '25'. The 'Services' section has a checked checkbox for 'Network Services'. The 'Enable email alerts' section has a checked checkbox for 'Enable'. The 'Select Systems' section is a scrollable list of systems, each with an icon, IP address, and name. The systems listed are: 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, and 10.193.184.71 - thor. At the bottom right, there are 'Save' and 'Close' buttons.

| Icon | IP Address | System Name |
|---------|----------------|-----------------|
| Windows | 10.193.185.107 | WIN-4HSMAGTHKC6 |
| Linux | 10.193.184.117 | HP-BLADE1 |
| Linux | 10.193.185.92 | throttle |
| Linux | 10.193.186.196 | SPINEL |
| Linux | 10.193.184.94 | munnar |
| Linux | 10.193.184.211 | eastend |
| Linux | 10.193.184.71 | thor |

Figure 8.4.5 - 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: | <input type="text" value="group_t4adapter"/> |
| Os Type : | <input type="text" value="Windows"/> |
| Group Type : | <input type="text" value="t4adapter"/> |
| <input type="button" value="Create a Group"/> | |

Figure 8.4.6 (a) – Creating a group

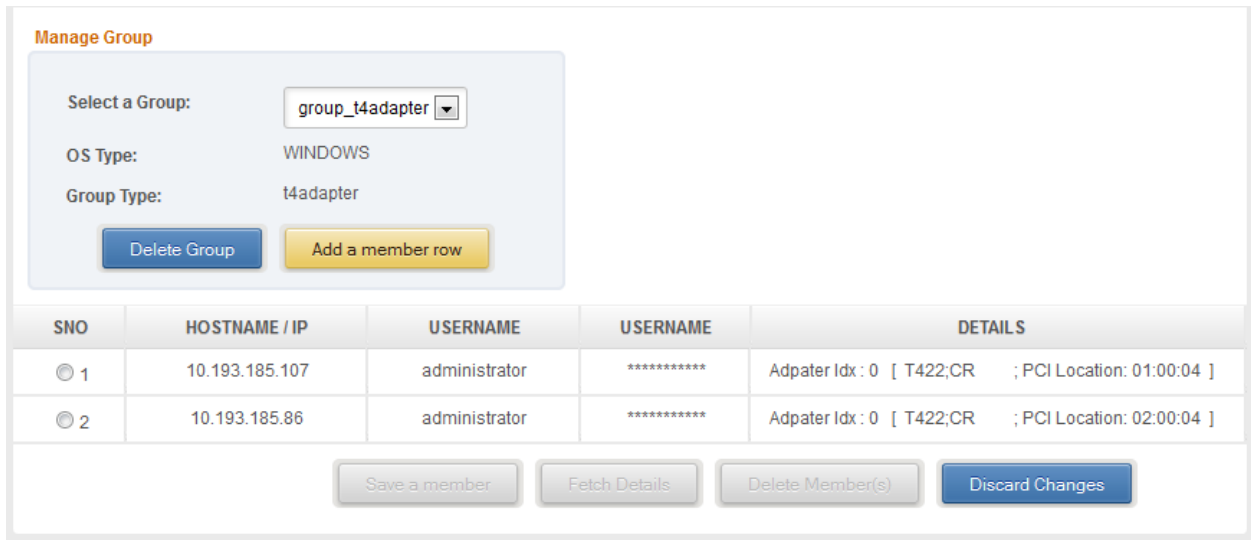


Figure 8.4.6 (b) – Managing a group

• **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.

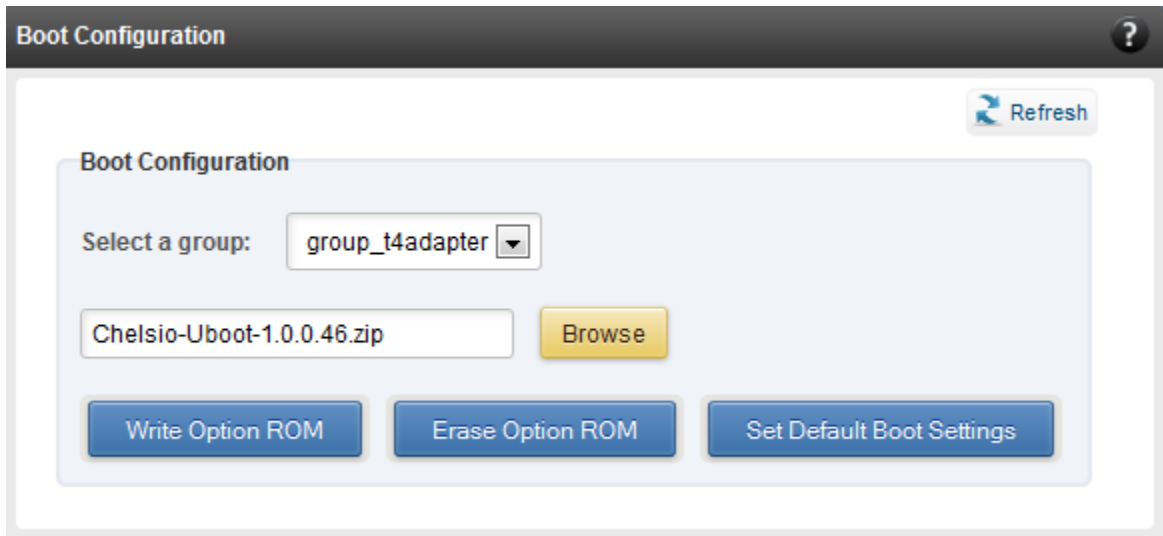
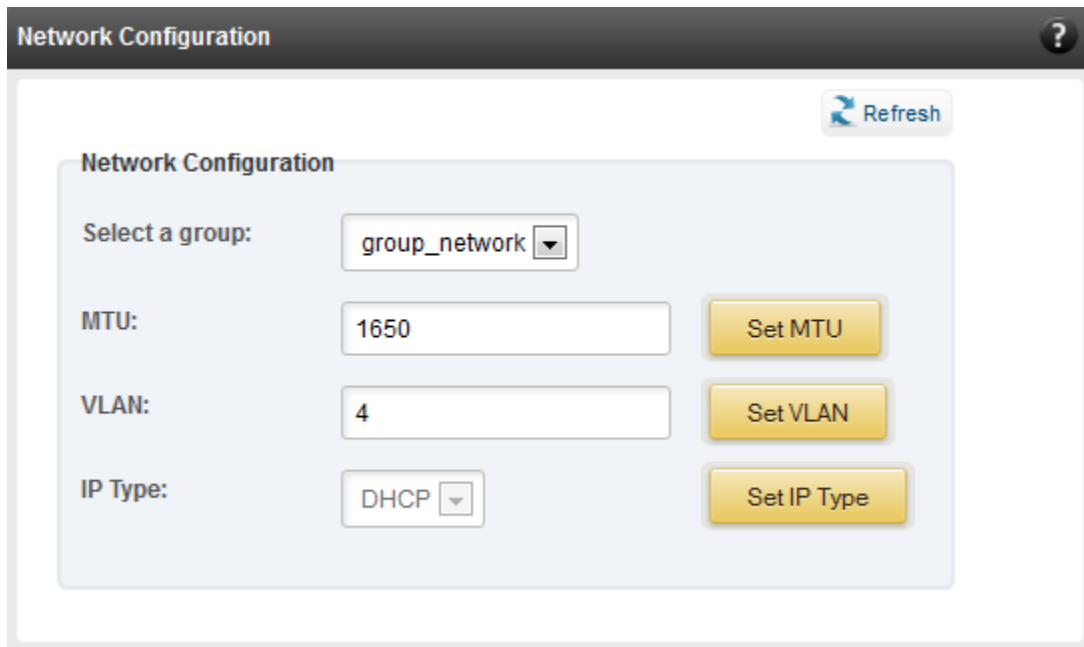


Figure 8.4.6 (c) – Boot Configuration module

- **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' module interface. At the top, there is a dark header bar with the title 'Network Configuration' and a help icon (question mark). Below the header, there is a 'Refresh' button with a circular arrow icon. The main content area is a light blue box titled 'Network Configuration'. Inside this box, there are three rows of configuration options:

- Select a group:** A dropdown menu showing 'group_network'.
- MTU:** A text input field containing '1650' and a yellow 'Set MTU' button.
- VLAN:** A text input field containing '4' and a yellow 'Set VLAN' button.
- IP Type:** A dropdown menu showing 'DHCP' and a yellow 'Set IP Type' button.

Figure 8.4.6 (d) – 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).

Card Configuration

Refresh

Select a Group: group_win_t4adapter

Group Type: t4adapter

OS Type: WINDOWS

Note:
MIN = Minimum value a variable of type int can assume
MAX = Maximum value a variable of type int can assume

| DESCRIPTION | RANGE | VALUE |
|-------------|--------|-------|
| Max VM | [0,16] | 4 |

Set Card Properties Discard Changes

Figure 8.4.6 (e) – 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 8.4.6 (f) - 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 a web-based configuration window titled "Bypass Configuration" with a help icon (?) in the top right corner. Inside the window, there is a "Refresh" button with a circular arrow icon. Below this is a light blue box containing the heading "Modify bypass configuration on the machines in the group". The configuration options within this box are: "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 of the light blue box are two buttons: "Save Changes" and "Discard Changes".


Figure 8.4.6 (g) - 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 screenshot shows a window titled "System Summary" with a help icon in the top right corner. Inside the window is a table with two columns: "PROPERTY" and "VALUE". The table contains five rows of system information.

| 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 8.5.1 (a) - System Summary module

8.5.2. Drivers Installation

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

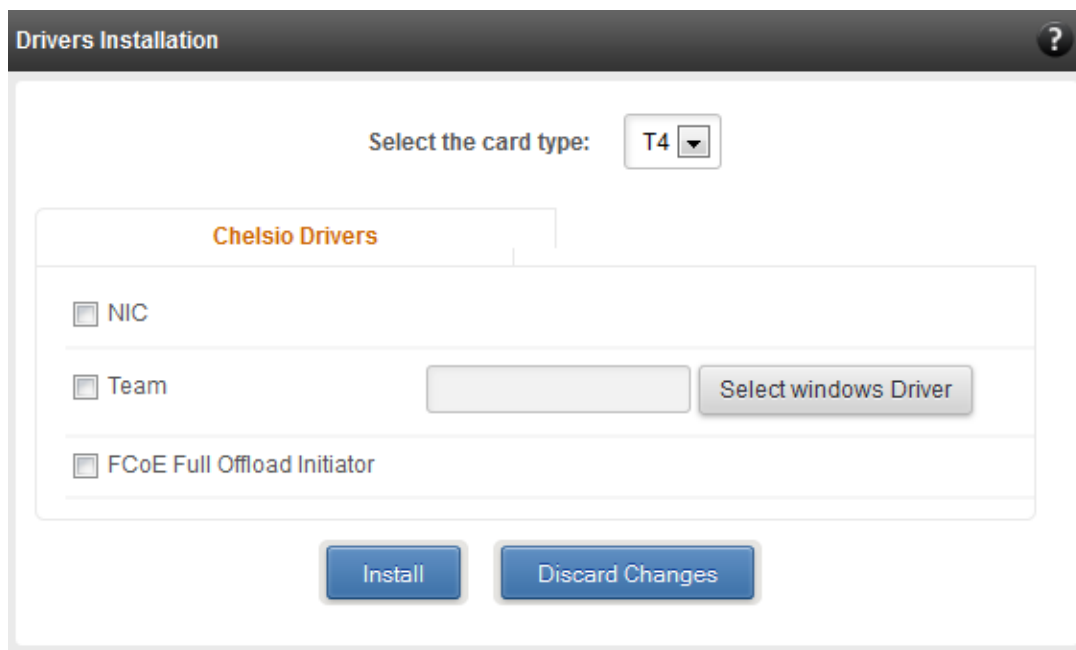



Figure 8.5.2 (a) - Drivers Installation module connected to Windows Agent

 **Note** *Teaming driver is not available for Windows Server 2012*

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 8.5.3 - Driver Details module

8.5.4. System Diagnostics

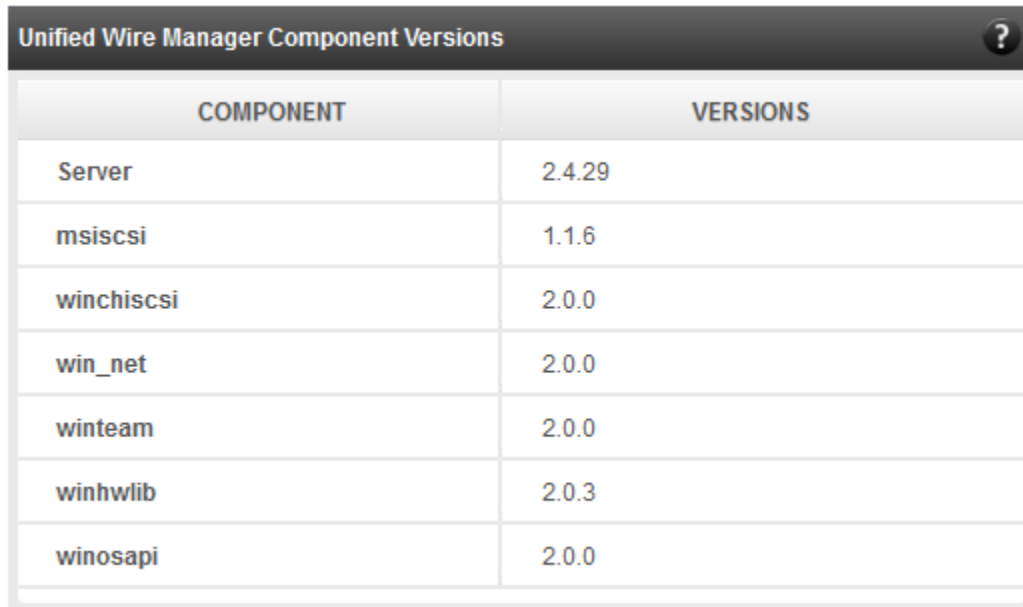
Using this module, you can run various diagnostic tests on Chelsio adapters to troubleshoot adapter related issues. Select the adapter(s) from the list for which you want to run the test, select the operation (type of test; you can run more than one test at a time) and click **Run Test**. After the tests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

| CARD | LED | CONTROL REGISTERS | MI I REGISTERS | EEPROM | INTERNAL MEMORY |
|---------|---------|-------------------|----------------|---------|-----------------|
| T420-CR | Success | Success | Success | Success | Success |

Figure 8.5.4 - 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 8.5.5 - 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.

