



Potomac ESAS iSCSI to SAS Bridge Software Manual

This manual covers the following products:

ESAS102800
ESAS402800
ESAS10023200

Eli-v6.4.84

Bridgeworks

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1 Introduction

Thank you for purchasing the Bridgeworks Potomac ESAS iSCSI to SAS Bridge.

The Bridge has been designed to ensure that in the majority of installations it will require minimal setup before use. However, we suggest you read the following section which will guide you through setting up both the network, iSCSI and SAS aspects of the Bridge.

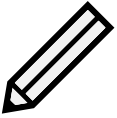


1.1 Overview

The ESAS creates an interface between a network, which utilises the iSCSI protocol, and peripherals that utilise the SAS bus. The internal circuitry of the Bridge acts as a two-way interface converting the data packets that are received on the iSCSI network to SAS data packets.

This data is then ready to be sent across a network to SAS-enabled storage devices such as disks and tape drives.

1.2 Manual Layout

Throughout the manual, symbols will be used to quickly identify different pieces of information.

| | |
|---|---|
|  | This icon represents a note of interest about a step or section of information. |
|  | This icon represents an important piece of information. |
|  | This icon represents a warning. Care must be taken and the warning should be read thoroughly. |

1.3 Definitions

Throughout this manual, selected terms will be used to describe pieces of equipment and concepts. This section provides an explanation of those terms.

1.3.1 iSCSI Target Device

iSCSI target devices are devices such as disk drives, tape drives or RAID controllers that are attached to the network. Each device is identified by an IQN (iSCSI Qualified Name).

1.3.2 iSCSI Qualified Name (IQN)

Anything connected to a network, be it a computer, printer or iSCSI device must have a unique identifier, such as an IP address, to enable other devices to communicate with it. With iSCSI devices (both targets and initiators) an extra level of identification in addition to the IP address is employed. This is called the IQN. The IQN includes the iSCSI Target's name and an identifier for the shared iSCSI device.

Example: 2002-12.com.4bridgeworks.sdt600a014d10:5

1.3.3 iSCSI Challenge Handshake Authentication Protocol (CHAP)

CHAP is an authentication scheme used by iSCSI to validate the identity of iSCSI targets and initiators. When CHAP is enabled, the initiator must send the correct username and target password to gain access to the iSCSI target.

Optionally the initiator can request that the target authenticates itself to the initiator; this is called mutual CHAP. If mutual CHAP is selected on the initiator, the iSCSI target will authenticate itself with the initiator using the initiator secret.

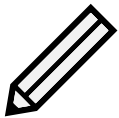
2 Using the Web Interface

The primary method for configuring any option is through the web interface. The following section highlights the requirements needed to access the web interface of the Bridge.

2.1 Browsers

This Bridge supports the following browsers:

- Microsoft Edge¹
- Mozilla Firefox¹
- Google Chrome¹



Note: JavaScript must be enabled within the web browser to use the web interface.



Important: If you choose to use a browser that is not in the list of supported browsers, Bridgeworks cannot guarantee the behaviour of the Bridge's functionality.

2.2 Connecting to the Web Interface



Note:

- DHCP is enabled by default on the management interface.
- The default hostname is `bridgeworks`.

For help locating management interfaces on hardware appliances, please refer to your hardware manual.

If the Bridge is successfully connected to your DHCP server, and DNS resolution is enabled on your network by default, you can access the Bridge's web interface from the default hostname by navigating to: <http://bridgeworks/>

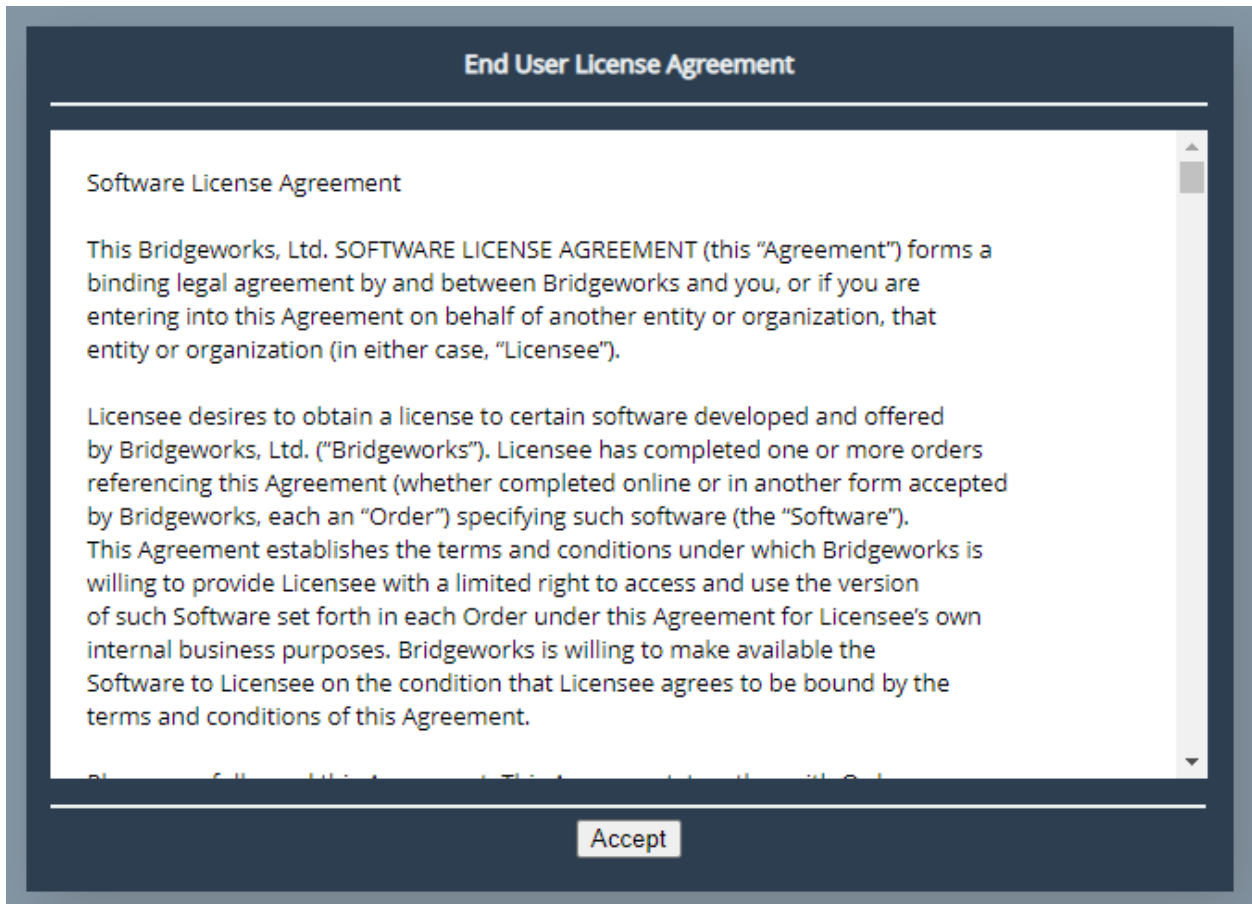


Important: Your host will likely need to be directly-connected to the Bridge if DHCP is not enabled, and its subnet set appropriately. See Appendix B: [Accessing the Bridge from Windows using a static IP Address](#) for help with accessing the Bridge web interface without DHCP.

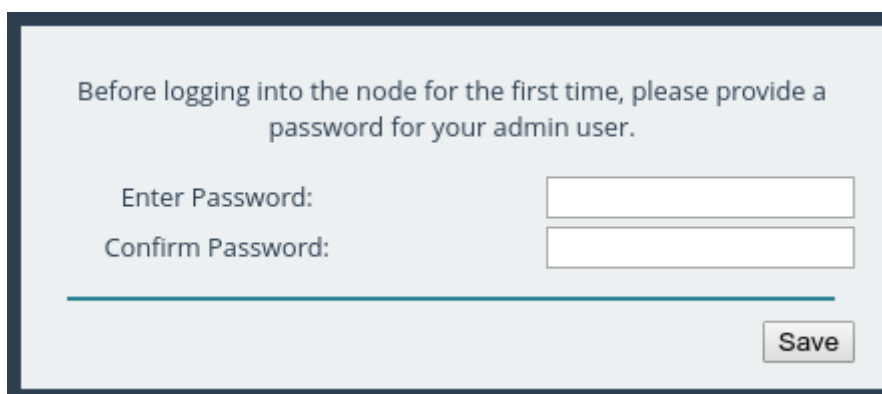
¹Latest version as of release

From within your web browser, connect to the Bridge's web interface using the default hostname or IP address of a connected management interface.

Once you have connected to the web interface on the Bridge you will be provided with the Bridgeworks End User License Agreement (EULA) which must be accepted before you are able to access the Bridge. Ensure you read this agreement thoroughly. To proceed, you must accept the agreement by clicking the *Accept* button.



You will then see the entry page shown below:



Enter and confirm the new web interface password to be presented with the login screen. The password must be between 5 and 64 characters and should contain both symbols and numbers.

To access the web interface a username and password must be used. The default username is *admin*.

2.3 Network Setup via CLI

If you are initially unable to access the web interface, you may need to perform some initial setup via the CLI.

On the Bridge's interface, press Alt+F2 to enter the CLI.

If this is your first time logging into the Bridge, you will have to set a password.

```
Bridgeworks Management Interface
No password configured - Enter new password: _
```

You can now log into the Bridge using the default username *admin*, and the password you set.

Within the CLI, you can select an option by entering the number next to it. Navigate to *Network Connections* using *1*, then select the port you will be using to manage your Bridge.

```
=====
Network Port                               Bridgeworks WANrockIT
=====
 1 Enable Port                             : Yes
 2 MTU Size                                 : 1500
 3 Enable Forwarding                       : No
 4 Use DHCP to assign an IP address         : Yes
 5 DNS Registration                         : Yes
 6 Use the following IP address            : No
 7 IP Address                              : 10.10.64.60
 8 Netmask                                 : 255.255.0.0
 9 Gateway                                  : 10.10.10.1

s Save
x Cancel
=====
```

Ensure this port is enabled by checking the *Enable Port* option. If this says *No* next to it, select it,

then press *y* to enable it.

DHCP will be enabled by default. If you need to set a static IP address for your Bridge, select *Use the following IP address*.

Next, set your IP address by selecting *IP Address* and entering a valid IPv4 address. You may also need to adjust the netmask and default gateway.

When you are done modifying your port settings, press *s* to save.

If you need to set your default route, you can navigate to *Network Connections*, then *General Settings*, then *Default Route*, and select the port you configured. Then press *s* again to save.

Once you have saved all your settings, press *r* to reboot your Bridge to apply them.

Once the Bridge has finished rebooting, you should see the status screen. If the port is working, you should see an IP address, and *UP*.



If you want to return to this screen without rebooting, you can do so with Alt+F1.

Once your port is set up correctly, you should be able to access the Bridge via a web browser as described in Section 2.2: [Connecting to the Web Interface](#).

2.4 Management Console (Home screen)

The web interface will now display the Console Home screen as shown below:



The web interface is split into two sections. The left hand *Bridge Menu* panel typically remains constant wherever you are within the web interface. It allows you to reboot or logout of the web interface. The Home link may be used from any page to return to the Home screen.



Note: Whenever a Reboot command is issued, it may take several minutes for the Bridge to become accessible again.

The Support link will open up a new tab in your browser at the Bridgeworks website support page. The Help will provide you with information relevant to the display and configuration data.

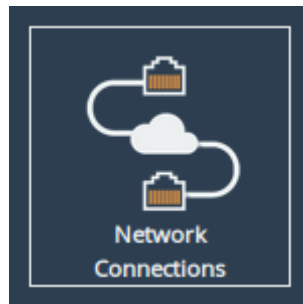
3 Bridge Configuration

This section details the configuration of the Bridge's basic network and service settings.

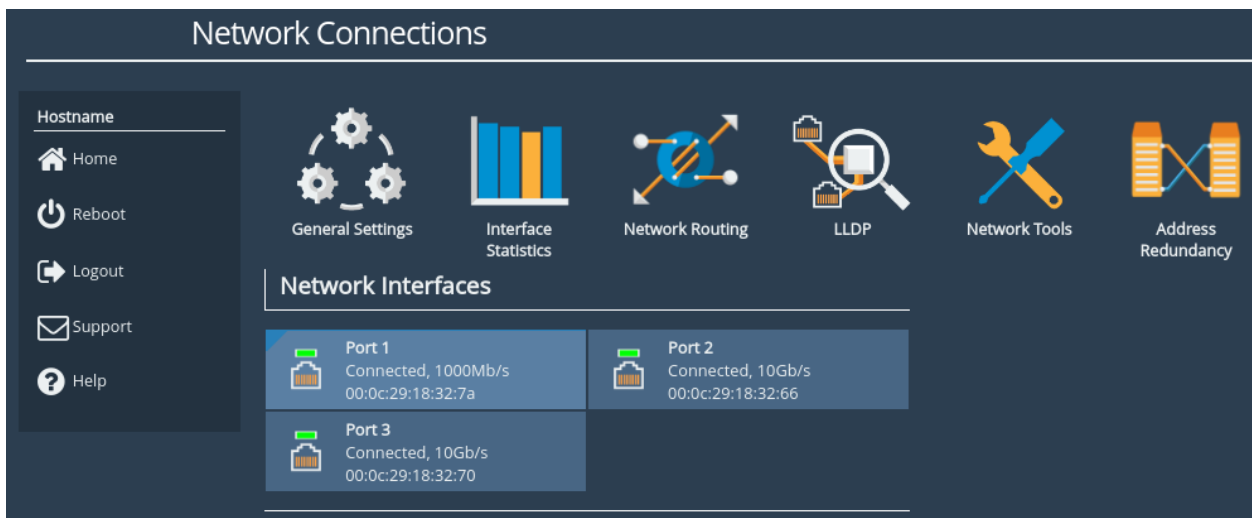
3.1 Network Connections

This configuration page allows the administrator to configure network interface settings and view network statistics.

From the Home screen, select the *Network Connections* icon under the *Bridge Configuration* section.



The web interface will display the following:



Options at the top of the page allow you to access various network settings and tools. More information for these options can be found in the following sections:

- Section 3.1.2: [General Settings](#)
- Section 3.1.3: [Interface Statistics](#)
- Section 3.1.4: [Network Routing](#)
- Section 3.1.5: [LLDP](#)
- Section 3.1.6: [Network Tools](#)

3.1.1 Network Interfaces

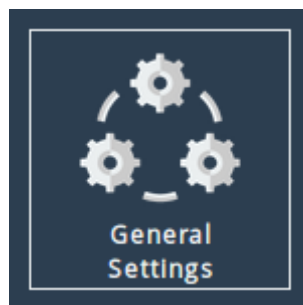
This section displays each network port present on the Bridge, along with its current status/link speed, and hardware identifier (MAC address).

Clicking on a particular interface will navigate to a bespoke configuration page for that particular interface. More information on the different interface settings is available in Section 3.1.7: [Port Settings](#).

3.1.2 General Settings

This configuration page allows the administrator to configure general network settings for the Bridge.

From the *Network Connections* page, select the *General Settings* icon.



When selected, you will be presented with the following screen.

A screenshot of the "Global Network Configuration" web interface. On the left is a dark sidebar with a "Hostname" header and icons for Home, Connections, Reboot, Logout, Support, and Help. The main area is light gray and contains the following settings:

- Hostname:
- Hostname on login page:
- DNS Servers: 10.10.10.3, 10.0.16.2, 10.0.48.2
- Fallback DNS Server:
- Default Route: (dropdown menu)
- Enable Dead Gateway Detection:
- Dead Gateway Detection Time Delay:
- Dead Gateway Detection Retry Count:
- Enable IPv6:

At the bottom right are "Cancel" and "Save" buttons.

3.1.2.1 Hostname

In the *Hostname* field, enter the name you wish to use to address this Bridge. It is a good idea to make the name relevant to the Bridge's location and/or purpose.

You can then access the web interface from this hostname in future, from any DHCP-enabled management interface.

3.1.2.2 Hostname on login page

Selecting the *Hostname on login page* checkbox enables the display of the system hostname, and if available the DHCP domain name on the login page. This may be useful to identify which device you are logging in to.

3.1.2.3 DNS Servers

Setting a DNS server enables the use of DNS names when configuring network services.

The *DNS Servers* field lists the DNS servers that are currently in use by the Bridge. If DHCP is enabled on an interface and returns DNS servers, then these will be displayed in the list, otherwise the *Fallback DNS Server* will be used.

3.1.2.4 Default Route

The *Default Route* is the interface that the Bridge will use to route packets when no specific interface has been specified.



Important: The selected interface must have a gateway configured for this to take effect.

In addition to being able to select a specific interface for the *Default Route* it is also possible to select the interface automatically with the *Auto* option. In this case, an interface which has both *Management* mapped to it and a default gateway configured will be set as the default route. This operation is performed at startup only.

If the user requires no *Default Route* it is possible to set *None*. The factory default value for this setting is *Auto*.

3.1.2.5 Dead Gateway Detection

Selecting the *Enable Dead Gateway Detection* checkbox will allow the Bridge to detect dead gateways and remove network routes that specify those gateways. When the dead gateways are reachable again, the routes are restored. This provides a level of failover in the event that the gateways become unreachable.

Dead Gateway Detection Time Delay refers to the time in seconds between requests being sent to the gateway to see whether that gateway is still reachable.

Dead Gateway Detection Retry Count refers to the number of times an unreachable gateway will be contacted before being set as a dead gateway and removed.

The status of each gateway is displayed on the *Routing* page. The status of the gateways for an individual port are also shown on the *Port Settings* pages. Refer to Section [3.1.4: Network Routing](#) for information on viewing and modifying network routes. An icon next to each gateway indicates its state:



Live Gateway Represents a gateway that responds to ICMP echo



Dead Gateway Represents a gateway that no longer responds to ICMP echo requests; it is dead



Important: Dead gateway detection functions by sending periodic ICMP echo requests to each gateway. Please ensure that the gateways can respond to such requests; if they're blocked by a firewall, dead gateway detection will always consider the gateways to be dead.

Hostname

- Home
- Connections
- Reboot
- Logout
- Support
- Help

Default routes should not be added here

Routing Tables

| Destination | Gateway | | Interface | Metric | |
|----------------|---------------|---|-----------|--------|---|
| 0.0.0.0/0 | 10.10.10.1 | ✓ | Port 1 | 1 | 🔒 |
| 10.10.0.0/16 | | | Port 1 | 1 | 🔒 |
| 192.168.1.0/24 | | | Port 2 | 1 | |
| 192.168.2.0/24 | 192.168.1.1 | ✗ | Port 2 | 1 | |
| 192.168.2.0/24 | 192.168.1.100 | ✓ | Port 2 | 2 | |

Delete route

Add Static Route

Interface:

Destination:

Prefix:

Gateway:

Metric:

Add route

In this example, dead gateway detection has been enabled and multiple redundant routes to 192.168.2.0/24 have been added with different gateways (192.168.1.1 and 192.168.1.100) and different metrics (1 and 2, respectively).

The gateway with the IP address of 192.168.1.1 isn't responding to ICMP echo requests, so it's deemed to be dead. The corresponding route has been removed, so any traffic to 192.168.2.0/24 will now go via 192.168.1.100 instead.

When the gateway with the IP address of 192.168.1.1 starts to respond to ICMP echo requests again, the icon next to it will change from the red cross to the green tick and its route will be restored. Any traffic to 192.168.2.0/24 will go via 192.168.1.1.

3.1.2.6 Enable IPv6

Selecting the *Enable IPv6* checkbox will enable the Bridge to use IPv6 addresses. As with IPv4, you can either choose automatic address assignment or assign a static IPv6 address.

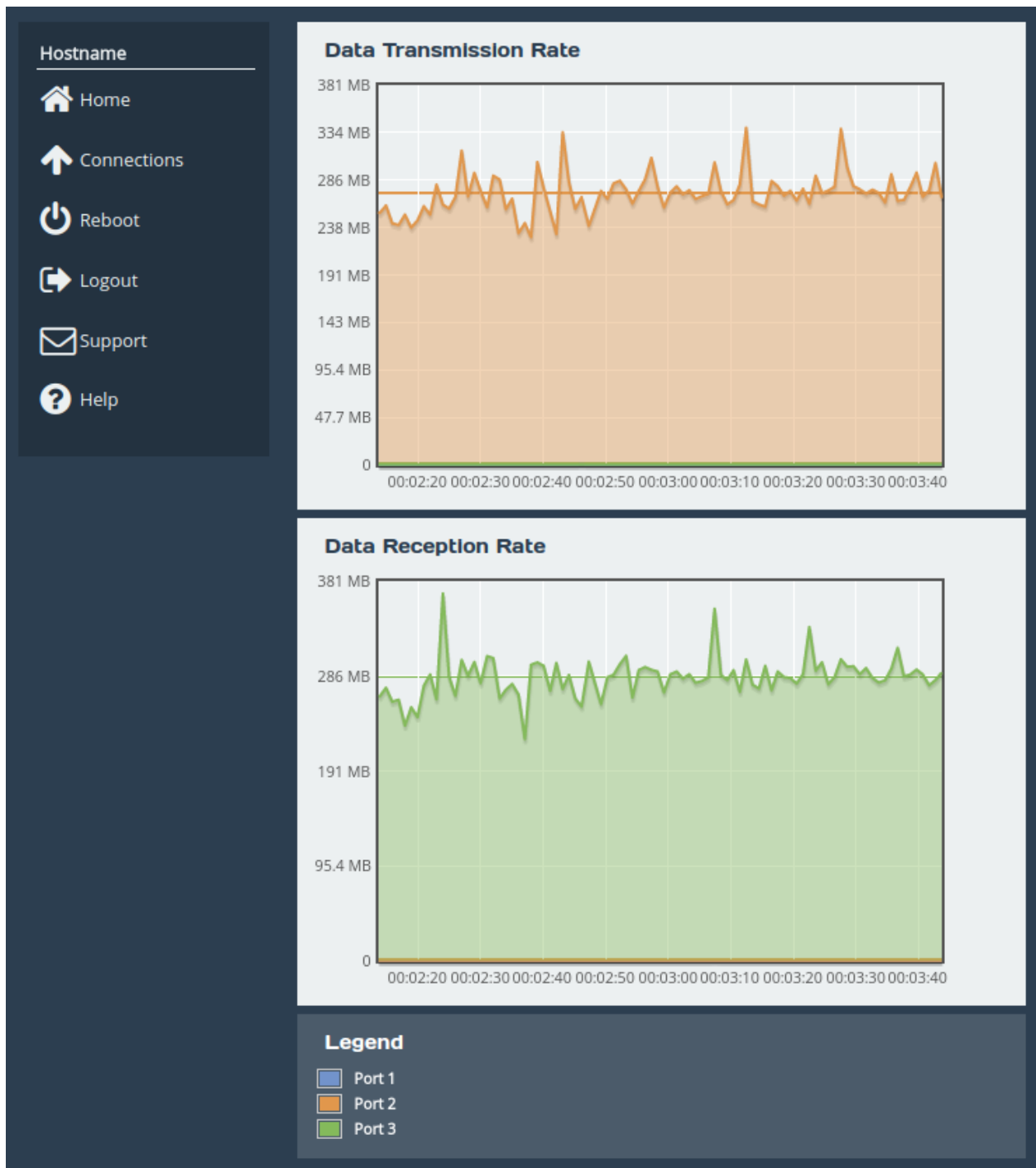
3.1.3 Interface Statistics

This page displays live network interface data rate statistics.

From the *Network Connections* page, select the *Interface Statistics* icon.



When selected, you will be presented with the following screen.



3.1.3.1 Data Transmission Rate

This section displays a graph, representing the data transmission rate for each network interface over the last 90 seconds. Each interface is displayed using a unique colour specified in the *Legend*. The average transmission rate over the last 90 seconds is displayed by a horizontal line for each interface.

3.1.3.2 Data Reception Rate

This section displays a graph, representing the data reception rate for each network interface over the last 90 seconds. Each interface is displayed using a unique colour specified in the *Legend*. The

average reception rate over the last 90 seconds is displayed by a horizontal line for each interface.

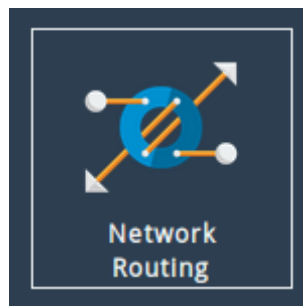
3.1.3.3 Legend

Each base network interface will be displayed using a unique colour for the data rate graphs. Each interfaces colour will be displayed alongside the ports name here.

3.1.4 Network Routing

This configuration page allows the administrator to view the network routes currently active on the Bridge. Routes can also be added or removed on this page.

From the *Network Connections* page, select the *Network Routing* icon.



3.1.4.1 Add Static Route

To add a route, fill in the following fields and click on the *Add route* button:

Interface The network interface to which the route applies.

Destination The IP address component of the CIDR block to which the route applies, e.g. 192.168.5.0.

Prefix The prefix length component of the CIDR block to which the route applies, e.g. /24.

Gateway Route traffic via the gateway with this IP address. Optional.

Metric Metric (priority) of the route. Optional; defaults to 1.

Hostname

- [Home](#)
- [Connections](#)
- [Reboot](#)
- [Logout](#)
- [Support](#)
- [Help](#)

i
Default routes should not be added here
▼

Routing Tables

| Destination | Gateway | Interface | Metric | |
|----------------|-------------|-----------|--------|---|
| 0.0.0.0/0 | 10.10.10.1 | Port 1 | 1 | 🔒 |
| 10.10.0.0/16 | | Port 1 | 1 | 🔒 |
| 192.168.1.0/24 | | Port 3 | 1 | |
| 192.168.2.0/24 | | Port 2 | 1 | |
| 192.168.4.0/24 | 192.168.2.3 | Port 2 | 2 | |

[Delete route](#)

Add Static Route

Interface:

Destination:

Prefix:

Gateway:

Metric:

[Add route](#)

In this example, a route is being added to 192.168.5.0/24 via the gateway at 192.168.2.4 on Port 2. The route has a metric of 3.

To remove an existing route, click on the *Delete* button next to it.

Important: Routes created automatically by the system cannot be removed.

When dead gateway detection is enabled, each gateway in the table will have an icon next to it indicating its current status (live or dead). Refer to Section [3.1.2.5: Dead Gateway Detection](#) for more information.

3.1.5 LLDP

This page allows an administrator to configure Link-Layer Discovery Protocol (LLDP) system settings. LLDP is a layer 2 protocol used for discovering and advertising a system's identity, capabilities, and neighbours.

From the *Network Connections* page, select the *LLDP* icon.



When selected, you will be presented with the following screen.

A screenshot of a web interface for configuring LLDP. On the left is a dark sidebar with a 'Hostname' header and menu items: Home (house icon), Connections (up arrow), Reboot (power icon), Logout (right arrow), Support (envelope icon), and Help (question mark icon). The main content area has a light gray header 'Link Layer Discovery Protocol (LLDP/CDP)' and a checkbox 'Enable LLDP/CDP' which is currently unchecked. Below this is a section titled 'LLDP Settings' with two input fields: 'LLDP Transmit Interval' set to '30' and 'LLDP Transmit Hold' set to '4'. At the bottom right are 'Cancel' and 'Save' buttons.