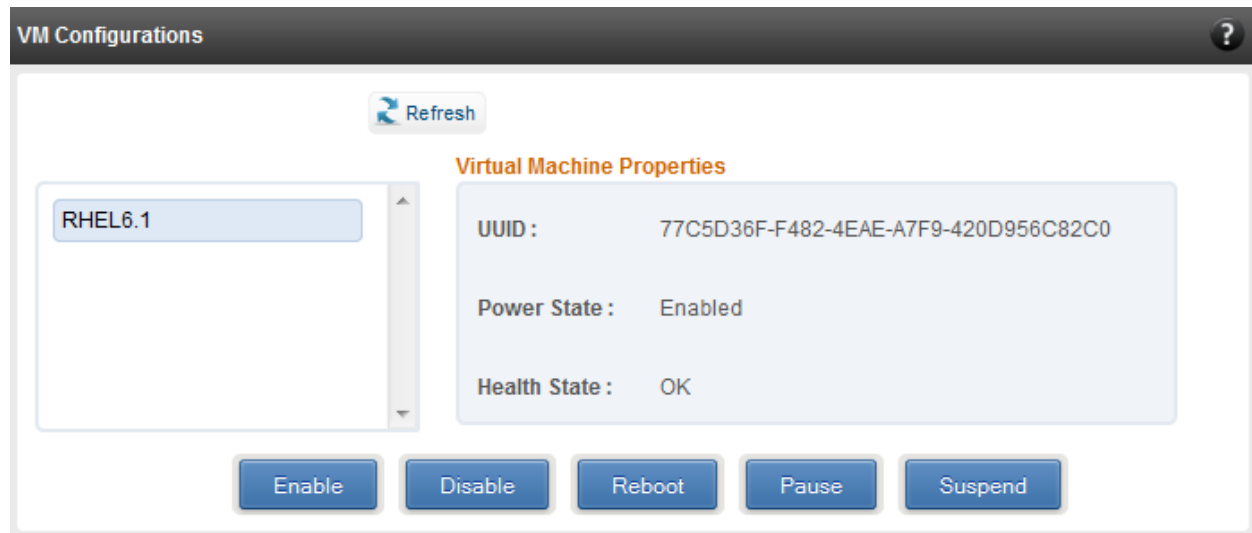


Figure 8.5.6 - VM Configurations module

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.

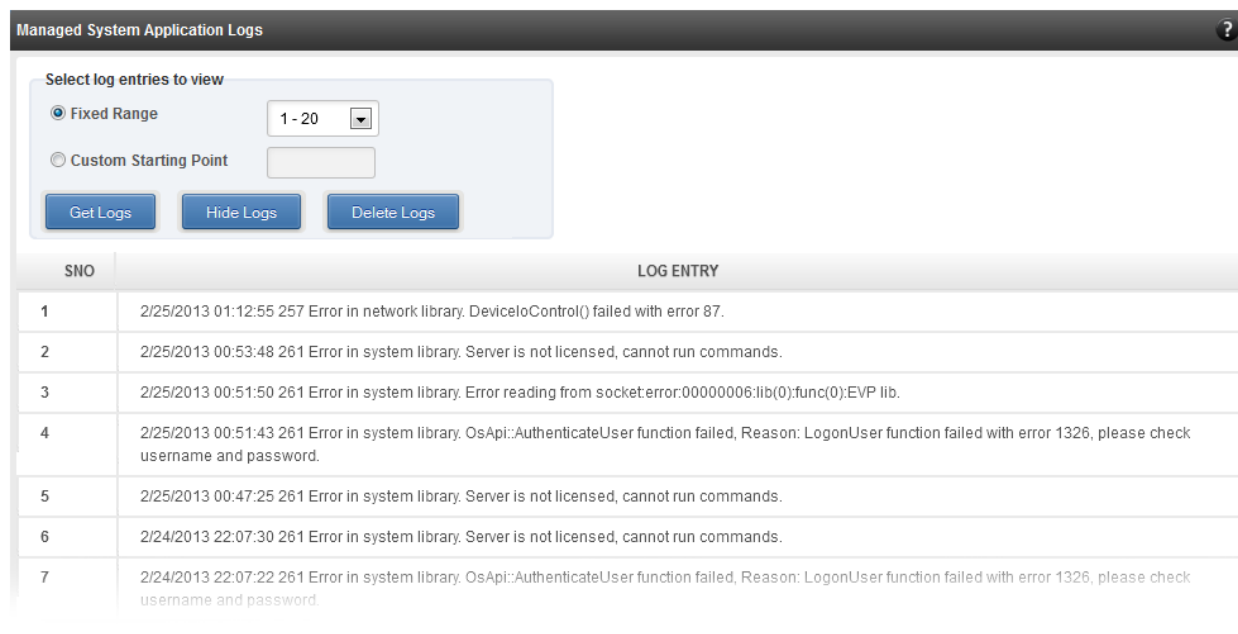


Figure 8.5.7 - Managed System Application Logs module for Windows Agent

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 8.6.1 - 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 8.6.2 (a) - 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) ?

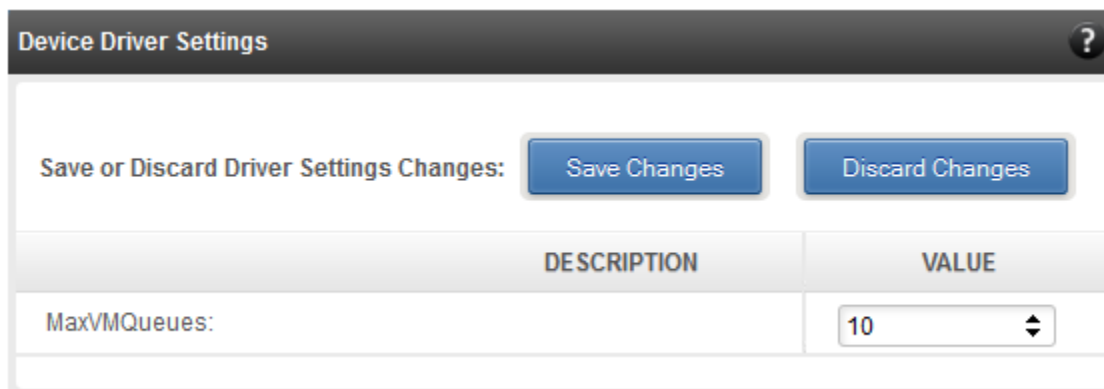
Save or Discard Driver Settings Changes: Save Changes Discard Changes

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

Figure 8.6.2 (b) - 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.

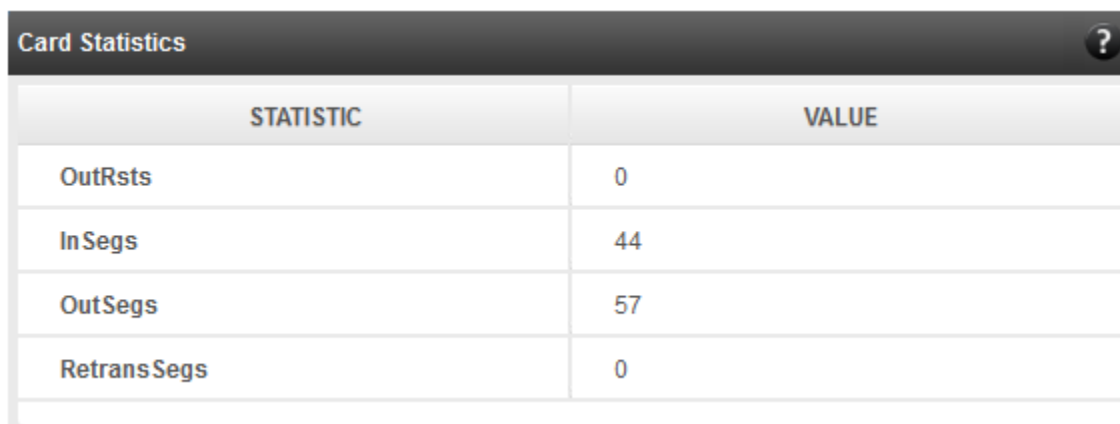


| DESCRIPTION | VALUE |
|--------------|-------|
| MaxVMQueues: | 10 |

Figure 8.6.2 (c) - 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 8.6.2 (d) - 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 8.6.2.1 (a) - 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:

Save Changes

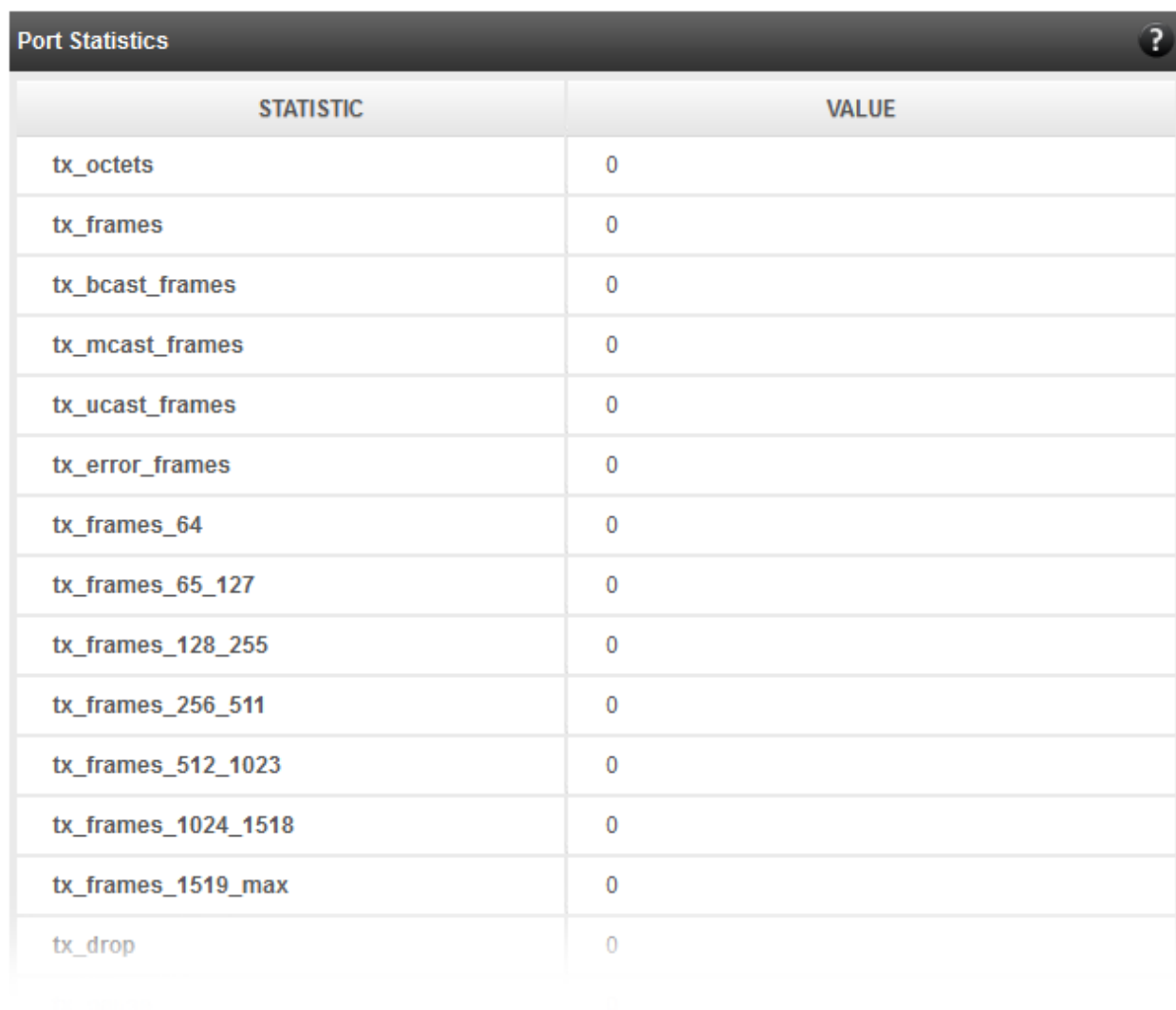
Discard Changes

| 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 WQ on filtering: | Yes |

Figure 8.6.2.1 (b) - Port Settings of T4 CNA

- **Port statistics**

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



The screenshot shows a window titled "Port Statistics" with a help icon in the top right corner. Below the title bar is a table with two columns: "STATISTIC" and "VALUE". The table lists various network statistics, all of which have a value of 0. The statistics include tx_octets, tx_frames, tx_bcast_frames, tx_mcast_frames, tx_ucast_frames, tx_error_frames, tx_frames_64, tx_frames_65_127, tx_frames_128_255, tx_frames_256_511, tx_frames_512_1023, tx_frames_1024_1518, tx_frames_1519_max, and tx_drop.

| 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 8.6.2.1 (c) - 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.