Checking the *Enable LLDP/CDP* checkbox will enable LLDP on all ports and show the LLDP Chassis Status section.

A screenshot of the same web interface, but with the 'Enable LLDP/CDP' checkbox checked. A new section titled 'LLDP Chassis Status' is now visible above the LLDP settings. This section contains the following information: Name: Hostname; Description: PORTrockIT Hostname "Eli.v6.4" (Jul 14 2022 9:00:00); Chassis ID: mac 00:0c:69:18:44:aa; Capabilities: Router. The 'LLDP Settings' section below remains the same, with 'LLDP Transmit Interval' at '30' and 'LLDP Transmit Hold' at '4'. The 'Cancel' and 'Save' buttons are still present at the bottom right.

LLDP Chassis Status The LLDP Chassis Status section displays the chassis information to be advertised to neighbours. This includes the system's name, description, chassis ID, and capabilities. These will be automatically created and updated by the Bridge when LLDP is enabled.

Enable LLDP/CDP When the *Enable LLDP/CDP* checkbox is selected, LLDP will be enabled and by default all ports will start to advertise device information from the Bridge whilst also discovering neighbouring device information. To view discovered neighbour information, navigate to any port on the *Network Connections* page.

3.1.5.1 LLDP Settings

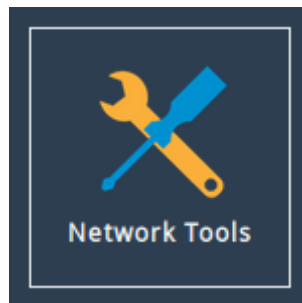
LLDP Transmit Interval The transmit interval is the time in seconds between LLDP packet transmissions. The total time-to-live (TTL) for LLDPDU's are the product of the transmit interval and transmit hold. Default is 30.

LLDP Transmit Hold The transmit hold is a multiplier for transmit interval used to determine the total TTL.

3.1.6 Network Tools

The Potomac product provides some network tools that can be used for verifying network connectivity and behaviour between the Bridge and network hosts.

From the *Network Connections* page, select the *Network Tools* icon.



When selected, you will be presented with the following screen.

Hostname

- [Home](#)
- [Connections](#)
- [Reboot](#)
- [Logout](#)
- [Support](#)
- [Help](#)

Ping

Host:

Payload Size:

Count:

Network Interface:

Traceroute

Traceroute Protocol:

Host:

Packet Size:

Destination Port:

Set Don't Fragment Bit:

Network Interface:

Output

3.1.6.1 Ping

Ping can be used to verify the connectivity between the Bridge and a network host.

To test connectivity, fill in the following fields and click on the *Ping* button:

Host The IP address of the network host.

Payload Size The ping payload size. Leave blank to default to 56 bytes.

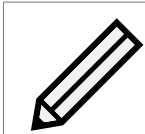
Count The number of ping attempts that you wish the Bridge to perform. Setting the count to 0 will send pings indefinitely, until the page is navigated away from, or another ping/traceroute operation is initiated.

Network Interface The interface that you want to ping from. If you are checking the routing on the unit, leave this option set to

On a successful ping, the *Output* box will fill with text similar to that below.

```
PING Address (Address): 56 data bytes
64 bytes from Address: seq=0 ttl=64 time=0.600 ms
64 bytes from Address: seq=1 ttl=64 time=0.129 ms
64 bytes from Address: seq=2 ttl=64 time=0.096 ms
64 bytes from Address: seq=3 ttl=64 time=0.143 ms
64 bytes from Address: seq=4 ttl=64 time=0.094 ms

--- Address ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 0.094/0.212/0.600 ms
```



Note: *Address* is replaced with the IP address that you entered.

3.1.6.2 Traceroute

Traceroute can be used to determine the route packets take from the Bridge to a network host.

To test the routing, fill in the following fields and click on the *Traceroute* button:

Traceroute Protocol The type of protocol you wish to use: UDP, ICMP or TCP. UDP is the default option, ICMP can be used if firewalls block UDP datagrams. TCP is useful for testing access lists and firewall protocol rules.

Host The IP address of the network host.

Packet Size The traceroute payload size. Leave blank to default to 46 bytes for IPv4 or 72 bytes for IPv6.

Destination Port The destination port can be selected. This may be useful, alongside TCP probes, when testing policy based routing; or for testing specific ports, especially Dynamic Ports (also known as Private or Ephemeral Ports). It is disabled when using ICMP.

Set Don't Fragment Bit Select to set the don't fragment (DF) bit on the traceroute packets. This can be used to diagnose MTU issues on your network.

Network Interface The interface that traceroute packets will be sent from. Leave as *Default selection* for the interface to be selected according to the routing table.

The result from traceroute will appear in the *Output* box.

3.1.7 Port Settings

Clicking on an interface will navigate to a bespoke settings page for that particular interface. Depending on the type of interface that was selected and the current options that are enabled, different settings will be presented.

Hostname

- [Home](#)
- [Connections](#)
- [Reboot](#)
- [Logout](#)
- [Support](#)
- [Help](#)

Link Status

| | | | |
|-------------|---------|-------------|---------|
| Link State: | Up | Link Speed: | 10Gb/s |
| RX Bytes: | 3343211 | TX Bytes: | 1941165 |
| RX Errors: | 0 | TX Errors: | 0 |

Settings

| | |
|---------------|----------------------------------|
| IPv4 Address: | 10.10.64.12 /255.255.0.0 |
| MTU: | 1500 |
| Gateway: | Global default via 10.10.10.1 |

Mapped Protocols

Management

Port Settings

Enable Port:

MTU Size:

Use DHCP to assign an IP address automatically

DNS Registration:


Use the following IP address:

IP Address:

Netmask:

Gateway:

When dead gateway detection is enabled, each gateway on the port will have an icon next to it indicating its current status (live or dead). Refer to Section 3.1.2.5: [Dead Gateway Detection](#) for more information.



Important: IPv6 Options will only be displayed if IPv6 has been enabled (see Section 3.1.2: [General Settings](#)).

3.1.7.1 Enable Port


An interface may be enabled or disabled by toggling this option.

3.1.7.2 Setting the MTU

The maximum transmission unit (MTU) may be adjusted from the default of 1500 bytes. Lower values are sometimes required for best performance with some types of network VPN equipment. However, it is recommended to leave this value unchanged, unless advised by documentation for any external VPN equipment used in conjunction with the Bridge.


Enabling larger frames on a jumbo frame-capable network can improve your network throughput. Jumbo frames are Ethernet frames that contain more than 1500 bytes of payload (MTU).

Before enabling jumbo frames, ensure that all the devices/hosts located on the network support the jumbo frame size that you intend to use to communicate with the Bridge. If you experience network-related problems while using jumbo frames, use a smaller jumbo frame size. Consult your networking equipment documentation for additional instructions.

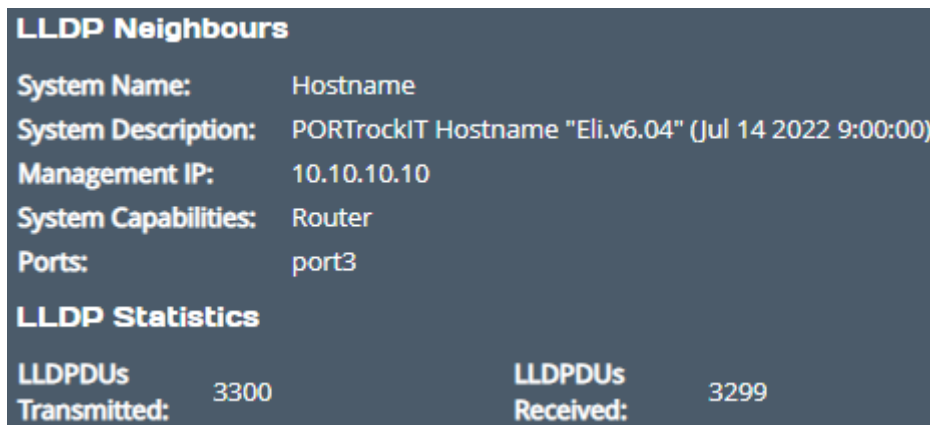
| | |
|---|--|
|  | <p>Important: Some networking switches require you to specify the size of the jumbo frame (MTU) when enabling, as opposed to a simple enable command. On these switches, it might be required to add the necessary bytes needed for the frame header to the MTU size you specify in the Bridge's port configuration. Typical header size is 28 bytes, so a 9000 byte MTU could translate to a 9028-byte total size. Refer to your switch documentation to understand what the maximum frame size settings are for your switch.</p> |
|---|--|

3.1.7.3 LLDP Port Settings

To configure LLDP settings on ports, first ensure that LLDP has been enabled from the LLDP page.

| | |
|--|---|
|  | <p>Important: The different LLDP protocols compatible with your Bridge are LLDP and CDP (Cisco Discovery Protocol.)</p> |
|--|---|

After enabling LLDP, the following statistics and configuration boxes will become visible.



The screenshot shows two sections: 'LLDP Neighbours' and 'LLDP Statistics'. The 'LLDP Neighbours' section lists: System Name: Hostname, System Description: PORTrockIT Hostname "Eli.v6.04" (Jul 14 2022 9:00:00), Management IP: 10.10.10.10, System Capabilities: Router, and Ports: port3. The 'LLDP Statistics' section shows: LLDPDUs Transmitted: 3300 and LLDPDUs Received: 3299.

3.1.7.4 LLDP Neighbours

System Name The system name of the neighbour device.

System Description The description set for the neighbour device. This will usually contain information such as: kernel name, node name, kernel version, build date, architecture. Your Bridge will advertise a combination of product name, host name, firmware version.

Management IP The management IP address of the neighbour device.

System Capabilities A list of capabilities the neighbouring device has enabled. This can be any of the following: Bridge, Router, Station, Telephone, WLAN Access Point, Repeater, DOCSIS

Cable Device, Other.

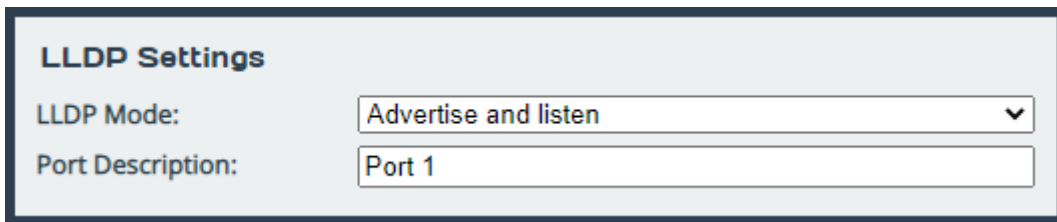
Ports A list of port descriptions from the connecting ports on the neighbouring device.

3.1.7.5 LLDP Statistics

LLDPDUs Transmitted Total LLDPDU's sent from this port.

LLDPDUs Received Total LLDPDU's received from this port.

3.1.7.6 LLDP Settings



LLDP Settings

LLDP Mode:

Port Description:

LLDP Mode Set the operation of LLDP on this port. The following options are available.

- *Disabled* LLDP will not run on this port, and therefore will not send or receive LLDPDU's. This option is useful if you want the port to remain anonymous to neighbouring machines using LLDP.
- *Only Listen* This port will receive LLDPDU's, however will not forward any. Use this if you want the port to remain anonymous to neighbouring machines whilst retaining the ability to view LLDP data from neighbours.
- *Only advertise* This port will send LLDPDU's, however will not receive any. Use this if you want the port to only advertise itself to neighbouring machines.
- *Advertise and Listen* This port will send and receive LLDPDU's, which will both allow the discovery of neighbouring machines and the advertisement of itself to neighbouring ports. This is the default setting.

Port Description Set a custom alphanumeric string to advertise from this port.

3.1.7.7 Setting the IP Address

There are two possibilities when configuring the IP address of a network port:

DHCP The Bridge will seek out your network's DHCP server and obtain an IP address for this port each time it boots.

If the server is not found, this port will fall back to its saved static IP settings.

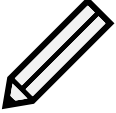
When DHCP is selected, the option to register the system's hostname with DNS is made available, this is enabled by default on management interfaces.

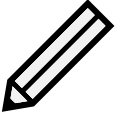
Static IP The IP address, netmask and gateway set in the corresponding fields will be used for this port.

The gateway field may be left blank.

The IPv4 netmask field must be specified in dot-decimal form, e.g. 255.255.255.0.

If IPv6 is enabled from the *Network Connections* page, you can choose to use automatic address assignment to assign an IPv6 address, or you can set a static IPv6 address.

| | |
|---|--|
|  | Note: DHCP is enabled by default on management interfaces. |
|---|--|

| | |
|---|---|
|  | Note: If DHCP is enabled, we recommend that your DHCP server is set to automatically update the DNS server. |
|---|---|

3.1.7.8 Committing the Changes

Click the *Save* button to save these parameters, then reboot the Bridge to apply them.

3.2 Passwords & Security

This configuration page allows the administrator to change the security settings of the Bridge.

From the Home screen, select the *Passwords & Security* icon under the *Bridge Configuration* section.




The web interface will display the following:


Passwords & Security

Hostname

 Home

 Reboot

 Logout

 Support

 Help

System Password

Old Password:

New Password:

Retype New Password:

Change Password

Password Reset Options

- Enable password reset via email
- Send confirmation code to event notification email
 - Send confirmation code to an alternative email:

- Enable password reset via the local console
- Enable password reset via SSH

Save

- Use a standard web connection
- Use an encrypted web connection (HTTPS):
- Generate new Certificate Signing Request
 - Upload existing certificate

Upload Certificate: No file chosen

Optional Separate Key: No file chosen

Save

User Settings


Session Timeout:

Unit Display Format:

Save

Secure Shell (SSH)

Enable SSH:

 At least one public key must be added to enable SSH.

Save

List of Public Keys


| Comment | Public Key |
|----------------------|------------|
| No Public Keys Added | |

Add Public Key

Remove Public Key

3.2.1 System Password

This section allows the administrator to change the access password for the web interface. The new password must be between 5 and 64 characters and should contain both symbols and numbers.

| | |
|---|---|
|  | Important: The word “RESET” is reserved by the system and cannot be used as a password. |
|---|---|

Enter the existing password into the *Old Password* field; then enter the desired new password into the two following fields. Then click *Change Password*.

3.2.2 Password Reset Options

This section allows the administrator to enable and disable different methods of password reset on the Bridge.


3.2.2.1 Password Reset via Email

3.2.2.1.1 Setup

This method of password reset allows a user that is authorised to access a pre-configured email address to reset the password of any user account on the Bridge.

When a user forgets their password, they will be able to click on the *Forgot your password?* link on the login page to reset their password.

To successfully reset your password using this method, a confirmation code will be sent to an email address previously configured in the web interface. This code will have to be obtained by the user and entered into the password reset wizard to complete the password reset procedure.

| | |
|---|---|
|  | Important: Resetting a password will log out any current sessions under that user name. |
|---|---|

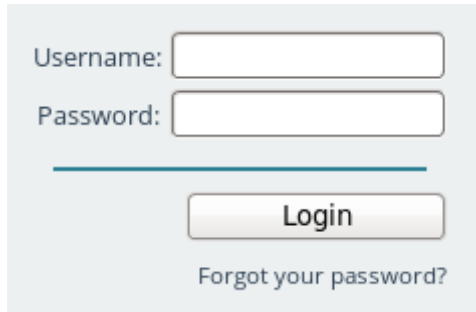
To enable password reset via email, SMTP settings will have to be configured first to allow the Bridge to send emails. Navigate to the *Service Control* page and enter your SMTP settings under the *Simple Mail Transfer Protocol (SMTP)* section. Refer to Section [3.3.3: Email](#) for information on SMTP configuration.

Next, navigate to the *Passwords & Security* page and tick the *Enable password reset via email* checkbox. You must then select whether you wish to have the confirmation code sent to the “event notification email” which is configured on the *Service Control* page, or to an alternative email which can be entered in the text box underneath.

Refer to Section [3.3.4: Event Notification Email](#) for information on setting an event notification email. You will be required to enter an email address into the *alternative email* text box if an event notification email has not been set.

3.2.2.1.2 Using Password Reset via Email

To reset the password of a user account using the email method, navigate to the login page of the Bridge you wish to reset the password for. If password reset via email is enabled, there will be a “Forgot your password?” link underneath the login button as shown:



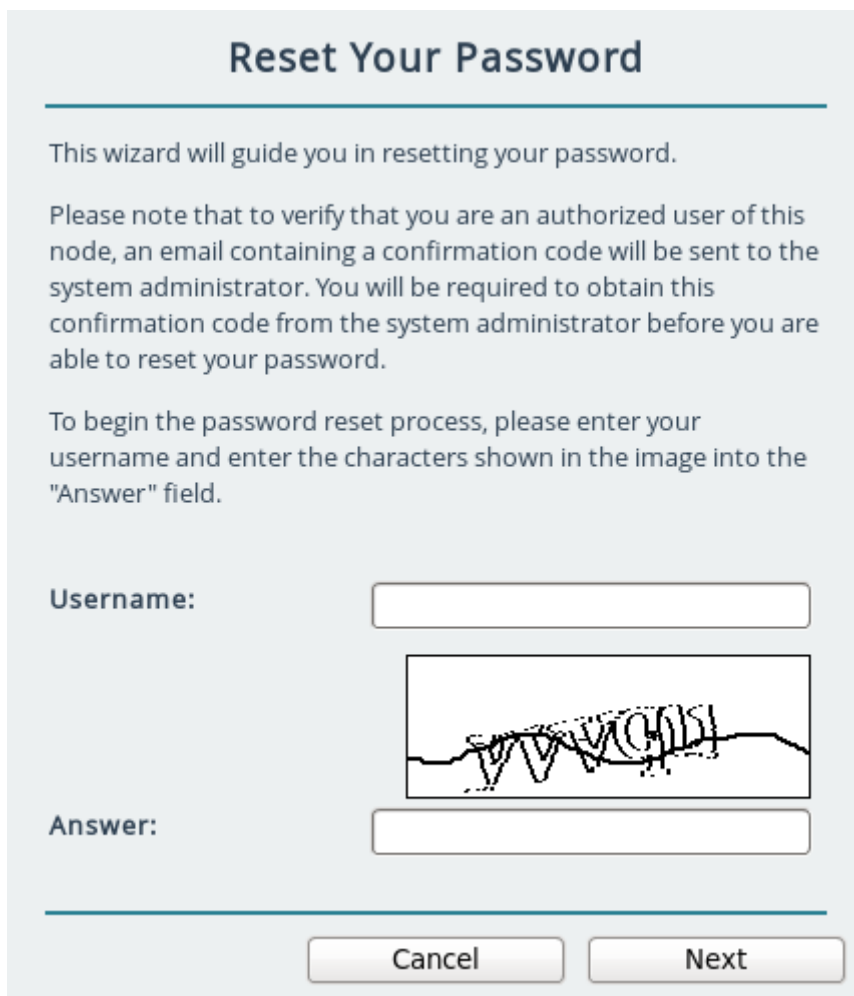
Username:
Password:

[Forgot your password?](#)



Important: If the “Forgot your password?” link is not present, then password reset via email has not been enabled on the Bridge.

Enter the username you wish to reset the password for and complete the captcha challenge by entering the characters in the image into the *Answer* text box. Then click *Next* to continue.




Reset Your Password

This wizard will guide you in resetting your password.

Please note that to verify that you are an authorized user of this node, an email containing a confirmation code will be sent to the system administrator. You will be required to obtain this confirmation code from the system administrator before you are able to reset your password.

To begin the password reset process, please enter your username and enter the characters shown in the image into the "Answer" field.

Username:



Answer:



Important: You can try a different captcha challenge by refreshing the web page.

An email containing a confirmation code will be sent to the email address set in the *Passwords & Security* page. Enter the confirmation code sent in the email to the *Confirmation Code* text box.

Enter your new password into the *New Password* and *Confirm Password* text fields and press the *Next* button.

Reset Your Password

An email containing a 16-digit confirmation code has been sent to the system administrator of this Node.

Enter the confirmation code and your new password below. Please note that you will not be able to reset your password if the confirmation code is incorrect.

Confirmation Code:

New Password:

Confirm Password:

If password reset was successful, a message will be displayed and you will be able to log in with your new password.

Password reset was successful.
Please login with your new password.

Username:


Password:


[Forgot your password?](#)

3.2.2.2 Password Reset via Local Console or SSH


3.2.2.2.1 Setup

These methods of password reset allow any user that either has access to the local console or remote access via SSH to reset the password of any user account on the Bridge.

| | |
|---|---|
|  | Warning: These methods of password reset should be disabled if unauthorised users may either have access to the local console or remote access via SSH. |
|---|---|

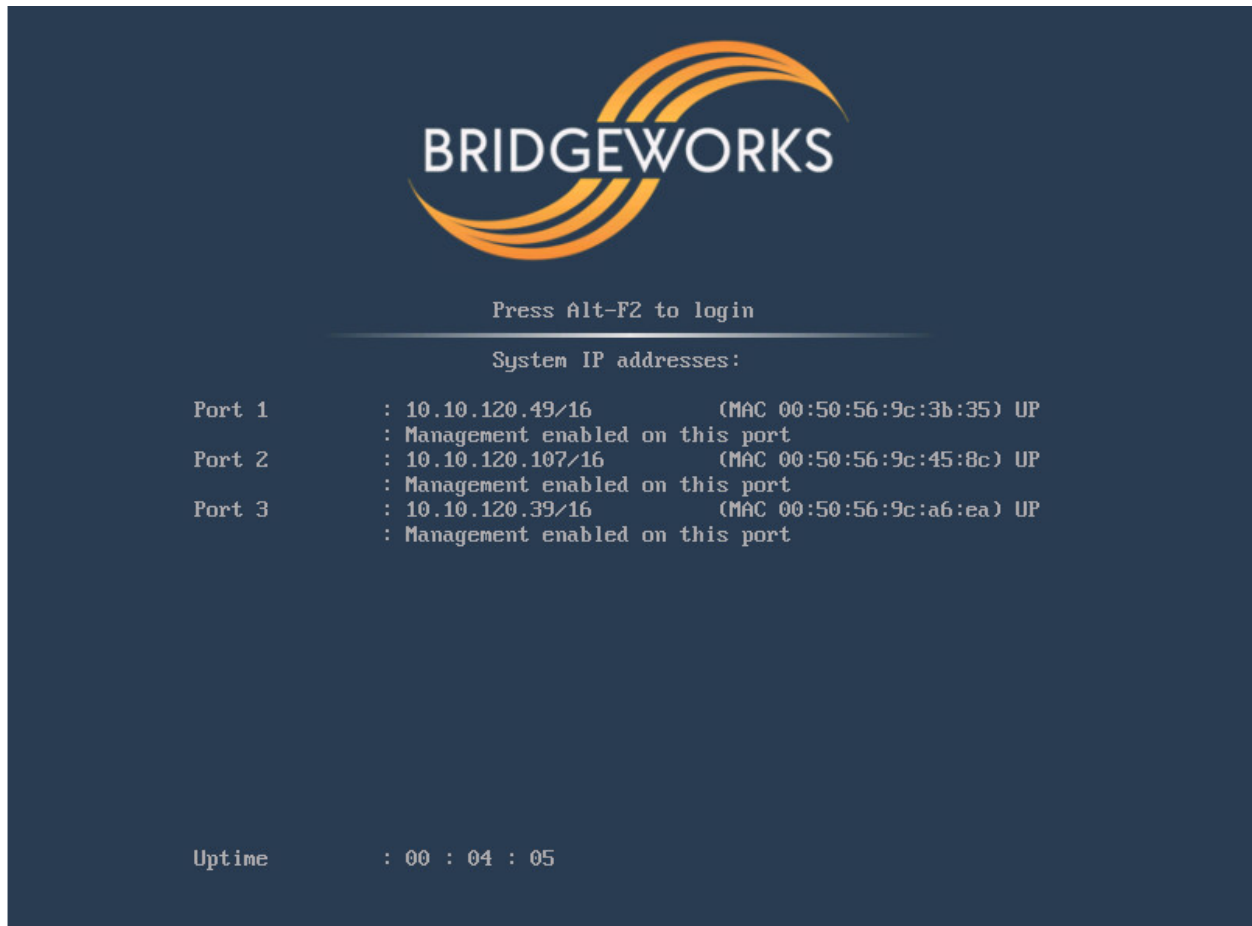
| | |
|---|---|
|  | Important: Resetting a password will log out any current sessions under that user name. |
|---|---|

To enable password reset via local console, tick the *Enable password reset via the local console* checkbox or to enable via SSH, tick the *Enable password reset via SSH* checkbox. Then click *Save*.

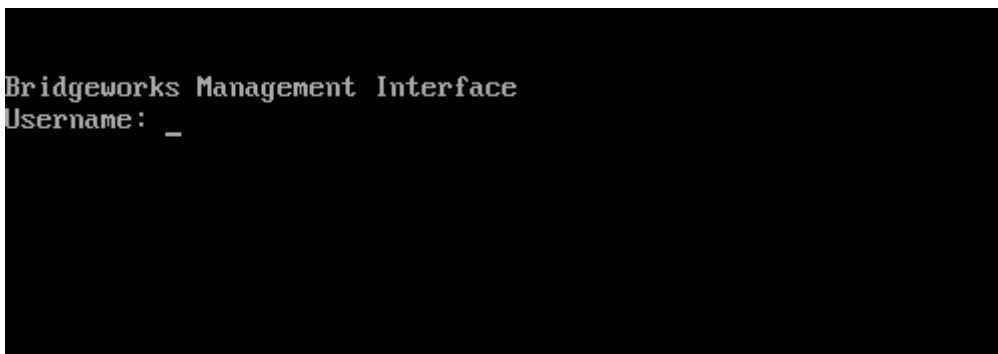
| | |
|---|--|
|  | Important: Password reset via local console is enabled by default. |
|---|--|

3.2.2.2 Using Password Reset via Local Console or SSH

To reset the password of a user account using the local console method, connect a keyboard and monitor to the Bridge. You will see the following screen:



Press the “Alt” and “F2” keys at the same time to get access to the login prompt as shown:




To reset the password of a user account using the SSH method, connect to the Bridge via SSH to access the login prompt.

Enter the username you wish to reset the password for, such as “admin”. Then enter the password as “RESET”. Both the username and password are case-sensitive.