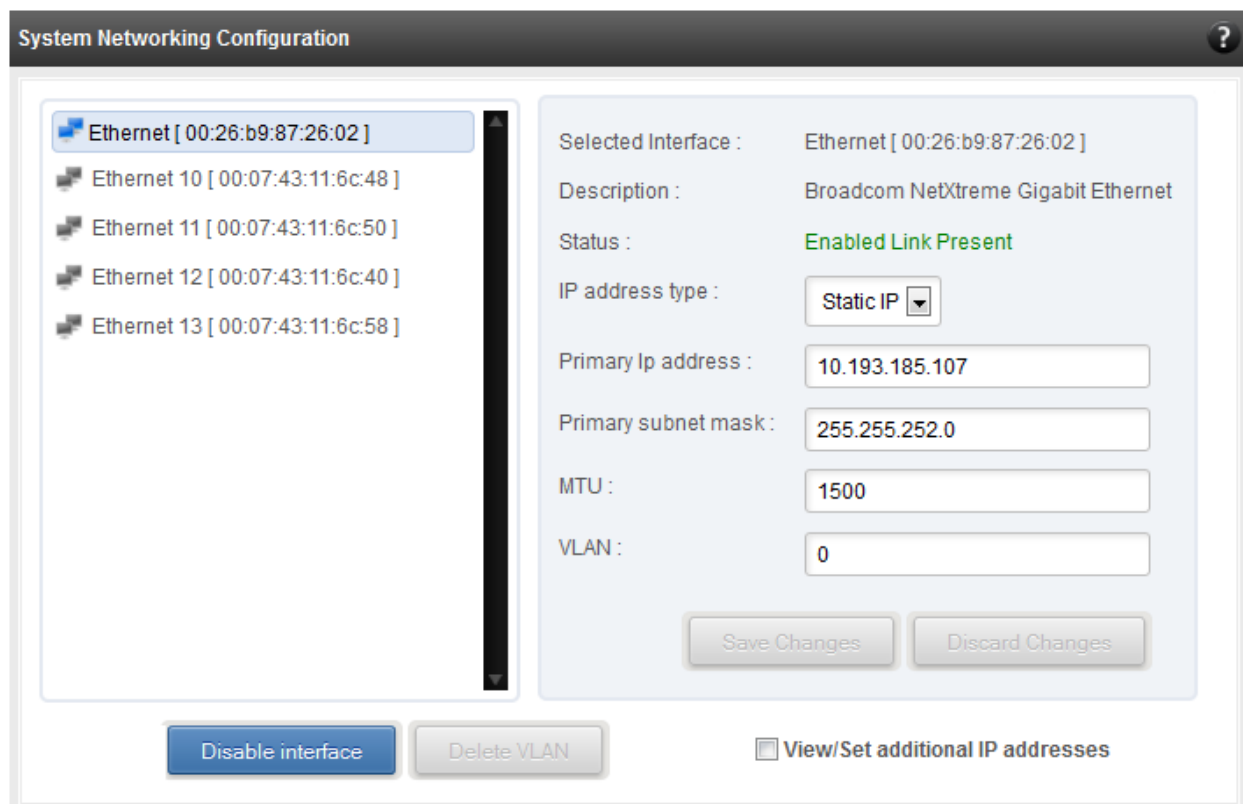


Figure 8.6.3 (a) - System network configuration module

The screenshot displays the 'Additional IP Address' section of the Unified Wire Manager (UM) interface. On the left, a list box contains one entry: '10.193.185.105 / 255.255.252.0'. To the right of this list are three main sections: 'Add IP Address', 'Modify Selected IP Address', and a 'Delete Selected IP Address' button. The 'Add IP Address' section has input fields for 'IP' (10.193.185.103) and 'Mask' (255.255.252.0), followed by an 'Add' button. The 'Modify Selected IP Address' section has input fields for 'IP' (10.193.185.105) and 'Mask' (255.255.252.0), followed by a 'Modify' button. The 'Delete Selected IP Address' button is located below the 'Modify' button.

Additional IP Address

10.193.185.105 / 255.255.252.0

Add IP Address

IP 10.193.185.103 Mask 255.255.252.0 **Add**

Modify Selected IP Address

IP 10.193.185.105 Mask 255.255.252.0 **Modify**

Delete Selected IP Address

Figure 8.6.3 (b) – 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.

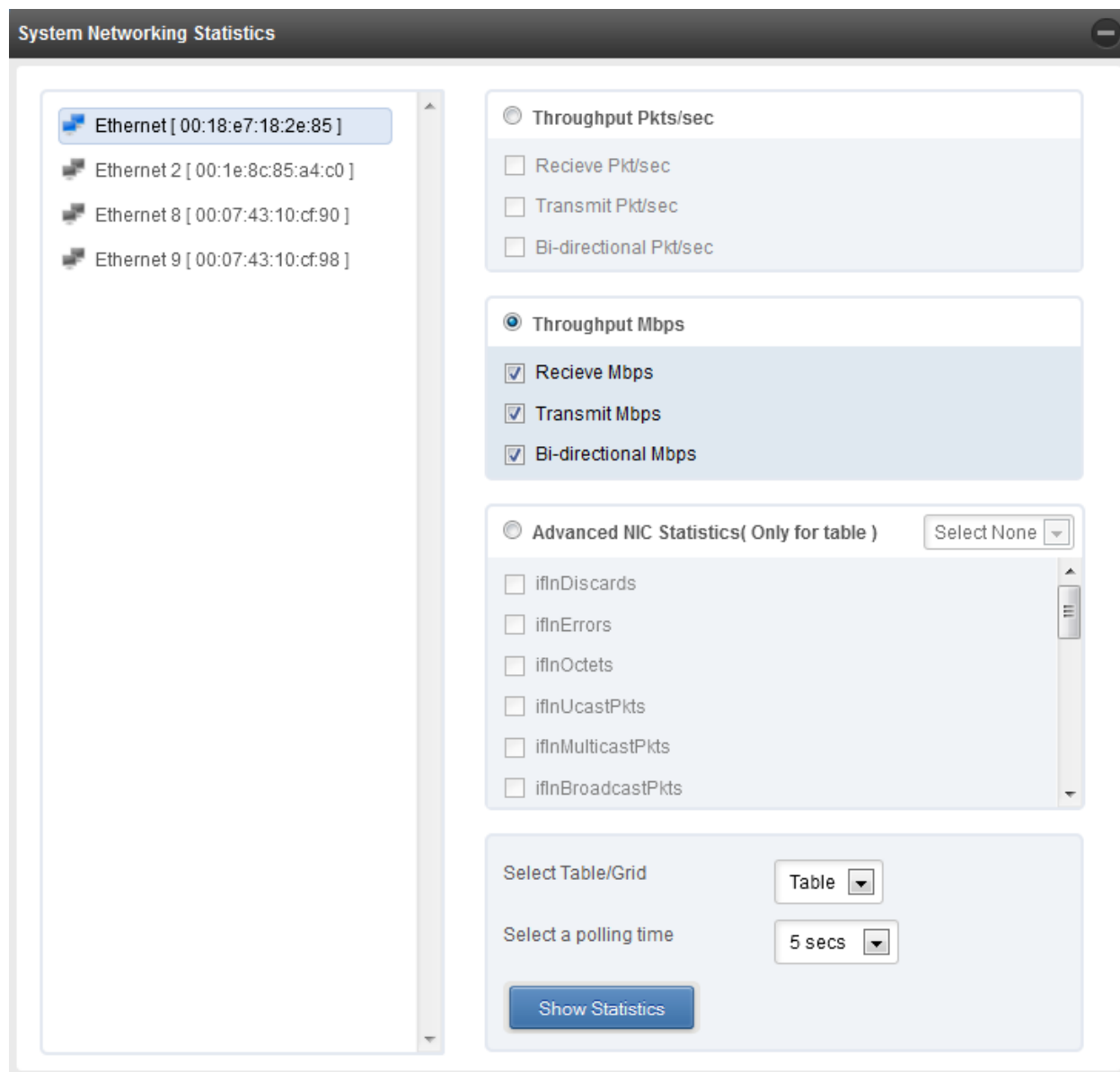


Figure 8.6.3 (c) - System network statistics module

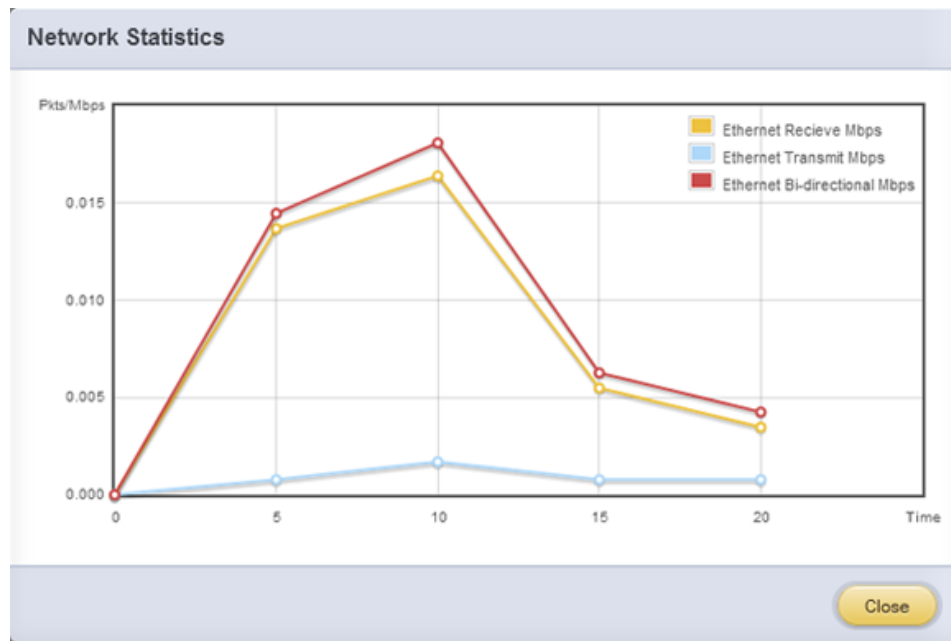


Figure 8.6.3 (d) - Network Throughput Vs Time instant Graph

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

Figure 8.6.3 (e) - 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.

The screenshot shows a configuration window titled "Default Gateway And DNS Configuration". It is divided into two main sections:

- Default Gateway Configuration:**
 - A list on the left shows a single gateway: 10.193.184.1.
 - On the right, the "Network Adapter" is set to "Ethernet".
 - The "Modify the selected gateway" section shows the IP 10.193.184.1 with a "Modify Gateway" button.
 - The "Add/Set Default gateway" section includes fields for "Gateway IP Address" and "Network Adapter" (set to "Ethernet"), with an "Add Gateway" button.
- DNS Server Configuration:**
 - A list on the left shows three DNS servers: 10.193.180.20, 10.192.160.5, and 10.192.160.6.
 - On the right, the "Network Adapter" is set to "Ethernet".
 - The "Modify the selected DNS Server" section has an empty input field and a "Modify DNS Server" button.
 - The "Delete the selected DNS Server" section has a "Delete DNS Server" button.
 - The "Add a DNS Server" section includes fields for "Server IP Address" and "Network Adapter" (set to "Ethernet"), with an "Add DNS Server" button.

Figure 8.6.3 (f) - 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 displays the 'Create a Network Team/Bond Device' interface. On the left, under 'Select Team Members', a list of network adapters is shown: 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 right side features a 'Refresh' button and a 'Driver Status' message: '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 contains two entries: 1. eth0 and 2. eth1. The 'IP Address Type' is set to 'DHCP'. The 'Static IP Address' and 'Static Subnet Mask' fields are empty. A 'Create Team' button is located at the bottom right.

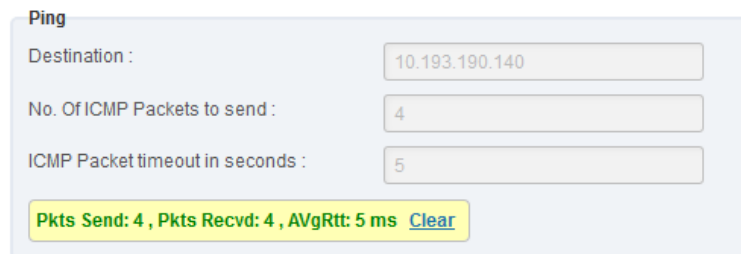
Figure 8.6.3 (g) - Create a network team/bond device module for Linux Agent

- **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.



The screenshot shows a 'Ping' utility window with a light blue header. Below the header, there are three input fields: 'Destination :' with the value '10.193.190.140', 'No. Of ICMP Packets to send :' with the value '4', and 'ICMP Packet timeout in seconds :' with the value '5'. At the bottom of the window, there is a yellow status bar with the text 'Pkts Send: 4 , Pkts Recvd: 4 , AVgRtt: 5 ms' and a blue 'Clear' link.

Figure 8.6.3 (h) - 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 8.6.3 (i) - TraceRoute Utility

GetConnections

| PROTOCOL | LOCAL ADDRESS | REMOTE ADDRESS | STATE | OFFLOAD |
|----------|---------------|----------------|-----------|---------|
| TCP | 0.0.0.0:135 | 0.0.0.0:0 | Listening | In host |
| TCP | 0.0.0.0:445 | 0.0.0.0:0 | Listening | In host |
| TCP | 0.0.0.0:3389 | 0.0.0.0:0 | Listening | In host |
| TCP | 0.0.0.0:35001 | 0.0.0.0:0 | Listening | In host |
| TCP | 0.0.0.0:47001 | 0.0.0.0:0 | Listening | In host |
| TCP | 0.0.0.0:49152 | 0.0.0.0:0 | Listening | In host |
| TCP | 0.0.0.0:49153 | 0.0.0.0:0 | Listening | In host |
| TCP | 0.0.0.0:49154 | 0.0.0.0:0 | Listening | In host |
| TCP | 0.0.0.0:49155 | 0.0.0.0:0 | Listening | In host |
| TCP | 0.0.0.0:49156 | 0.0.0.0:0 | Listening | In host |

Figure 8.6.3 (j) - 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.

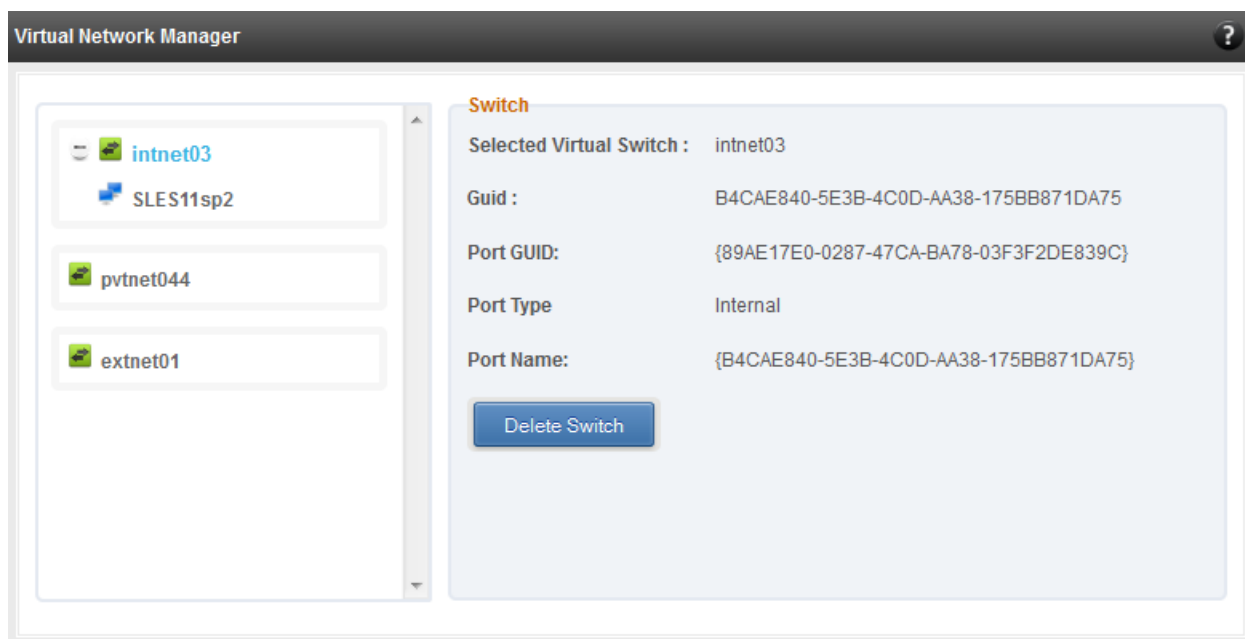


Figure 8.6.3.1 (a) – Virtual Network Manager module

• 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.