You will then be asked whether you wish to continue resetting the password. Press the “y” key then press the “Enter” key. Entering any other key will abort the password reset process.

```
Bridgeworks Management Interface
Username: admin
Password:
Are you sure you want to reset your password? y/n
_
```

Next, enter the new password you wish to set for the user selected. You will then be asked to enter the password again.

| | |
|---|--|
|  | Important: If the two passwords do not match, or you are attempting to set the password as "RESET", then password reset will fail. |
|---|--|

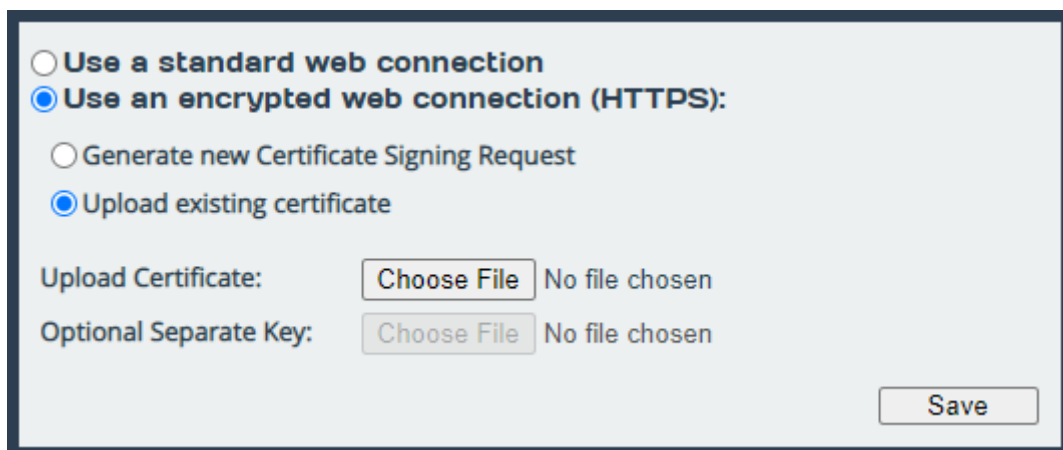
If your new password is accepted, the "Password set successfully" message will appear as shown:

```
Password set successfully
Bridgeworks Management Interface
Username : _
```

You will now be able to log into the web interface using your username and new password.

3.2.3 Secure Connection

To enable HTTPS, select the *Use an encrypted web connection (HTTPS)* radio button, then *Upload existing certificate*, and click *Save*.



Use a standard web connection
 Use an encrypted web connection (HTTPS):
 Generate new Certificate Signing Request
 Upload existing certificate

Upload Certificate: No file chosen
Optional Separate Key: No file chosen

If you simply click *Save* without uploading any files for the certificate or key, a self-signed certificate will be automatically generated by the Bridge.

Alternatively, You can use your own certificate & key pair by selecting files to upload with the file-picker buttons. You may upload the key pair as two separate files, or one combined file.

You will be logged out of the Bridge's web interface, and further transactions with the web interface will use SSL/TLS encryption.

3.2.3.1 Generate new Certificate Signing Request

Use a standard web connection
 Use an encrypted web connection (HTTPS):
 Generate new Certificate Signing Request
 Upload existing certificate

Domain Name:
Organisation Name:
Town/City:
State/County:
Country:

If you need a certificate signed by an external certificate authority, you may use the *Generate new Certificate Signing Request* option to do so. Select *Use an encrypted web connection (HTTPS)*, then *Generate new Certificate Signing Request* to open the form.

The fields which appear below this option when selected should be filled in with the details you want to appear on the certificate. The *Domain Name* field should be filled in with the IP address or fully qualified domain name which you use to access your Bridge. The following four fields should identify your company or organisation. Note that the *Country* field should contain a two-letter country code (ISO 3166-1 alpha-2), not a full country name.

Clicking *Save* will then download a CSR file. You should then send this file to your certificate authority, who should send you back a signed certificate file.

You can then upload this signed certificate file to the Bridge, using the *Upload existing certificate* option, leaving the *Optional Separate Key* field empty.

3.2.4 User Settings

Settings in this section allow you to change parameters for the user interface.

3.2.4.1 Session Timeout

After not interacting with the interface for a certain period of time, you will automatically be logged out. The Session Timeout setting allows you to adjust the length of time that must pass before you are logged out.

3.2.4.2 Unit Display Format

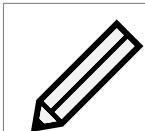
To allow a user to view system graphs in a unit that is applicable to their use case, the system may be switched to display in one of 6 different unit scales:

- Bits per second, decimal prefix (Mbit/s)
- Bytes per second, decimal prefix (MB/s)
- Bits per second, binary prefix (Mibit/s)
- Bytes per second, binary prefix (MiB/s)
- Bytes per hour, decimal prefix (TB/h)
- Bytes per hour, binary prefix (TiB/h)

3.2.5 Secure Shell (SSH)

Secure Shell (SSH) is a protocol that allows for secure access to a Bridge's configuration console.

To enable SSH on network interfaces with the "Management" protocol mapped, tick the *Enable SSH* checkbox and click *Save*.

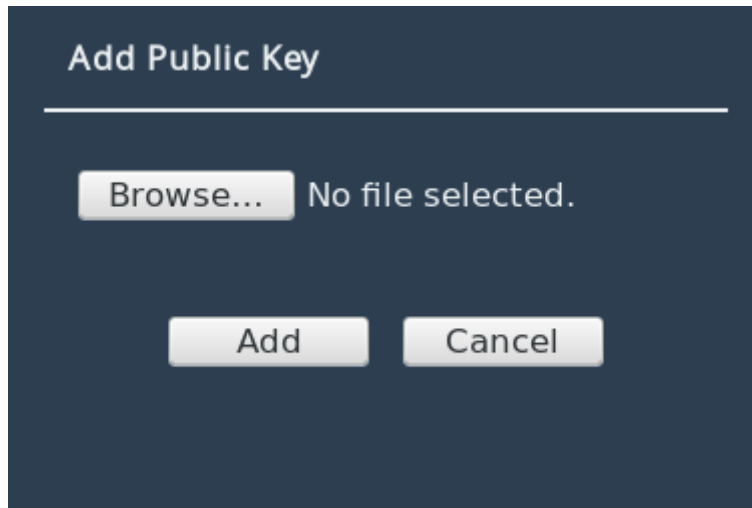


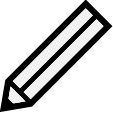
Note: At least one public key must be uploaded, as described below, before SSH can be enabled.

3.2.5.1 Managing Public Keys

To log on to a Bridge's configuration console using SSH, a public key is required to be uploaded first. Users connecting to the Bridge without having uploaded the corresponding public key to the Bridge first will be refused access.


To upload a public key, click on the *Add Public Key* button. The *Add Public Key* dialog box will appear. Click on the *Browse* button to select a public key file.



| | |
|---|---|
|  | Note: Only RSA keys in the OpenSSH or RFC4716 format are supported. |
|---|---|

Click on the *Add* button to upload the selected public key file. The public key should then appear in the *List of Public Keys*.

To delete a public key, click on the public key to delete in the *List of Public Keys* and then click on the *Remove Public Key* button.

| | |
|---|--|
|  | Important: Open SSH connections will not be closed when a public key is removed, or if SSH is disabled. Only new SSH connections will be rejected. |
|---|--|


3.2.5.2 Using SSH

To connect to a Bridge which has a management port with an IP address of 192.168.0.20 using the OpenSSH SSH client, use the command:

```
ssh admin@192.168.0.20
```

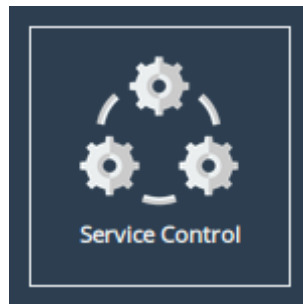
You will then be prompted for the username and password of the Bridge to log into the configuration console.

You will be denied entry to the configuration console if you have not uploaded a public key to the Bridge prior to connecting via SSH. A valid username and password for the Bridge are also required to log in using SSH.

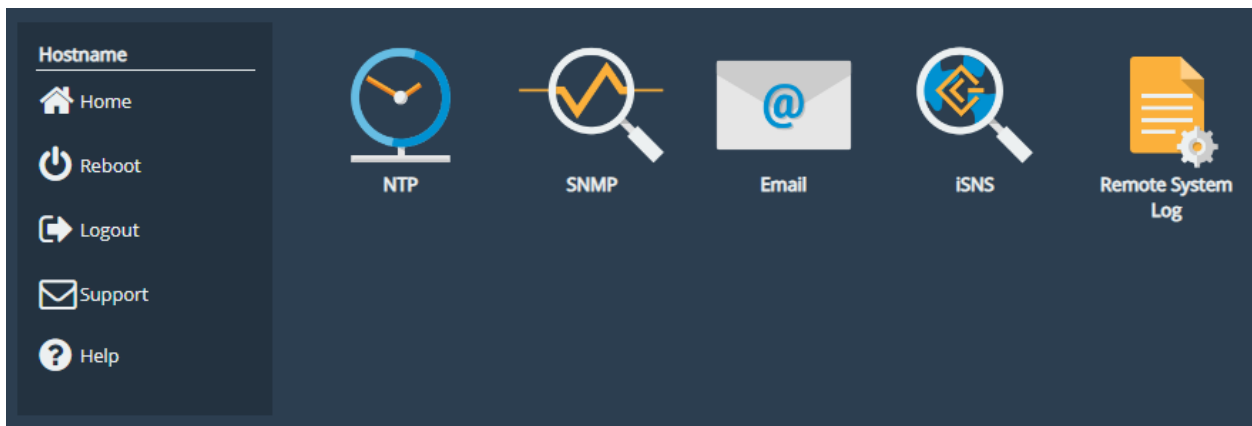
| | |
|---|--|
|  | Important: Logging in as root user is disabled on SSH. |
|---|--|

3.3 Service Control

This configuration page allows the administrator to configure network services for the Bridge. From the Home screen, select the *Service Control* icon under the *Bridge Configuration* section.



The web interface will display the following:



Each link leads to a different service.

The *NTP* (Network Time Protocol) page allows you to configure various settings available for NTP on the Bridge.

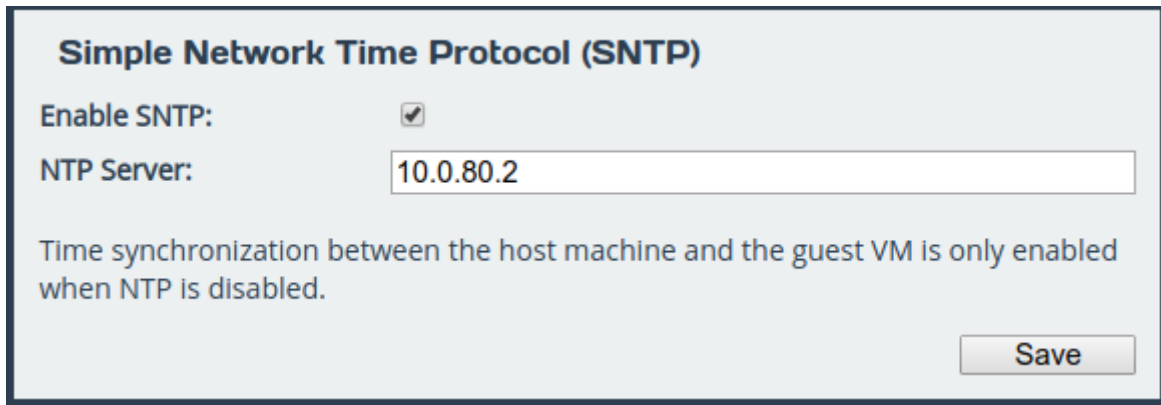
The *SNMP* (Simple Network Management Protocol) page allows you to configure various settings available for SNMP on the Bridge.

The *Email* page allows you to configure various settings available for Email alerts on the Bridge.

The *iSNS* page allows you to configure various settings available for iSNS on the Bridge.

The *Remote System Log* page allows you to configure various settings available for remote logging on the Bridge.

3.3.1 Network Time Protocol (NTP)



The screenshot shows a configuration window titled "Simple Network Time Protocol (SNTP)". It contains the following elements:

- Enable SNTP:** A checkbox that is checked.
- NTP Server:** A text input field containing the IP address "10.0.80.2".
- Time synchronization between the host machine and the guest VM is only enabled when NTP is disabled.** A note in a smaller font.
- Save:** A button located in the bottom right corner.

SNTP is a protocol for synchronising the clock of computer systems. This feature is critical if you are planning on using the scheduler or useful when viewing the logs to determine when an event occurred. Refer to Section [7.2: System Log](#) for more information.

To enable SNTP, select the *Enable SNTP* checkbox and enter the IP address for the NTP server. Then click *Save*.

3.3.2 Simple Network Management Protocol (SNMP)

SNMP v2c Agent
Community Name:

SNMP v3 Agent
Username:
Auth Type:
Auth Password:
Privacy Type:
Privacy Password:

System Information
System Location:
System Contact:

SNMP Trap Sinks

| Address | Port | Version | Community/User |
|-------------------------------|------|---------|----------------|
| No SNMP trap sinks configured | | | |

Download MIB Files

Two versions of SNMP are supported, 2c and 3. V3 is recommended as it has everything 2c has plus vastly superior security.

To enable SNMPv2c, check the box in the top left of the *SNMP v2c Agent* box, enter a *Community Name* and click *Save*.

To enable SNMPv3, check the box in the top left of the *SNMP v3 Agent* box, then enter a *Username*. Authentication verifies the sender of data while privacy protects the data. *SHA1* and *AES-128* are the superior and recommended hash function and encryption protocol respectively. Once done configuring the security settings, click *Save*.

3.3.2.1 System Information

The information configured here is accessible over SNMP.

System Location is the location of this Bridge. The value of this property should provide enough information for an administrator to locate this Bridge.

System Contact is the contact information for the person or department responsible for managing this Bridge. Click *Save* to save changes to System Information.

3.3.2.2 SNMP Trap Sinks

The Bridge notifies all configured *Trap Sinks* when a system event occurs. This means your SNMP manager can be notified should the Bridge encounter an error.

Click *More Info* link to view more information about a specific sink.

To add a new sink, click the *Add Sink* button to open the Add SNMP Trap Sink dialog.

3.3.2.3 Add SNMP Trap Sink

Address is the IP Address of the trap sink. Must be a valid IP address. Reserved and multicast addresses are not supported.