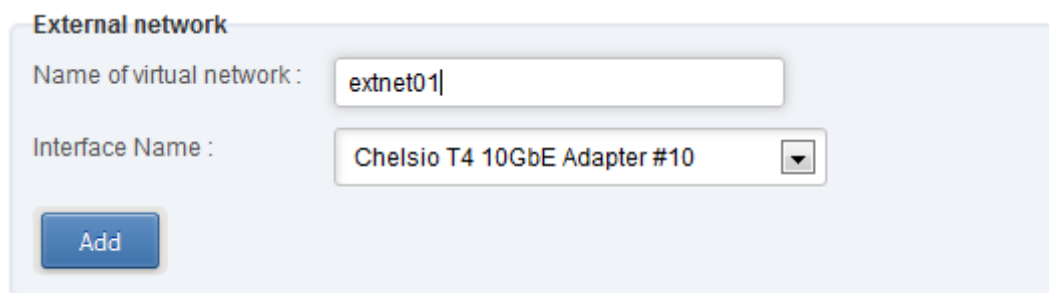


Figure 8.6.3.1 (b) – Creating external virtual network

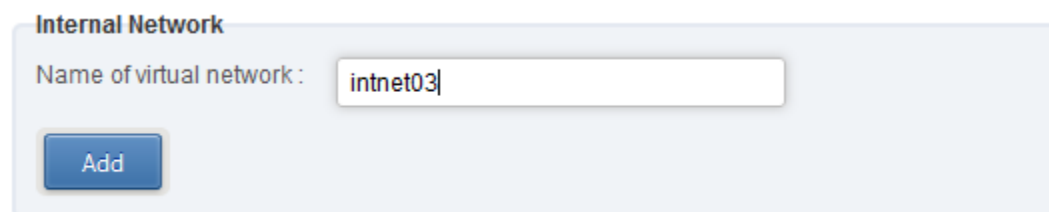
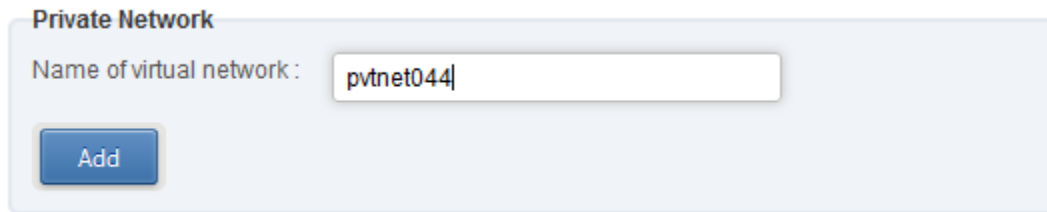


Figure 8.6.3.1 (c) – Creating internal virtual network



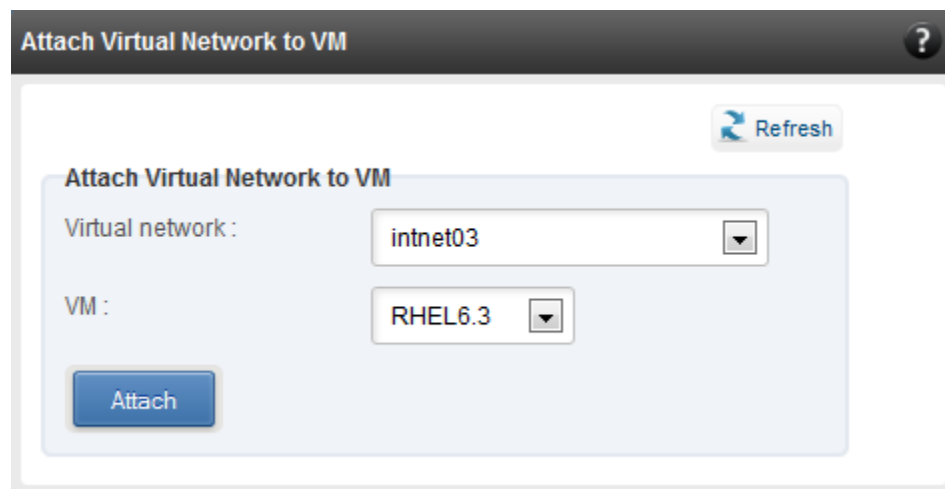
Private Network

Name of virtual network :

Figure 8.6.3.1 (d) – 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*.



Attach Virtual Network to VM ?

Attach Virtual Network to VM

Virtual network :

VM :

Figure 8.6.3.1 (e) – 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 8.6.4 (a) – iWARP settings for T4 CNA for FreeBSD Agent

iWarp Settings ?

Select a Driver: iw_cxgb4 ▼

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 | 32768 ▼ |
| nocong | No ▼ |
| cong_flavor | 1 ▼ |

Figure 8.6.4 (b) – 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.

| Storage ? | |
|-----------------------------------|---------|
| PROPERTY | VALUE |
| FCoE service on server | Enabled |
| iSCSI Initiator service on server | Enabled |
| iSCSI Target service on server | Enabled |

Figure 7.7 – 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 to **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.

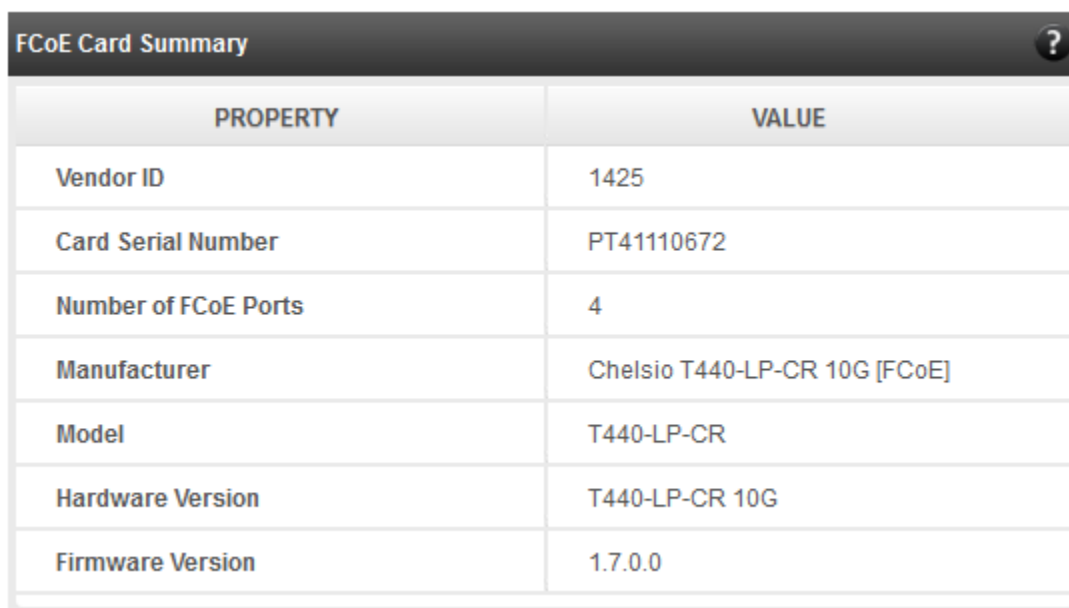
| FCoE Initiator Summary ? | |
|---------------------------|---------------------|
| PROPERTY | VALUE |
| FCoE Driver | csistor (1.1.0.9) |
| No. of FCoE enabled cards | 2 |
| No. of FCoE Ports | 6 |

Figure 8.7.1 (a) – 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.

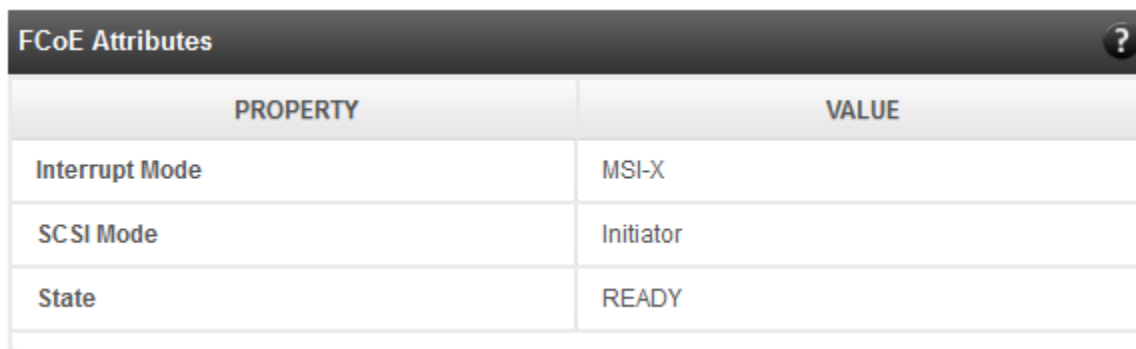
The image shows a software window titled "FCoE Card Summary" with a question mark icon in the top right corner. The window contains a table with two columns: "PROPERTY" and "VALUE". The table lists the following information:

| 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 8.7.1.1 (a) – 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.

The image shows a software window titled "FCoE Attributes" with a question mark icon in the top right corner. The window contains a table with two columns: "PROPERTY" and "VALUE". The table lists the following information:

| PROPERTY | VALUE |
|----------------|-----------|
| Interrupt Mode | MSI-X |
| SCSI Mode | Initiator |
| State | READY |

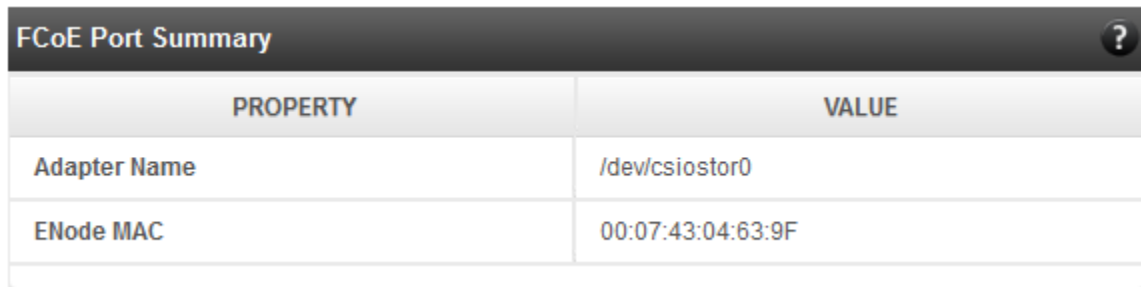
Figure 8.7.1.1 (b) – FCoE Attributes module

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 8.7.1.2 (a) – 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 8.7.1.2 (b) – 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.

- i. Manual: Where the user can manually create a virtual port by providing a value to the WWPN and WWNN fields.
- ii. 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 features a 'Refresh' button at the top. The main area is divided into two sections. The first section, 'Create/Delete NPIV', includes input fields for WWPN and WWNN, each consisting of eight digit boxes. Below these are radio buttons for 'Create' (which is selected) and 'Delete'. The second section, 'Create NPIV Port', includes a 'Type' section with 'Manual' (selected) and 'Auto Generate' radio buttons. Below this are WWPN and WWNN input fields, each with eight digit boxes (the last box in each is empty). At the bottom of this section are 'Create' and 'Discard Changes' buttons.

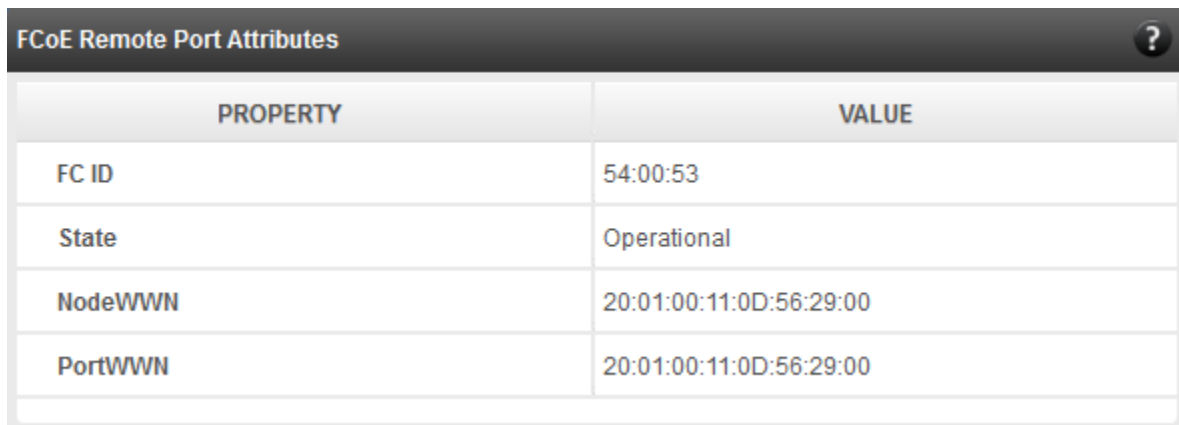
Figure 8.7.1.2 (c) – FCoE NPIV management module

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 8.7.1.3 (a) – 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.

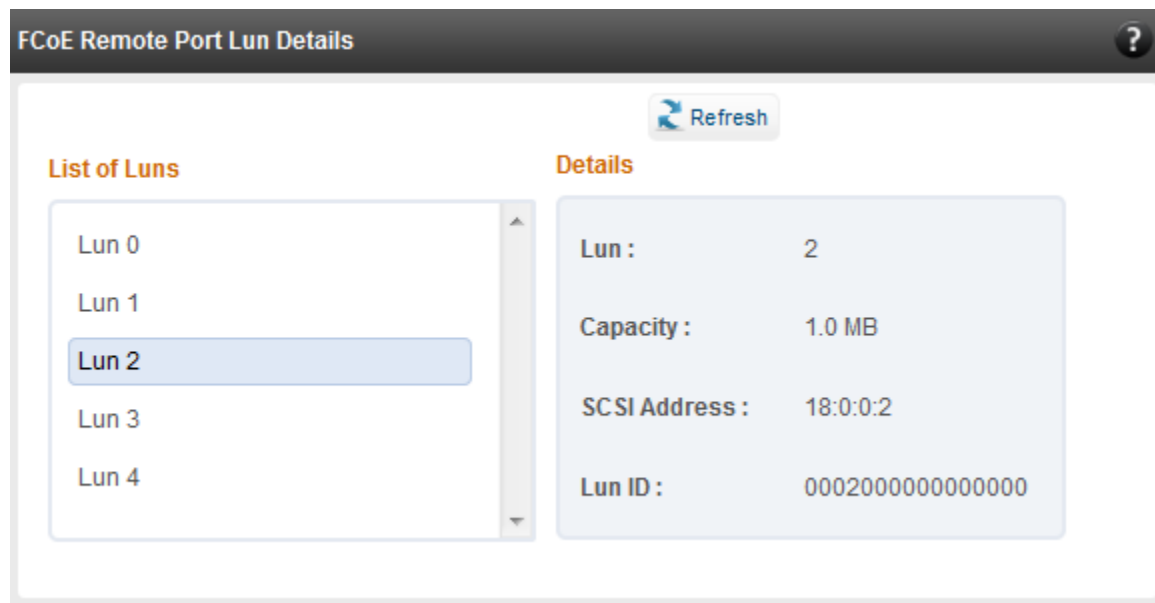


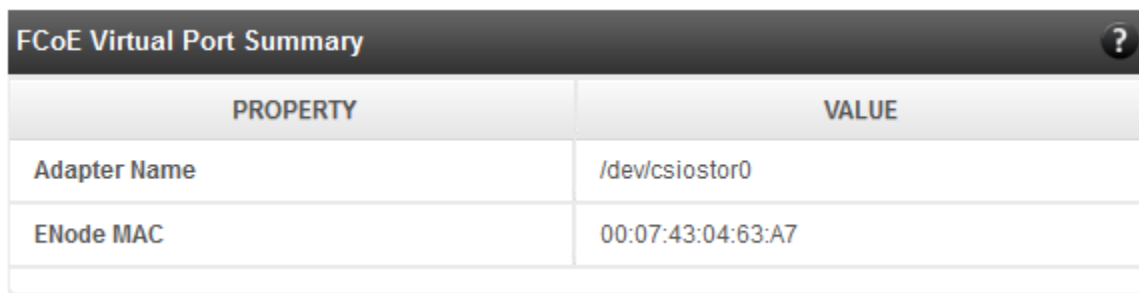
Figure 8.7.1.3 (b) – FCoE Remote Port Lun Details module

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 8.7.1.4 (a) – FCoE Virtual Port Summary module for Linux Agent

• FCoE Virtual Port Attributes

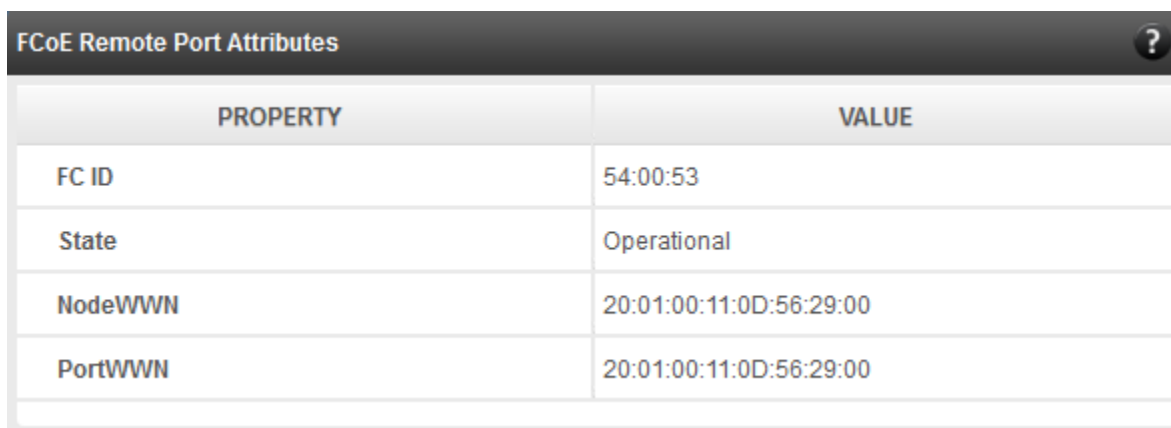
The module provides details about link status and port identifiers such as WWPN, WWNN, FC ID and Virtual NPort MAC Address. The module also contains fabric information such as fabric name, VLAN on which the FCoE service is currently running and the number of SCSI targets that are being discovered by 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 8.7.1.4 (b) – 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.

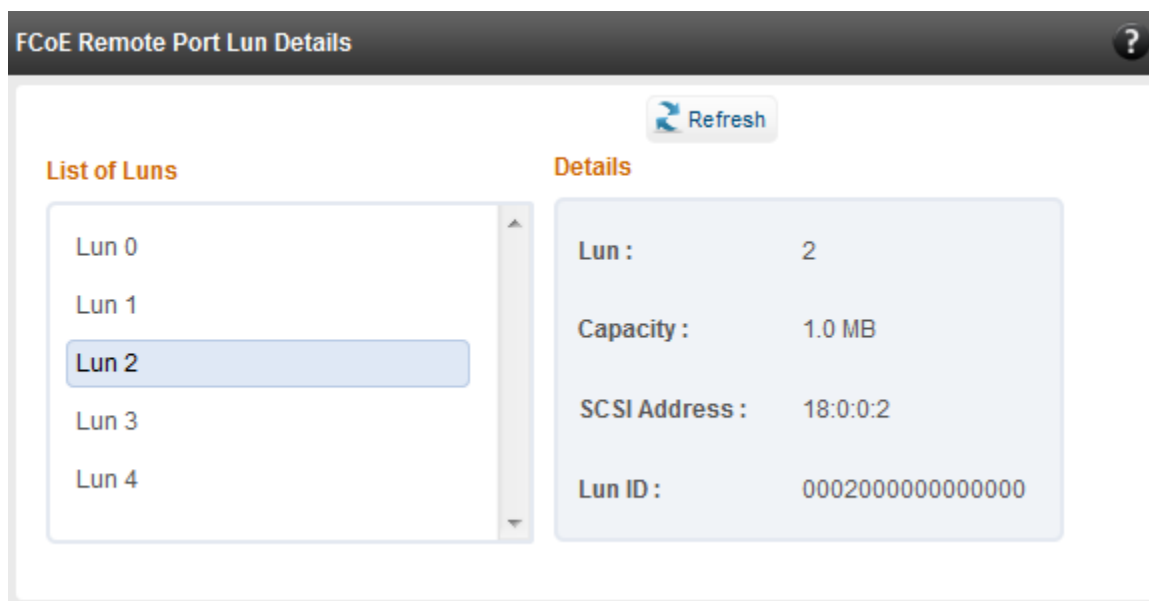


| PROPERTY | VALUE |
|----------|-------------------------|
| FC ID | 54:00:53 |
| State | Operational |
| NodeWWN | 20:01:00:11:0D:56:29:00 |
| PortWWN | 20:01:00:11:0D:56:29:00 |

Figure 8.7.1.4 (c) – 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.



FCoE Remote Port Lun Details

Refresh

List of Luns

- Lun 0
- Lun 1
- Lun 2**
- Lun 3
- Lun 4

Details

Lun : 2

Capacity : 1.0 MB

SCSI Address : 18:0:0:2

Lun ID : 0002000000000000

Figure 8.7.1.4 (d) - 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.".

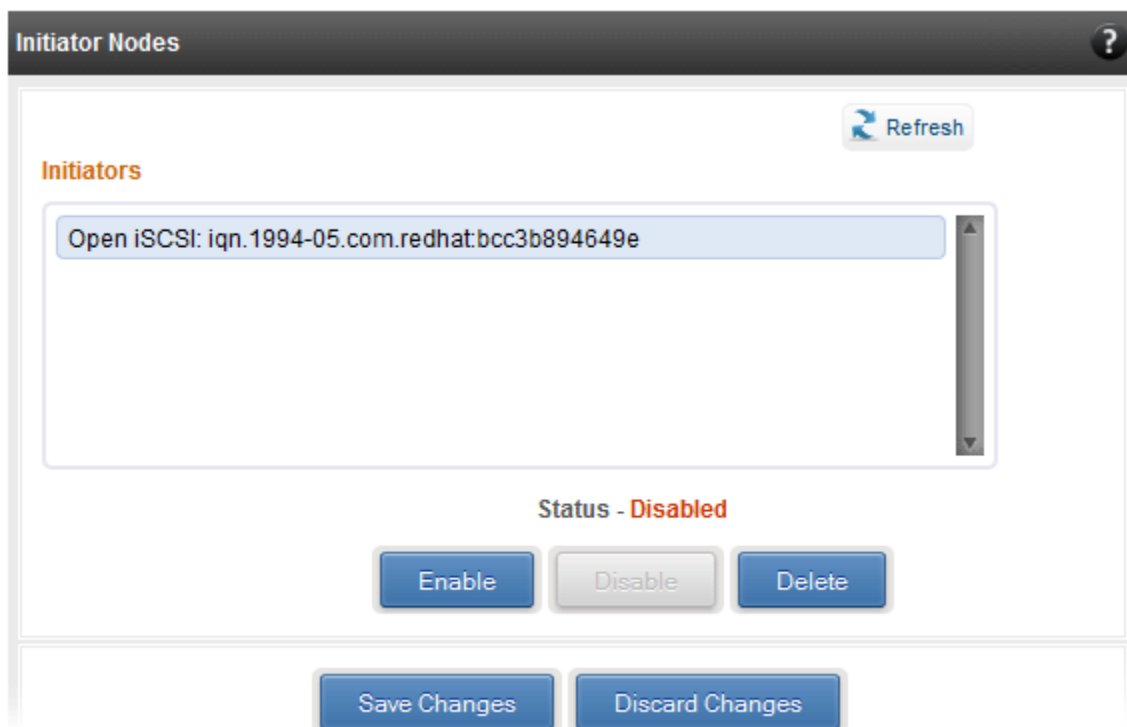


Figure 8.7.2 (a) - Open iSCSI initiator

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 |
|---------------|--------------------|
| InitiatorName | iqn.chelsioone.com |

Figure 8.7.2 (b) - 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 8.7.2 (c) - 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.*

The screenshot shows the 'Discover Targets' window. At the top, there is a 'Refresh' button. Below it, the 'Discovery Portals' section contains a list with one entry: 'Target - 102.11.11.155 : 3260'. To the right, the 'Targets' section contains a list with one entry: 'iqn.2004-05.com.kapil.chelsio.target'. A 'Delete' button is positioned between these two lists. Below the 'Discover Targets' section, there is a 'Discover an iSCSI target' section. It includes a 'Choose the initiator stack' dropdown menu set to 'Open iSCSI'. Below this, there are input fields for 'Target Ip address' (containing '102.11.11.155') and 'Port' (containing '3260'). A 'Discover Target' button is at the bottom of this section.

Figure 8.7.2 (d) - 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.

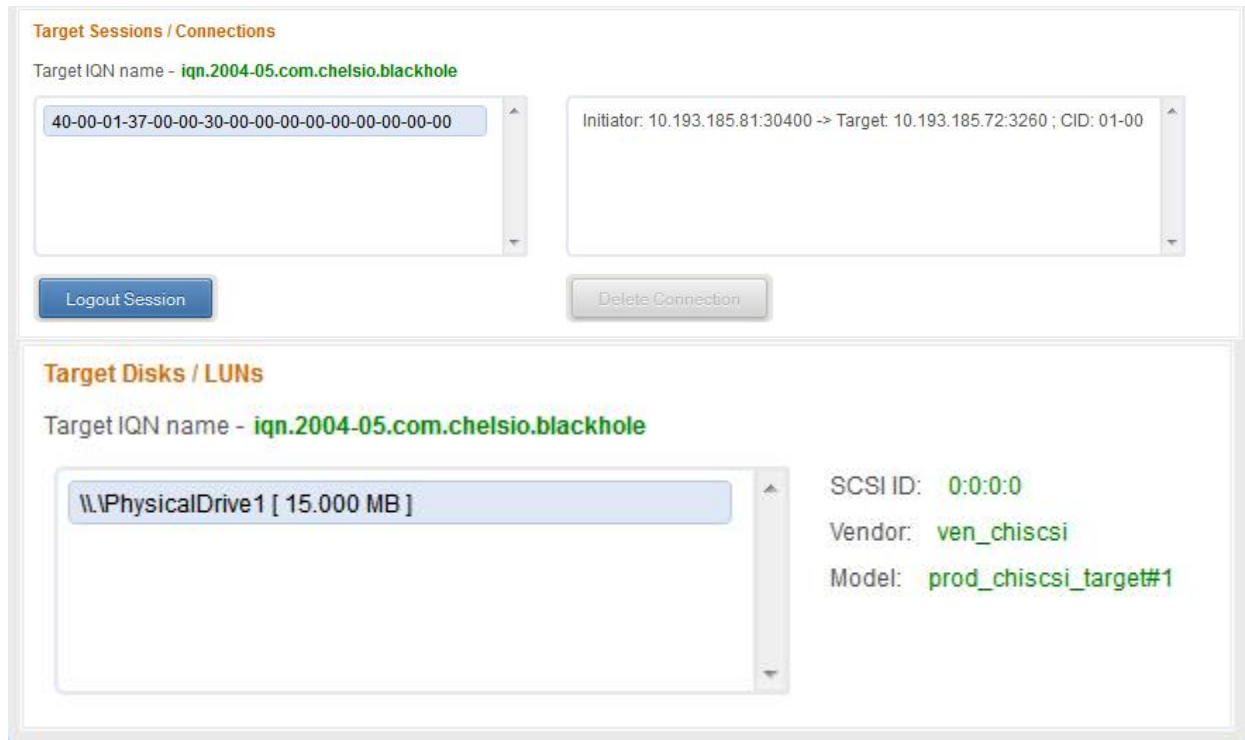


Figure 8.7.2 (e) - Targets module after logging in

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.

Full Offload iSCSI Hardware Information

?