Port is the port of the trap sink.

Version is the version of SNMP the sink uses. It is recommended to use SNMPv3 where possible since it allows for authentication and privacy. The following versions are supported:

- v1: SNMPv1 (not recommended)
- v2c: SNMPv2c allows acknowledged traps
- v3: SNMPv3 allows privacy and authentication, making it more secure than SNMPv1 and SNMPv2c. (recommended)

Type is the type of notification sent to the trap sink. It is recommended to use the *Inform* notification type since it is acknowledged and therefore the notification is less likely to be unintentionally lost.

- Trap: Unacknowledged message
- Inform: Acknowledged message, not supported with SNMPv1

Community is the community string to use for the trap sink. Supported in SNMPv1 and SNMPv2c. Cannot contain spaces.

Username is the SNMPv3 unique identifier to associate these security details with. Must be 1-32 characters in length, and cannot contain spaces.

Engine ID is the SNMPv3 Engine ID of the trap sink. The Bridge should automatically discover the engine ID if this is left blank. If an Engine ID is provided, it must be 5-32 characters in length, and cannot contain spaces.

Authentication is the SNMPv3 authentication hash function used by the trap sink. Authentication allows only SNMP engines with the correct authentication password to connect to the trap sink. It is recommended to use authentication where available. It is not recommended to use the MD5 hash function since it suffers from vulnerabilities.

- SHA1: Uses the SHA1 hash function (recommended)
- MD5: Uses the MD5 hash function (not recommended)
- None: Authentication Disabled (not recommended)

Auth Password is the authentication password used to log in to the trap sink. An authentication password must be provided if *Authentication* is not set to *None*.

Privacy is the SNMPv3 privacy type used by the trap sink. *Authentication* must be enabled to use privacy. Privacy allows SNMP engines to communicate privately using encrypted messages. It is recommended to use privacy where available. It is not recommended to use the DES cipher function since it is cryptographically weak.

- AES-128: Uses the AES-128 cipher function (recommended)
- DES: Uses the DES cipher function (not recommended)
- None: Privacy Disabled (not recommended)

Privacy Password is the privacy password used to communicate privately with the trap sink. A privacy password must be provided if *Privacy* is not set to *None*. If the sink has privacy enabled but doesn't have a specific privacy password, then the privacy password is likely the same as the authentication password.

3.3.2.4 Download MIB Files

Several Management Information Bases (MIBs) are available for querying on this unit using SNMP and these MIBs can be accessed using unique Object Identifiers (OIDs).

| MIB | OID |
|--|----------------------|
| System | 1.3.6.1.2.1.1 |
| Interfaces | 1.3.6.1.2.1.2 |
| IP | 1.3.6.1.2.1.4 |
| ICMP | 1.3.6.1.2.1.5 |
| TCP | 1.3.6.1.2.1.6 |
| UDP | 1.3.6.1.2.1.7 |
| Bridgeworks Node Management Statistics | 1.3.6.1.4.1.49599.11 |
| Bridgeworks Service Statistics | 1.3.6.1.4.1.49599.12 |

The MIBs describing data within the Bridgeworks' OID can be downloaded by clicking [Click Here to Download](#). A MIB file can be imported into an SNMP manager in order to provide useful information about data returned by the SNMP agent or sent in an SNMP trap.

3.3.3 Email

Simple Mail Transfer Protocol (SMTP)

SMTP Server:

SMTP Server Port:

Sender Email Address:

SMTP Username:

SMTP Password:

Save

Event Notification Email

Enable Email Alerts:

Recipient Email Address:

System Event Level: Alert ▼

System Log Level: Critical ▼

Test Save

This section allows an SMTP server to be configured, to send emails on behalf of the Bridge.

The fields in this subsection are:

SMTP Server To enable an SMTP server, enter its IP address or hostname in this field.

The server must be reachable from the Bridge's Management interface (or whichever port the default route is set to) on this address. Refer to Section 3.1.2.4: [Default Route](#) for information on setting the default route.

SMTP Server Port Enter the port number of the SMTP server. If no port number is specified, it will use the default port (25).

Sender Email Address The address from which emails will be sent. This needn't be a previously in-use address; it can be anything your SMTP server will allow. This can be used to identify the emails from this Bridge.

Must be of the form: _____@_____.____

SMTP Username Username credential to be used to send emails from the SMTP server. May be blank, depending on your server's configuration.

SMTP Password Password credential to be used to send emails from the SMTP server. May be blank, depending on your server's configuration.

Click **Save** to apply any changes made to the SMTP configuration.

3.3.4 Event Notification Email

The Bridge can notify a systems administrator when events of a certain urgency occur in the Bridge log. Before this can be done, SMTP settings must be configured. Refer to Section 3.3.3: [Email](#) for information on SMTP settings.

To enable email alerts on the Bridge, select the *Enable Email Alerts* checkbox. The two following fields should then be completed:

Recipient Email Address The email address/addresses to which the emails will be sent. Multiple email addresses can be specified, separated by a semicolon, e.g.:
`office@example.com; home@example.com.`

Trigger Event Log Level The minimum log level to trigger an email. Events of higher urgency than the selected level will also trigger an email. The available levels are, in descending order of urgency:

Critical Example: The Bridge is running at non-recommended temperatures.

Error Example: A device attached to the Bridge has been disconnected.

Warning Example: An invalid configuration file was uploaded.

Confirm these settings by clicking **Save**.

The *Test* button will send a test email to the recipient email address/addresses to confirm that the email configuration is working correctly.

3.3.5 Remote System Log

This section is about remote system logging, which allows the user to store the node's logs in a centralised external system. Each node can send its logs to a maximum of 10 different servers by completing the form below.

Syslog Server The IP address or hostname of the local server being accessed.

Port The port number to use when connecting to the log host. This defaults to 514 if not changed.

Protocol The type of protocol to use for forwarding: TCP or UDP. Only one protocol can be defined per remote log host.

TCP Framing When sending system log messages to TCP hosts there are two forms of message framing, traditional sends new line characters after each log, while octet-counted sends the message length ahead of the log entry. Select the method which is most compatible with your system log server.

Enable Encryption This section allows the log host connection to be encrypted. If you do not wish to encrypt your system log, leave the Enable Encryption checkbox unchecked.

Certificate Authority When encryption has been selected a Certificate Authority certificate must be provided using the file upload field. This should match the certificate authority used on your remote log host as it will be used to verify the connection.

Authorisation Mode There are two supported authorisation modes: Name and Anon. Name is the default option as it is the most secure.

Name Uses certificate validation and subject name authentication.

Anon Uses anonymous authentication. This mode checks for certificates, however they aren't validated.

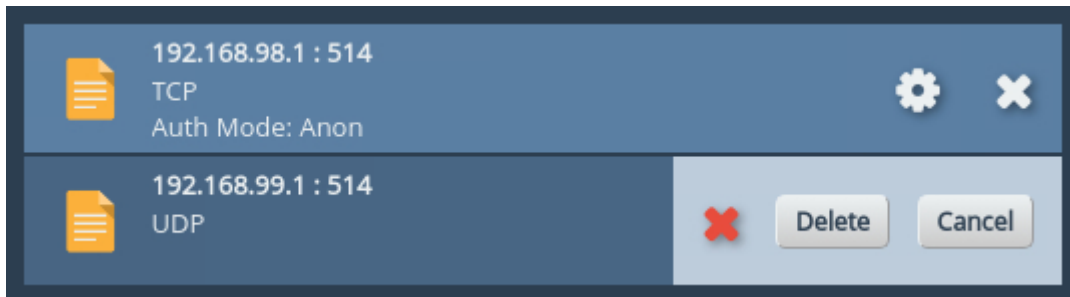
Peer Name This is the name of the remote peer on your client's certificate. This is only relevant when Name Authorisation is selected.

Once all the desired fields have been completed, click the *Add* button at the bottom right of the form.

3.3.5.1 Editing or Deleting a Connection

Once a connection has been created, the information can be updated by clicking the *gear* symbol. Any aspect of the connection can be edited from the address to type of encryption it uses. If a certificate authority has previously been uploaded for that connection, editing also means that this can be removed and a new one uploaded if desired.

Additionally, a host can be deleted by clicking the *X* icon on the main remote logging host page. Deleting a host will immediately remove the connection as well as the Certificate Authority linked to that connection, if applicable.



3.3.6 Internet Storage Name Service (iSNS)



Internet Storage Name Service allows automated discovery, management and configuration of iSCSI resources from a central point. With this option enabled, the Bridge's iSCSI target will be registered with an iSNS server, from which it can be discovered.

To enable this feature, select *Enable iSNS*, and enter the IP address or hostname of the iSNS server with which to register in the *iSNS Server* field. Then click *Save* to apply changes.

4 SAS Initiator

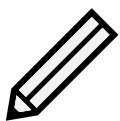
This section details the information displayed on the *SAS Initiator* page. This page allows the administrator to examine physical connections (hereinafter referred to as “phys”) from their SAS devices.

From the Home screen of the web interface, select the *SAS Initiator* icon from the *Devices and Protocols* section.



You will see the following page:

A screenshot of the SAS Initiator web interface. The page has a dark blue header with the title "SAS Initiator". On the left is a navigation sidebar with links for Home, Reboot, Logout, Support, and Help. The main content area shows "Display Options" with a "Phy display filter" dropdown set to "All" and a "Live Update" checkbox checked. Below this is a section for "Host - Slot 2" with "4 links active". It displays eight SAS ports in a 4x2 grid. The first two columns are labeled A-1 through A-4, and the second two columns are labeled B-1 through B-4. Ports A-1, A-2, A-3, and A-4 are shown as "3.0 Gbit Expander" with green status bars. Ports B-1, B-2, B-3, and B-4 are shown as "Unknown No Device" with red status bars.



Note: The *SAS Initiator* page may look different than pictured depending on your configuration.

4.1 SAS Initiator Page

This page displays physical SAS cards (or “hosts”) contained within your unit, and any devices to which they are connected (such as disk drives or expanders). A host will contain four phys for every physical port on the card.

4.1.1 Hosts

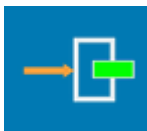
The heading of a host section shows the following information:

Chevron An arrow for expanding or collapsing the section.

Name (e.g. Host 1).

Active Connections A display of the number of connections available (e.g. 4 links active).

Under the host heading, a number of phys will be displayed. The icon represents their state.



End Device A device is connected



No Device No device is connected



Expander Device An expander is connected

The text to the right of each icon displays information relating to the phy:

Device identifier The identifier of the device, shown with a letter and a number (e.g. “B-3”). The letter pertains to the physical port, as displayed on your port mapping page.

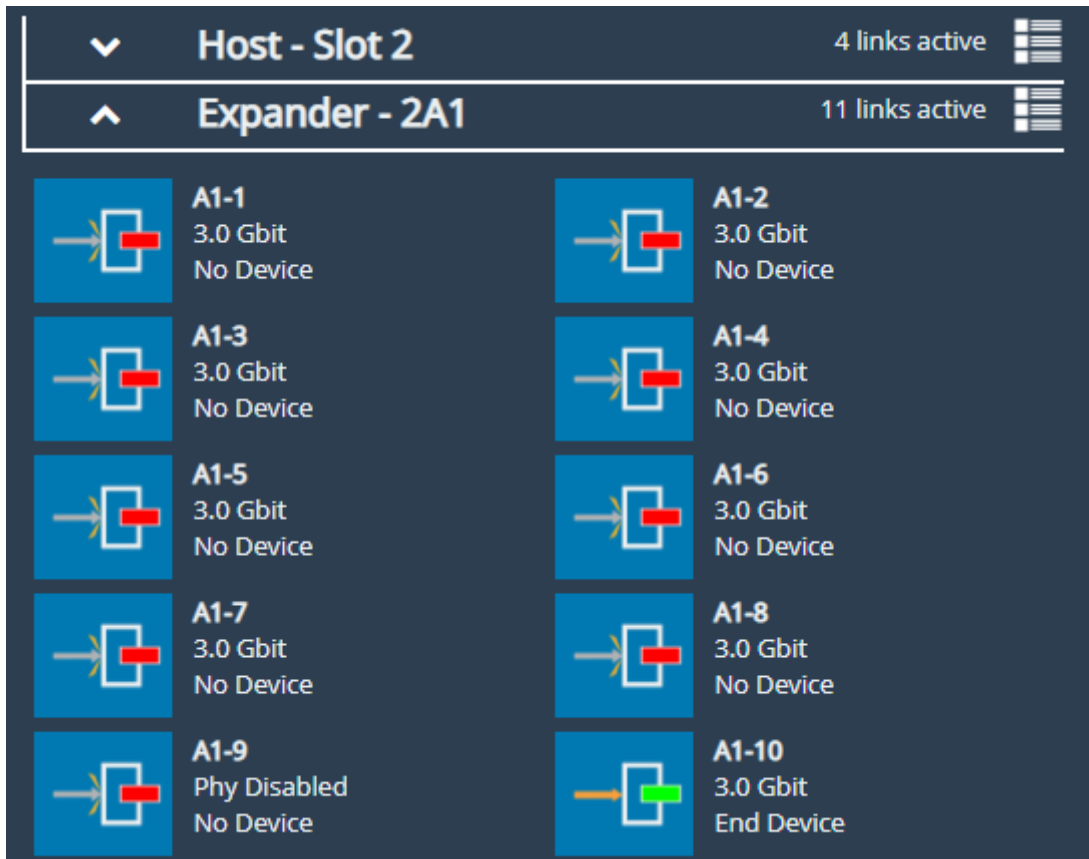
Link speed The negotiated link speed of the device. This will show a speed if a physical connection is made (e.g. “6.0 Gbit”), or otherwise displays “Unknown”.