Refresh

Select a T4 Card: T404-BT

| 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 |

1.0.0.0

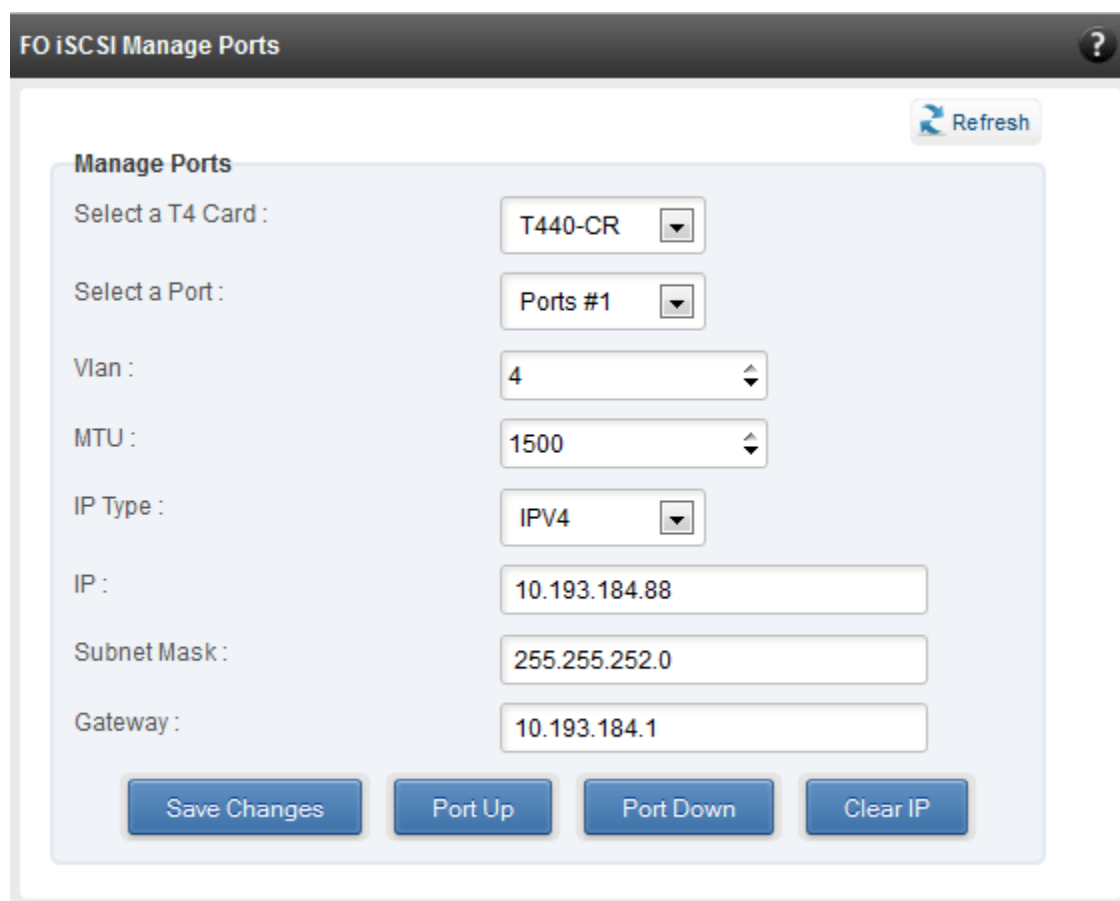
1.0.0.0

Figure 8.7.3 (a) - 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 has a title bar with a question mark icon. Inside, there's a 'Refresh' button with a circular arrow icon. Below that is a 'Manage Ports' section. It contains several configuration fields: 'Select a T4 Card' with a dropdown menu showing 'T440-CR'; 'Select a Port' with a dropdown menu showing 'Ports #1'; 'Vlan' with a numeric input field showing '4'; 'MTU' with a numeric input field showing '1500'; 'IP Type' with a dropdown menu showing 'IPv4'; 'IP' with a text input field showing '10.193.184.88'; 'Subnet Mask' with a text input field showing '255.255.252.0'; and 'Gateway' with a text input field showing '10.193.184.1'. At the bottom of the form are four buttons: 'Save Changes', 'Port Up', 'Port Down', and 'Clear IP'.

Figure 8.7.3 (b) - 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.

FO iSCSI Initiator Properties

?

Refresh

Save or Discard Changes:

Save Changes

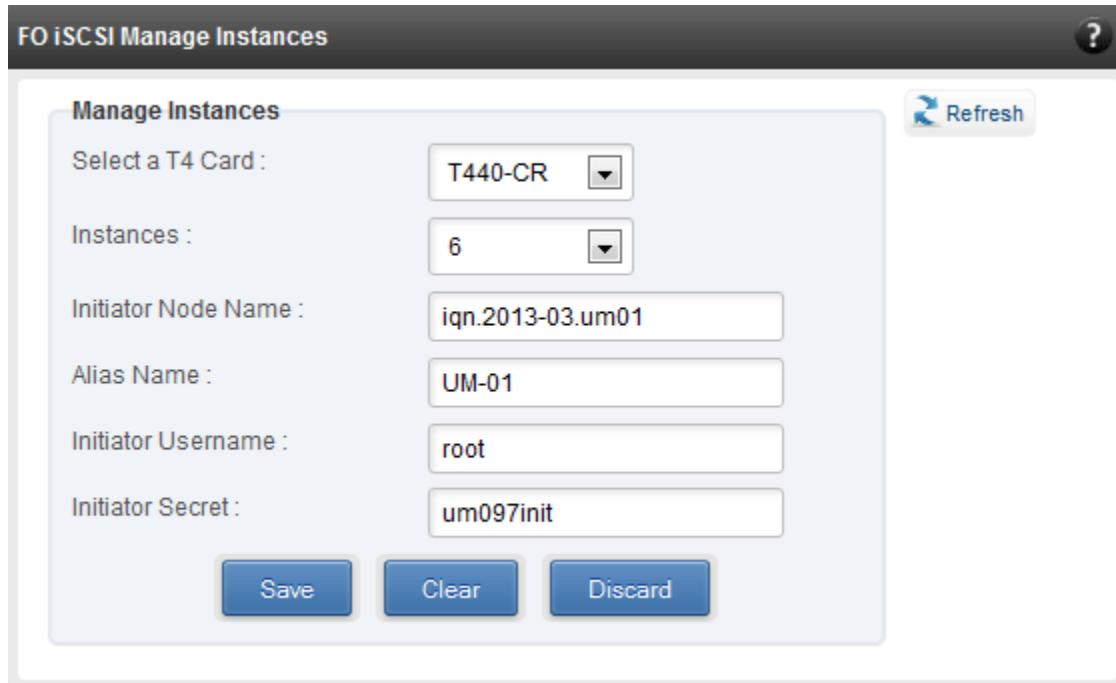
Discard Changes

| 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 | fst_username |

Figure 8.7.3 (c) - 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. The form contains the following fields and values:

| Field | Value |
|-----------------------|------------------|
| Select a T4 Card : | T440-CR |
| Instances : | 6 |
| Initiator Node Name : | iqn.2013-03.um01 |
| Alias Name : | UM-01 |
| Initiator Username : | root |
| Initiator Secret : | um097init |

At the bottom of the form are three buttons: 'Save', 'Clear', and 'Discard'.

Figure 8.7.3 (d) - 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. At the top right is a help icon (?). Below the title bar is a 'Refresh' button. The main area is divided into two sections. The top section, titled 'Discovered Targets', contains two large text boxes. The left box is labeled 'Target Name :' and contains the text 'TargetName=iqn.2004-05.com.chelsio.target'. The right box is labeled 'Target Address :' and contains the text 'TargetAddress=102.11.11.12:3260,1'. The bottom section is a light blue box containing several input fields. It starts with 'Select a T4 Card :' followed by a dropdown menu showing 'T440-CR'. Below that is 'Instance :' followed by a dropdown menu showing '1'. Then there are three text input fields: 'Source IP Address :' with '102.11.11.11', 'Destination IP Address :' with '102.11.11.12', and 'Destination Port :' with '3260'. At the bottom left of this section is a blue 'Discover' button.

Figure 8.7.3 (e) - 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 8.7.3 (f) - 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](#)

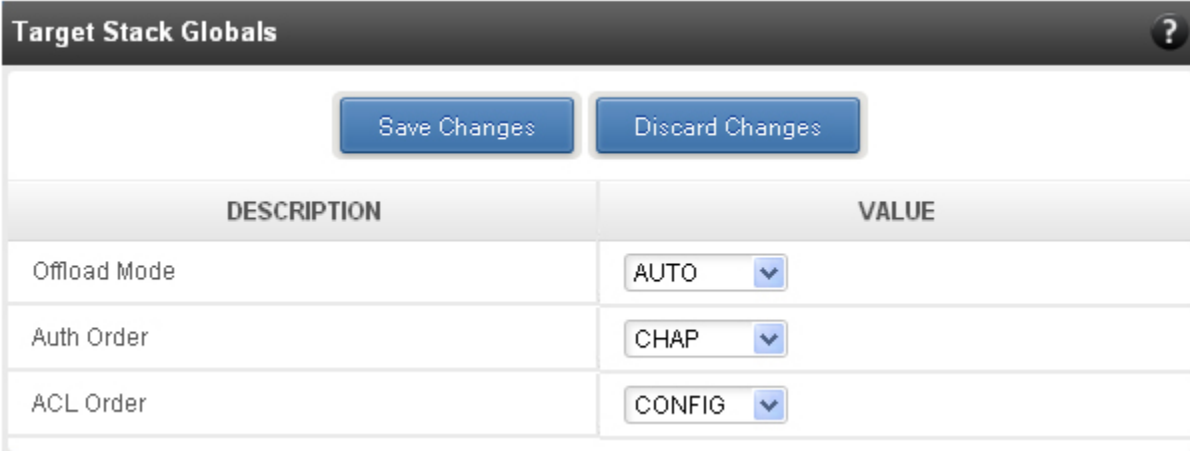
Figure 8.7.3 (g) - FO iSCSI Session Details module: Established Sessions

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 8.7.4 (a) - 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 8.7.4 (b) - 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.

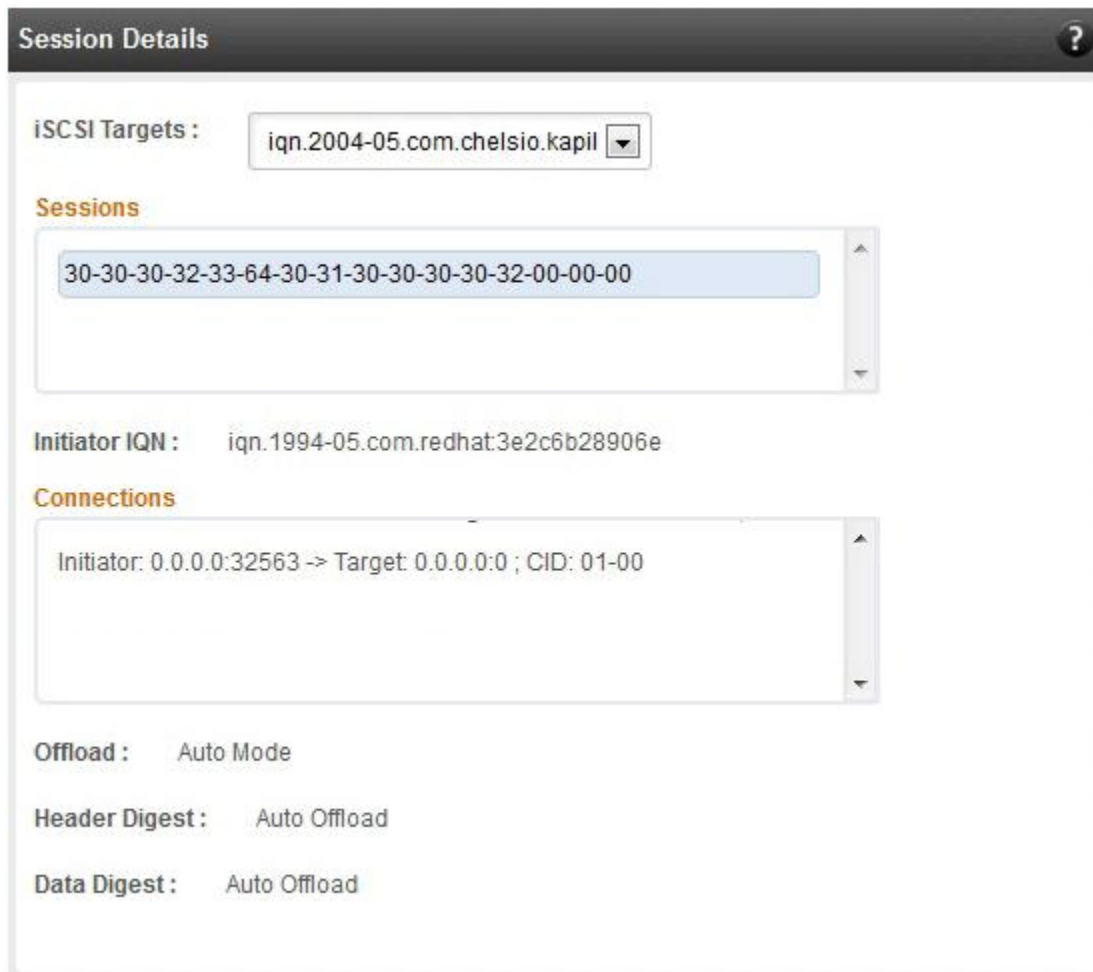
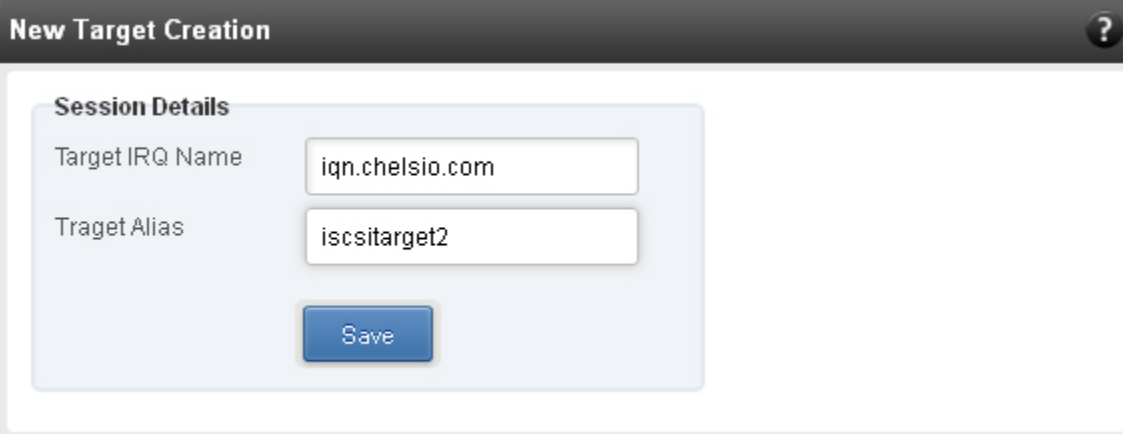


Figure 8.7.4 (c) – Session Details module

- **New Target Creation**

New iSCSI target can be created here by specifying the Target IQN and Target Alias name.



The image shows a 'New Target Creation' dialog box with a dark header bar containing a question mark icon. Below the header, there is a light blue box titled 'Session Details'. Inside this box, there are 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 8.7.4 (d) - 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**

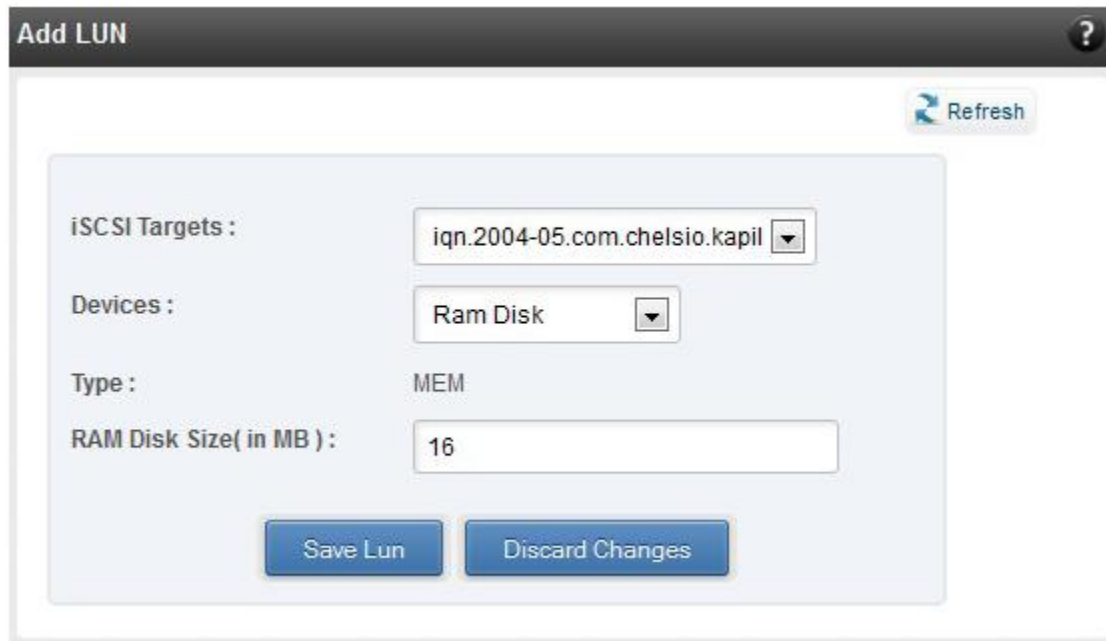
This module displays various Logical Units created in an iSCSI Target. Selected LUNs can be deleted.

The screenshot shows a web-based interface titled "View/Edit iSCSI Target LUNs". At the top, there is a dropdown menu for "iSCSI Targets" with the value "iqn.2004-05.com.chelsio.kapil" and a "Refresh" button. Below this, the "Target Status" is displayed as "STARTED" in green. The main area is divided into two columns. The left column, labeled "LUN List", contains a single entry "/dev/sda5". The right column, labeled "Edit LUN List", contains three buttons: "Move Up", "Move Down", and "Delete LUN". Below these buttons is the "Edit Selected LUN" section, which includes fields for "LUN Name" (containing "/dev/sda5") and "RAM Disk Size" (containing "12288"). There are also radio button options for "Permissions" (RO and RW, with RW selected), "Device Type" (FILE, MEM, and BLK, with BLK selected), and "Options" (SYNC, NULLRW, and NONEXCL, with NULLRW and NONEXCL selected). At the bottom of the interface are two buttons: "Save Changes" and "Discard Changes".

Figure 8.7.5 (a) - 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 with the selected value "iqn.2004-05.com.chelsio.kapil".
- Devices :** A dropdown menu with the selected value "Ram Disk".
- Type :** A text field containing the value "MEM".
- RAM Disk Size(in MB) :** A text input field containing the value "16".

At the bottom of the light blue panel, there are two buttons: "Save Lun" and "Discard Changes".

Figure 8.7.5 (b) - 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 features a dropdown menu with 'iqn.2004-05.com.chelsio.kapil' selected and a 'Refresh' button. The 'Target Status' is displayed as 'STARTED' in green. The main area is divided into two columns. The left column, titled 'Portal List', contains a single entry: '1@102.44.44.155:3260'. The right column, titled 'Edit Portal List', contains three buttons: 'Move Up', 'Move Down', and 'Delete Portal'. Below these is the 'Portal Details' section, which includes input fields for 'Ip Address' (102.44.44.155), 'TimeOut in mSecs' (0), 'Redirect Tag' (1), and 'TCP Port' (3260). There is also a checkbox for 'Use default iSCSI service TCP Port' which is unchecked. An 'Update List' button is located at the bottom of the 'Portal Details' section. At the very bottom of the window, there are two buttons: 'Save Changes' and 'Discard Changes'.

Figure 8.7.6 (a) - 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 image shows a software dialog box titled "Add Portal" with a question mark icon in the top right corner. Inside the dialog, there is a "Refresh" button with a circular arrow icon. Below this, there are four input fields arranged vertically. The first field is labeled "iSCSI Targets :" and contains a dropdown menu with the selected value "iqn.2004-05.com.chelsio.kapil". The second field is labeled "IP Address :" and contains the text "102.44.44.155". The third field is labeled "Port :" and contains the text "3260". The fourth field is labeled "Redirect Tag :" and is currently empty. At the bottom of the dialog, there are two blue buttons: "Save Portal" and "Discard Changes".

Figure 8.7.6 (b) – 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**

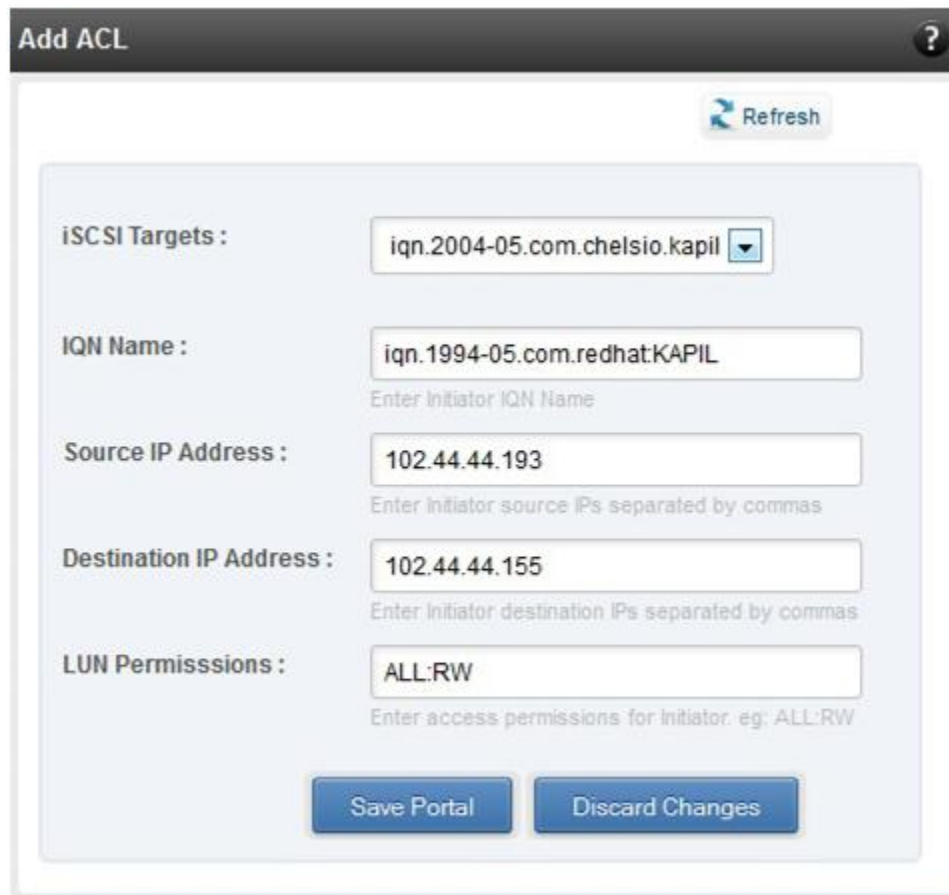
This module displays details for all the ACLs configured for an iSCSI Target. Selected ACLs can be deleted.

The screenshot shows a web-based interface titled "View/Edit iSCSI Target ACLs". At the top, there is a dropdown menu for "iSCSI Targets" with the value "iqn.2004-05.com.chelsio.kapil" and a "Refresh" button. Below this, the "Target Status" is displayed as "STARTED". The main content area is divided into two sections. On the left, under the heading "ACL List", there is a text box containing the ACL details: "iname=iqn.1994-05.com.redhat:KAPIL;sip=102.44.44.193;dip=102.44.44.155;lun=ALL:RW". Below this text box is a "Delete" button. On the right, there is a form titled "ACL List" with fields for "IQN Name" (value: iqn.1994-05.com.redhat:KAPIL), "Source IP Address" (value: 102.44.44.193), "Destination IP Address" (value: 102.44.44.155), and "LUN Permissions" (value: ALL:RW). A small grid icon is visible at the bottom right of the LUN Permissions field.

Figure 8.7.7 (a) - Target ACL operations module

- **Add ACL**

New ACLs can be configured by specifying Target name, initiator IQN name, IP address and permission type.



The image shows a software dialog box titled "Add ACL" with a question mark icon in the top right corner. Inside the dialog, there is a "Refresh" button with a circular arrow icon. Below this, there are five input fields with labels on the left and placeholder text below each field:

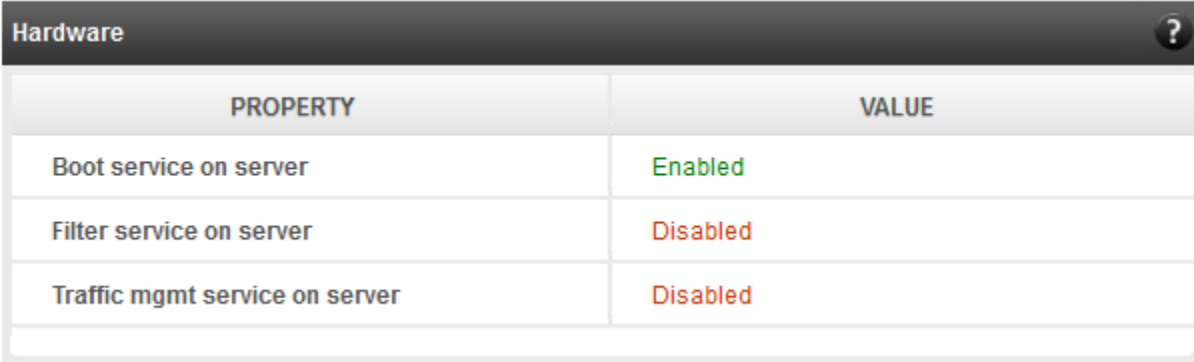
- iSCSI Targets :** A dropdown menu showing "iqn.2004-05.com.chelsio.kapil".
- IQN Name :** A text box containing "iqn.1994-05.com.redhat:KAPIL". Below it, the text "Enter Initiator IQN Name" is displayed.
- Source IP Address :** A text box containing "102.44.44.193". Below it, the text "Enter Initiator source IPs separated by commas" is displayed.
- Destination IP Address :** A text box containing "102.44.44.155". Below it, the text "Enter Initiator destination IPs separated by commas" is displayed.
- LUN Permisssions :** A text box containing "ALL:RW". Below it, the text "Enter access permissions for Initiator. eg: ALL:RW" is displayed.

At the bottom of the dialog, there are two buttons: "Save Portal" and "Discard Changes".

Figure 8.7.7 (b) - Adding new ACL

8.8. Hardware Features

The **Hardware** module lists the status of configuration modules under Hardware Features section, running on the agent.



The screenshot shows a window titled "Hardware" with a help icon (question mark) in the top right corner. Below the title bar is a table with two columns: "PROPERTY" and "VALUE". The table contains three rows of data:

| PROPERTY | VALUE |
|--------------------------------|----------|
| Boot service on server | Enabled |
| Filter service on server | Disabled |
| Traffic mgmt service on server | Disabled |

Figure 8.8 – 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 8.8.1 (a) - 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 8.8.1(b) - 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 shows the 'Traffic Management Configuration' window. It is divided into two main sections: 'Policy List' and 'Policy Details'.

Policy List: This section contains a 'Chelsio Cards' list on the left with items 'T404-BT', 'T420-CR', and 'T302E-CU'. To the right is a 'TM Policies' list containing 'src port 22 => !offload !ddp'. A 'Refresh' button is located above the 'TM Policies' list. Below the lists are 'Add New Policy' and 'Delete' buttons.

Policy Details: This section is further divided into 'Rules' and 'Rule Details'.

- Rules:** A list box containing 'src port 22'.
- Rule Details:**
 - Primary Expression:** A dropdown menu set to 'port'.
 - Qualifier:** A dropdown menu set to 'src'.
 - Value:** A text input field containing '22'.
 - Buttons:** A 'Modify Rule' button and two checkboxes: 'Select to add rule' and 'Select to modify rule'.
- Actions:** A row of seven checkboxes and dropdown menus:
 - Offload:** checkbox, dropdown set to 'Disable'.
 - DDP:** checkbox, dropdown set to 'Disable'.
 - Time Stamp:** checkbox, dropdown set to 'Enable'.
 - Sack:** checkbox, dropdown set to 'Enable'.
 - Bind:** checkbox, dropdown set to 'random'.
 - Class:** checkbox, dropdown set to '0'.
 - Congestion:** checkbox, dropdown set to 'reno'.

At the bottom of the 'Policy Details' section are 'Save Changes' and 'Discard Changes' buttons.

Figure 8.8.3 - 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.x/src/network/firmware`. For instance, to select *Low latency Networking*, locate the file, `t4-config.txt`, in `/ChelsioUwire-x.x.x.x/src/network/firmware/low_latency_config` directory.