Device type Whether there is an end device, no device, or expander (as represented by the icon).

If expanders are connected to a host, they will appear in their own sections starting underneath all listed hosts. The header contains number and letter designations pertaining to host it is connected to. For example, the 1st expander connected to port **A** of Host **2** will be labelled “SAS Expander - 2A1”. The display of the heading and the phys of an expander mirrors the host phys exactly.

4.1.2 Expanders

Expanders are displayed in a similar manner to hosts. The title bar continues to show a chevron, the name of the expander, and the links active. All the phys of the expander are shown underneath this heading, using the same icons as hosts.



The name of an expander signifies its origin, and its level. For example, an expander named **2A1** originates from the **2nd** host, from physical port **A**, and is the **1st** level of expander from that port.

Phys from an expander are similarly named. A phy from expander **2A1** may be labelled **A1-12**, where **A** represents the physical origin port, **1** represents the level of expander from that port, and **12** represents the number of the phy.

4.1.3 Display Options

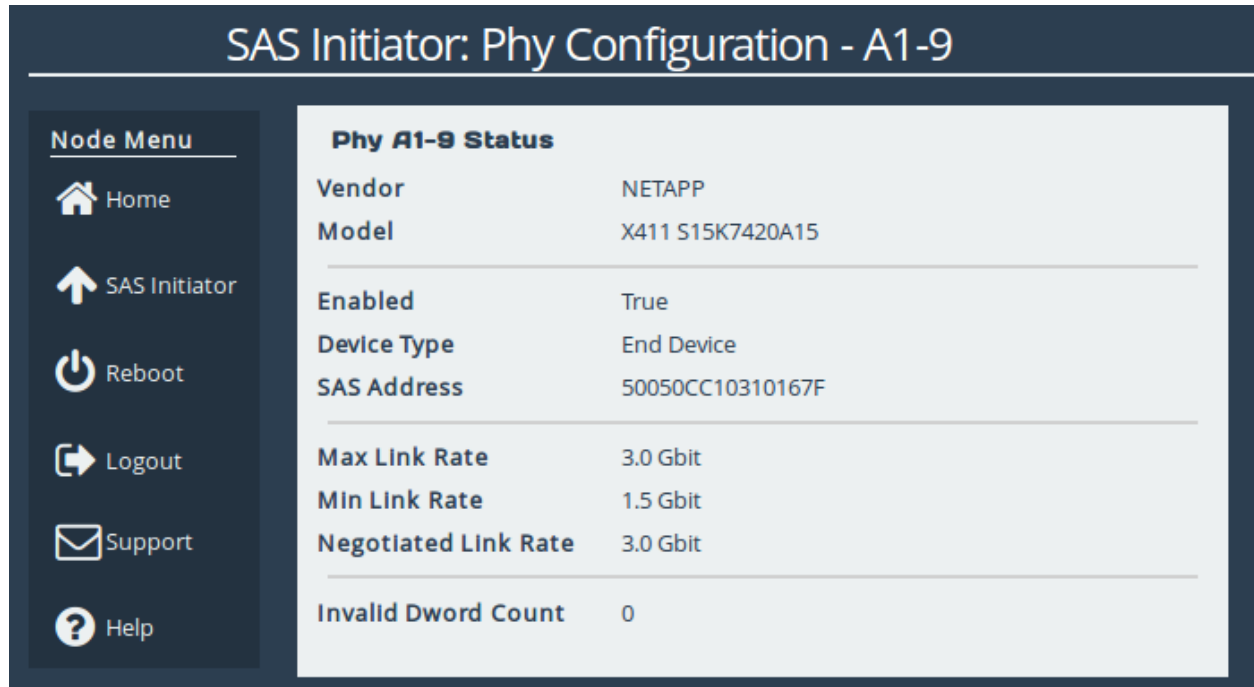
Options are available for configuring how devices are viewed. These are:

Phy display filter Show all phys, or choose to display phys based on whether they are connected.

Live update Ticked will update all phy information on the page every two seconds. Unticked will leave device information as it is at the time of unticking.

4.2 Phy Status Page

Clicking on a phy, either under a host or an expander, will lead to a status page showing information about that phy, as shown below. This shows information about the device as it was at the time of page load.



The screenshot displays the 'SAS Initiator: Phy Configuration - A1-9' page. On the left is a 'Node Menu' with options: Home, SAS Initiator, Reboot, Logout, Support, and Help. The main content area is titled 'Phy A1-9 Status' and contains the following information:

| | |
|-----------------------------|------------------|
| Vendor | NETAPP |
| Model | X411 S15K7420A15 |
| Enabled | True |
| Device Type | End Device |
| SAS Address | 50050CC10310167F |
| Max Link Rate | 3.0 Gbit |
| Min Link Rate | 1.5 Gbit |
| Negotiated Link Rate | 3.0 Gbit |
| Invalid Dword Count | 0 |

Information differs per connected device and not all fields will show on the page. Possible data includes:

Vendor Manufacturer of the device.

Product Product name of the attached expander.

Model Model name of the attached end device.

Enabled True or false.

Device Type No device, end device, or expander.

SAS Address Unique address of the SAS host the phy is from.

Max Link Rate Maximum link speed allowed by the hardware.

Min Link Rate Minimum link speed allowed by the hardware.

Negotiated Link Rate Link speed currently used for transfers. Unknown if no link rate has been decided.

Invalid Dword Count Number of malformed Dwords received.

5 iSCSI Target Configuration

This page allows you to configure mutual CHAP authorisation, and TCP ports of each iSCSI target interface.

From the Home screen of the web interface, select the *iSCSI Target* icon under the *Devices and Protocols* section.



The web interface will then display the following:

The screenshot shows a web interface with a dark blue sidebar on the left and a main content area on the right. The sidebar contains a 'Hostname' section with links for Home, Reboot, Logout, Support, and Help. The main content area is divided into two sections: 'Authorisation' and 'Network Interfaces'. The 'Authorisation' section has a warning message about secrets longer than 16 characters, an 'Enable CHAP' checkbox (which is unchecked), and three input fields for 'Username', 'Initiator Secret', and 'Target Secret'. The 'Network Interfaces' section contains a table with two rows. At the bottom right of the main content area are 'Cancel' and 'Save' buttons.

| Interface | Configured TCP Port(s) |
|-----------------------|------------------------|
| Port 2 (10.10.10.50): | 3260 |
| Port 3 (10.10.11.50): | 3260 |

5.1 Authorisation (CHAP)

CHAP is an authentication scheme used by servers to validate the identity of clients, and vice versa. When CHAP is enabled, the initiator must send the correct username and target password to gain access to the iSCSI target of the Bridge.

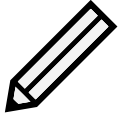
The initiator secret is provided to allow iSCSI mutual CHAP. If mutual CHAP is selected on the initiator, the iSCSI Bridge will authenticate itself with the initiator using the initiator secret.

To enable CHAP, select the *Enable CHAP* checkbox and enter the following details:

Username This is the same name as specified on the initiating host.

Initiator Secret This is the password defined on the initiating host. This must be 12 to 256 characters long. This should only be entered if mutual CHAP is enabled on the initiating host.

Target Secret This is the password that must be entered on the initiating host. This must be 12 to 256 characters long.



Note: While secrets longer than 16 characters are allowed, they may be unsupported by some hosts.

5.2 Network Interfaces

The table under the Network Interfaces section displays the interfaces and IP addresses the iSCSI target is presenting devices on.

The iSCSI protocol officially uses two main TCP ports: 3260 and 860. For each iSCSI target interface, you can choose to enable either one these TCP ports, or both, or disable iSCSI on the interface completely, from the *Configured TCP Port(s)* dropdown.

5.3 iSCSI Sessions

Each initiator will open at least one session with each target device it is logged on to. The iSCSI Sessions page in the web interface of the ESAS can be used to review these connections.

From the Home screen, select the *iSCSI Sessions* icon under the *Devices and Protocols* section.



The web interface will then display the following:

iSCSI Sessions


Hostname

- [Home](#)
- [Reboot](#)
- [Logout](#)
- [Support](#)
- [Help](#)

iSCSI Sessions

| Initiator | Target |
|---|--|
| iqn.1991-05.com.microsoft:kevin.test.d omain | iqn.2002-12.com.4bridgeworks.001bd 1:eui.00041B0002001BD1.0,t,0x00000 |

This page lists current connections to iSCSI initiators. The IQN of the initiator is shown in the *Initiator* column, and the IQN of the device it is logged on to is shown in the *Target* column. See Section 1.3.2: [iSCSI Qualified Name \(IQN\)](#) for more information.



Note: It is possible that more than one initiating host may be connected to any target device, one host to multiple target devices, or one host has multiple connections to a single device.

6 SCSI Device Management

This page allows you to view details of devices connected to the ESAS.

6.1 Viewing Attached Devices

From within the Home screen of the web interface, select the *SCSI Device Management* icon under the *Devices and Protocols* section.



The web interface will then display the following:



You will be presented with a list of all the devices connected to the ESAS.


Clicking on a device will open a page displaying more information about the device, as shown below.


Device Details


Node Menu

 Home

 Devices

 Reboot

 Logout

 Support

 Help

Tape Drive Details

Vendor: HP

Product: SDLT600

Port Name: iqn.2002-12.com.4bridgeworks.001bd1:eui.00041B0002001BD1.0,t,0x000001

Node Name: iqn.2002-12.com.4bridgeworks.001bd1:eui.00041B0002001BD1.0

LUN: 0 (0x0000000000000000)

SCSI
Revision: SPC

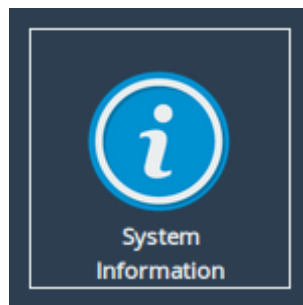
Ok

7 Bridge Maintenance

The following section describes the various pages that are available to the administrator to monitor performance and maintain the Bridge.

7.1 System Information

This page allows the administrator to view the performance of the Bridge. From the Home screen, select the *System Information* icon from the *Bridge Maintenance* section.



The following page will be displayed:

The screenshot shows the 'System Information' page. On the left is a dark sidebar with a 'Hostname' header and a list of navigation items: Home (house icon), Reboot (power icon), Logout (arrow icon), Support (envelope icon), and Help (question mark icon). The main content area is divided into two sections. The top section, 'Bridge & Firmware Details', contains a table with the following data:

| | |
|--------------------|--------------------------------------|
| Firmware Revision: | Eli.v4.05.70 (Oct 20 2015 10:30:39) |
| Serial Number: | QWERTYU |
| ISCSI IQN: | iqn.2002-12.com.4bridgeworks.QWERTYU |
| Uptime: | 03:12:30 |

The bottom section, 'System Performance', features three horizontal progress bars: 'Data Throughput' at 0 MB/s, 'CPU Utilisation' at 3%, and 'Memory Usage' at 21% used. A 'Download' button is located to the right of the throughput bar.

In the *Bridge & Firmware Details* section, the following information is displayed:

Firmware Revision is the installed firmware revision level.

Serial Number/UUID is the unique identifier of that specific ESAS.

iSCSI IQN is the iSCSI Qualified Name of that specific ESAS.

Uptime is the amount of time the ESAS has been powered on for.

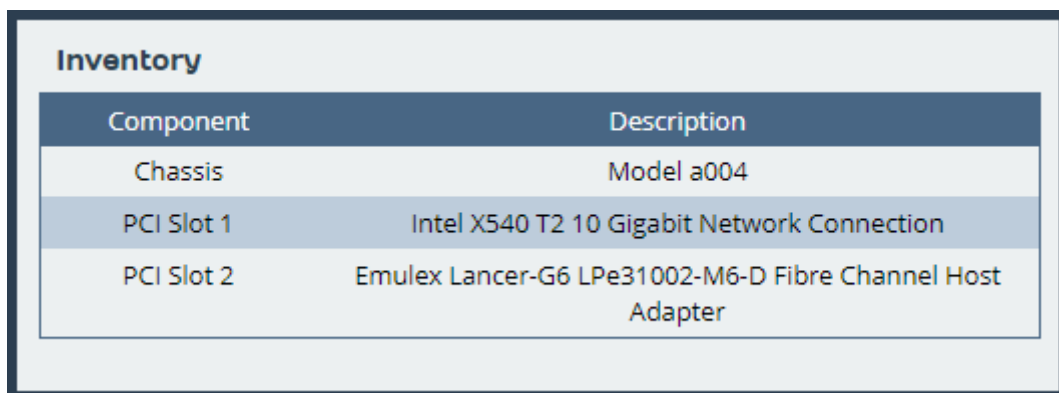
The *System Performance* section contains three meters which provide an approximation of the following performance parameters:

Data Throughput This indicates the current performance in MB/s.

CPU Utilisation This indicates the percentage of the time the CPU is occupied undertaking the management and scheduling the transfer of data between the two interfaces.

Memory Usage This indicates the percentage of memory used by all processes.

The following section will also appear on this page:



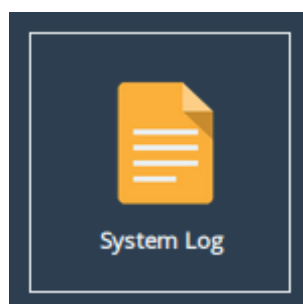
| Inventory | |
|------------|---|
| Component | Description |
| Chassis | Model a004 |
| PCI Slot 1 | Intel X540 T2 10 Gigabit Network Connection |
| PCI Slot 2 | Emulex Lancer-G6 LPe31002-M6-D Fibre Channel Host Adapter |

The *Inventory* section shows the hardware your Bridge is running on, including the board and any cards installed in it.