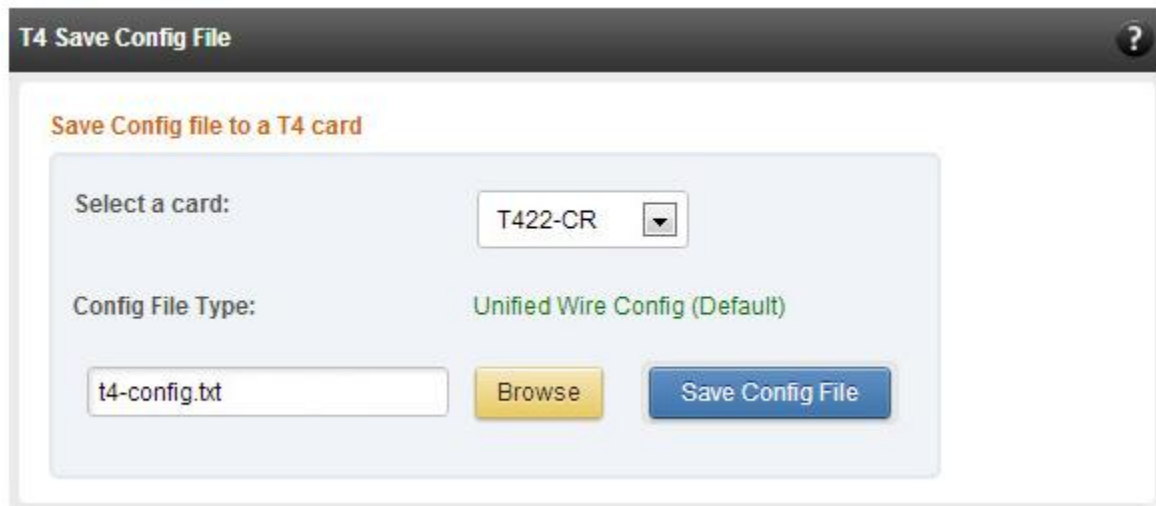


Figure 8.8.4 - T4 Save Config File module

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 | |
| 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 8.8.5 (a) - Option ROM management module for a T3 card

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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.

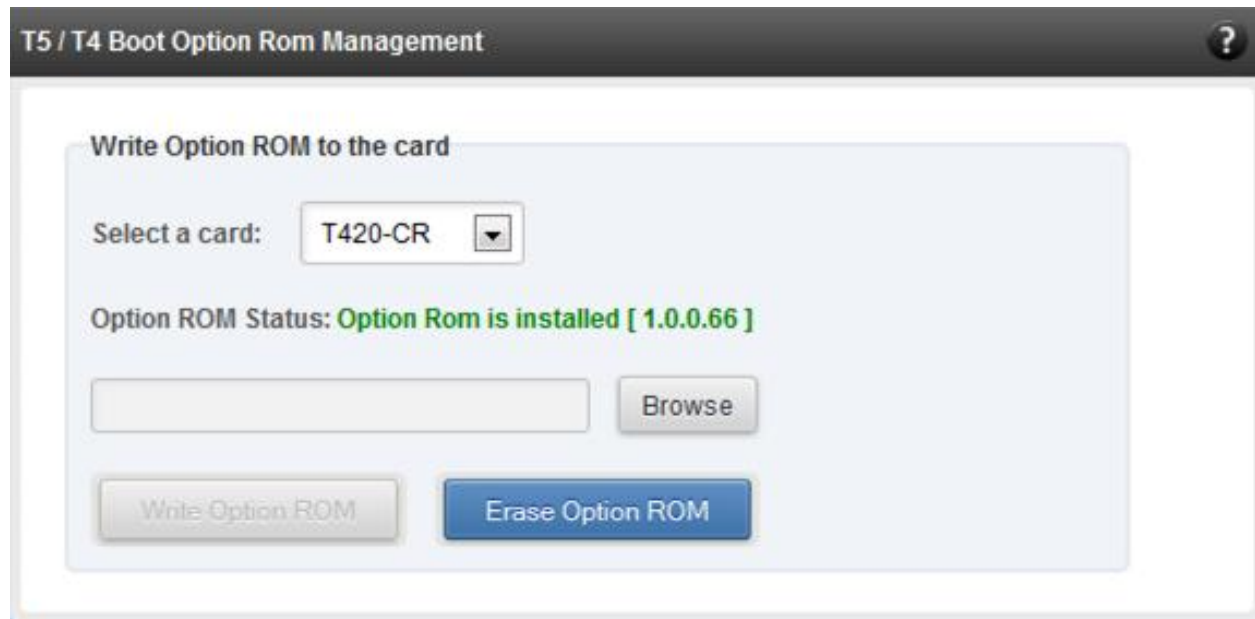


Figure 8.8.6 (a) – T5/T4 Option ROM Management module

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 shows the 'T5 / T4 Boot Configuration' window. At the top, there's a header bar with a question mark icon. Below it, a section titled 'Select a T4 / T5 card' contains a dropdown menu labeled 'Select a card:' with 'T420-CR' selected. The main area is divided into two primary sections: 'Adapter Configuration' and 'PXE Configuration'. The 'Adapter Configuration' section includes fields for 'PCI BUS:' (01), 'PCI Device:' (00), 'Initialization Platform:' (Both), 'Adapter Bios Status:' (radio buttons for Enable and Disable, with Disable selected), 'Boot mode:' (Compatibility), 'EDD:' (2.1), 'EBDA Relocation:' (Permitted), and a 'Default:' checkbox for '(Load Boot Default Settings)'. Below these are 'Save Changes' and 'Discard Changes' buttons. The 'PXE Configuration' section is selected, indicated by the 'Choose Options to configure:' radio buttons (PXE, FCOE, iSCSI) where PXE is chosen. It includes 'Select Physical Function:' (00), 'BIOS:' (Disable), and 'Vlan Id:' (0), with 'Save Changes' and 'Discard Changes' buttons at the bottom. On the right side, a 'Details' panel lists system information: 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 8.8.7 (a) - 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 : 00 ▾ 01 ▾ 02 ▾ 03 ▾

Discovery Time Out : 20 ▾

Save Changes Discard Changes

Figure 8.8.7 (b) - FCoE Boot configuration for T4 CNAs

Choose Options to configure: ☐ PXE ☐ FCoE ☒ iSCSI

iSCSI Configuration

Choose Paramter Type : ☒ Function ☐ Initiator ☐ Network ☐ Boot Devices

BIOS : Enable ▾

Port Order : 00 ▾ 01 ▾ 02 ▾ 03 ▾

Discovery Time Out : 0 ▾

CHAP Method: None ▾

Save Changes Discard Changes

Figure 8.8.7 (c) - iSCSI Boot configuration for T4 CNAs

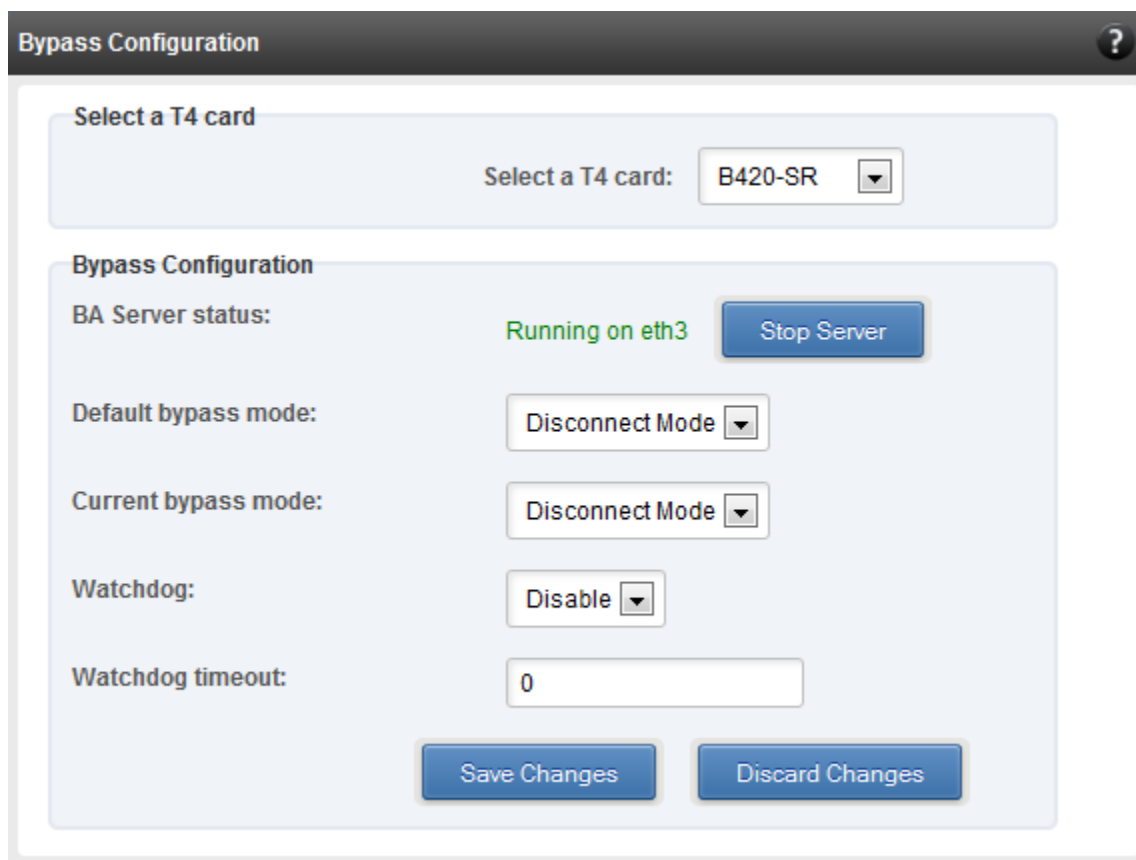
8.8.8. Bypass (Linux)

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 bar with the title 'Bypass Configuration' and a help icon. Below the header, there's a section 'Select a T4 card' with a dropdown menu currently showing 'B420-SR'. The main configuration area is titled 'Bypass Configuration' and contains several settings: 'BA Server status' is 'Running on eth3' with a 'Stop Server' button; 'Default bypass mode' is 'Disconnect Mode' with a dropdown; 'Current bypass mode' is 'Disconnect Mode' with a dropdown; 'Watchdog' is 'Disable' with a dropdown; and 'Watchdog timeout' is '0' with a text input field. At the bottom, there are two buttons: 'Save Changes' and 'Discard Changes'.

Figure 8.8.8 (a) - 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.

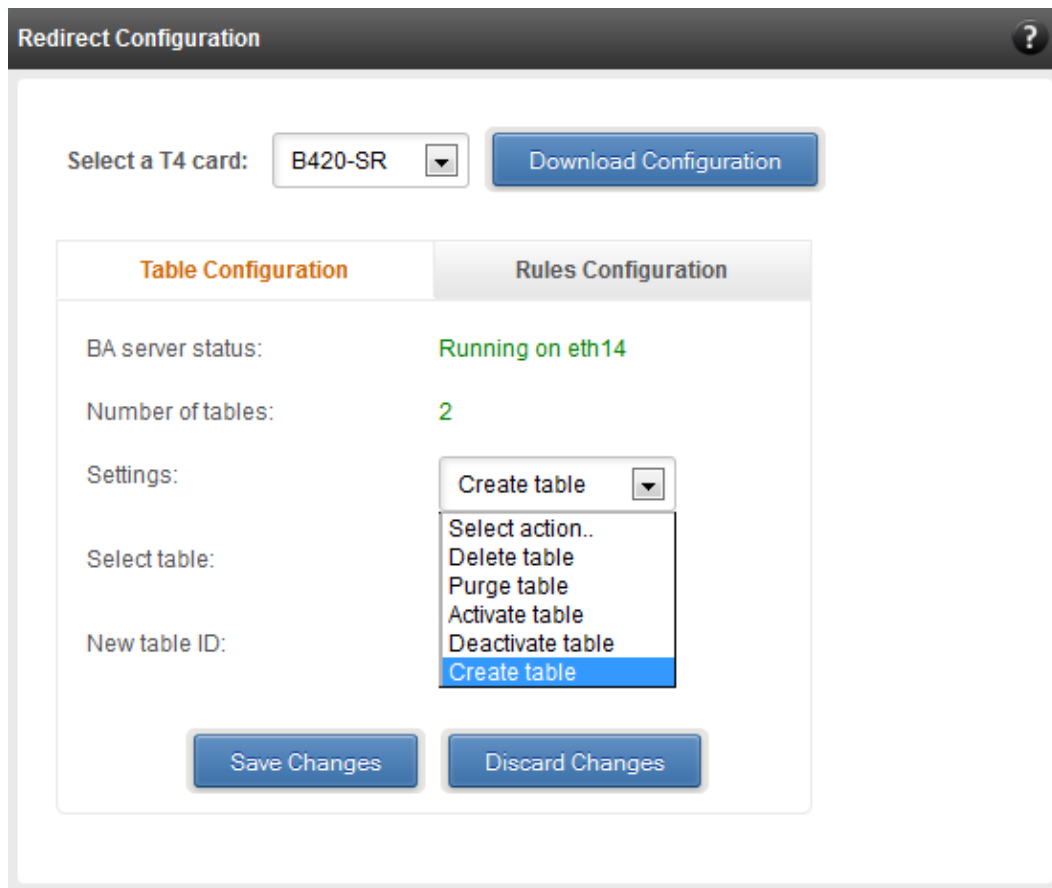


Figure 8.8.8 (b) - Redirect Configuration module: Table configuration tab

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 8.8.8 (c) - 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

8.8.9 (a) - 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

8.8.9 (b) – Egress Packet Scheduler module

9. Uninstalling Unified Wire Manager

To uninstall Unified Wire Manager, use **Programs and Features** in the **Control Panel**.

IV. UM for Win PE

1. Introduction

Chelsio **UM for Win PE** (chelsio_uwlite) 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 can be found in *ChelsioUwire-x.x.x.xx\UM* in the zip package. 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:

- T520-CR
- T420-CR
- T440-CR
- T422-CR
- T420-LL-CR
- T440-LP-CR
- T420-CX
- T420-SO-CR
- T420-BT
- T404-BT

1.2. Software Requirements

1.2.1. Windows Requirement

Currently Chelsio UM for Win PE is available for Windows server 2012 R2.

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

```

- 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>
```

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
```

- 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=cwlb4t4.bin
Flashing the Option ROM...
Success: Boot operation completed sucessfully
```

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
```

- 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
```

V. Appendix

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