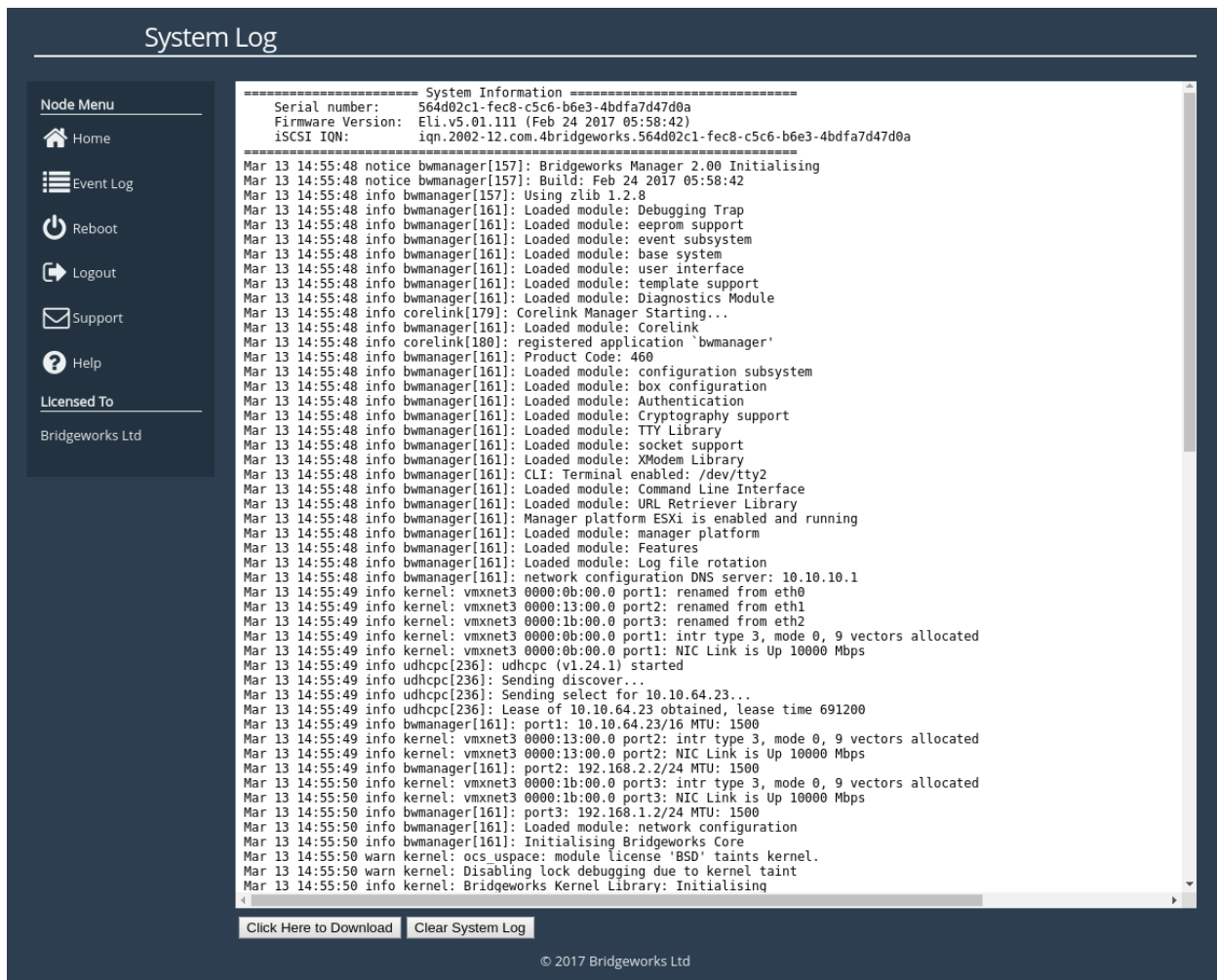
7.2 System Log

This page displays the system log, useful for diagnosing problems with the Bridge, attached devices and connections.

From the Home screen, select the *System Log* icon from the *Bridge Maintenance* section.



The web interface will now display the following:



Below the log display pane are two options:

Click Here to Download This will download the log file to your local machine.

Clear System Log This will clear all logs within the Bridge.

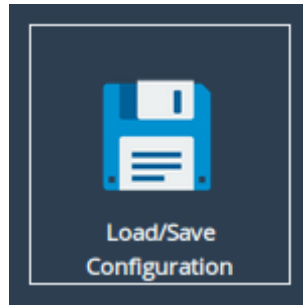
For information on troubleshooting your Bridge, see Chapter 8: [Troubleshooting](#).

7.3 Load/Save Configuration

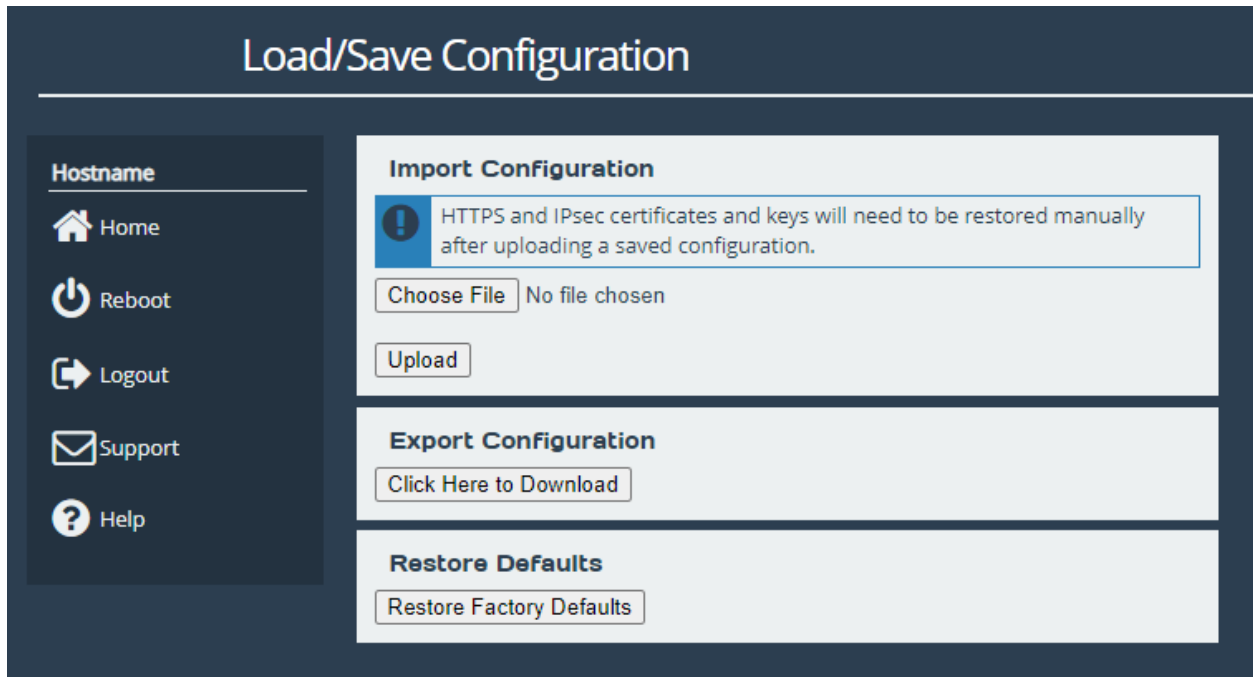
The configuration Load/Save feature allows you to save a copy of the Bridge's configuration to a file and optionally restore back to that configuration at a later time.

Once you have finished configuring your Bridge we recommend that you save your configuration data to a local disk. By doing so you could save valuable time if the Bridge requires replacement or if configuration is lost during upgrades.

From the Home screen, select the *Load/Save Configuration* icon from the *Bridge Maintenance* section.




The following page will be displayed:



7.3.1 Loading a Saved Configuration

To reload a configuration, click the *Choose file* button and locate the configuration file to upload to the Bridge. Once located, click the *Upload* button and the new configuration data will be uploaded.

| | |
|---|---|
|  | <p>Important: Once a valid configuration file is uploaded, a reboot will automatically occur.</p> |
|---|---|

7.3.2 Saving the Configuration to Disk

To save the configuration data, click the *Click Here to Download* button. Then choose to save the file.

The Bridge will now download an encoded file that contains all of its configuration settings.

7.3.3 Restoring to Factory Defaults

To restore the Bridge to factory defaults, click the *Restore Factory Defaults* button. This resets all configuration parameters including the hostname, IP addresses and passwords. This option is useful to protect sensitive information if a Bridge appliance is ever returned for maintenance.

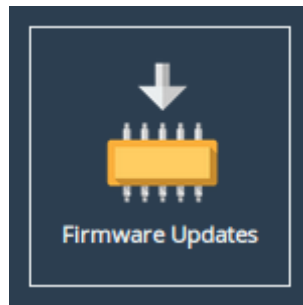


Important: After clicking the *Restore Factory Defaults* button, a reboot will automatically occur.

7.4 Firmware Updates

From time to time it may be necessary to upgrade the firmware within the Bridge. New versions contain resolutions to known issues as well as new features and improvements to the functionality of the Bridge.

The *Firmware Updates* page allows the administrator to load new firmware onto the Bridge. From the Home screen, select the *Firmware Updates* icon from the *Bridge Maintenance* section.



The following page will be displayed:

Firmware Updates

Node Menu

- [Home](#)
- [Reboot](#)
- [Logout](#)
- [Support](#)
- [Help](#)

Licensed To

Bridgeworks Ltd

Automatic Firmware Update

Check For Updates Automatically:

[Save](#)

[Check Now](#)

Note: No information regarding your node is sent during the check for firmware updates.

Firmware Upload

Firmware revision: Eli.v5.01.111 (Feb 24 2017 05:58:42)

Firmware Image: [Choose file](#) No file chosen [Update](#)

After clicking update please wait for this page to change before proceeding.

You can now instruct the Bridge to check for new firmware versions, alerting you when a new version is available and providing a button to perform the update. Alternatively, you can manually upload and update to a firmware version of your choosing.

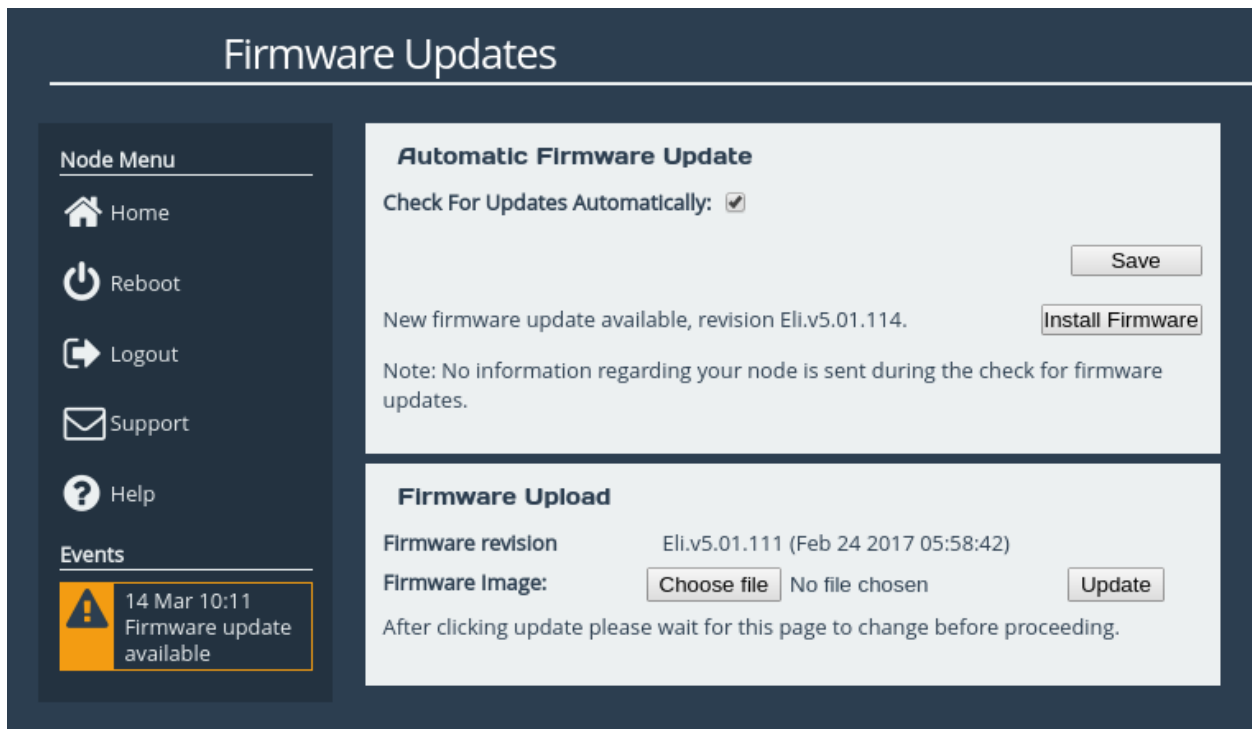
7.4.1 Automatic Firmware Update Checking

This section allows your Bridge to automatically check for new firmware versions, notifying you when a new version is available. This check occurs once per day.

To enable automatic firmware update checking, select the *Check For Updates Automatically* checkbox, then click the *Save* button. The check can be performed immediately by clicking the *Check Now* button.

Note: No information regarding your Bridge is sent during the check for firmware updates.

When a new firmware version is available, a notification will appear under the *Bridge Menu*.



To start the firmware update process:


1. Click on the *Install Firmware* button. A progress bar labelled *Downloading* will appear showing the progress in downloading the new firmware on to the ESAS.
2. When the label above the progress bar changes to *Progress*, you can navigate away from this page and the installation will continue.

Updating the firmware will take a few minutes. After the update is complete, a notification will appear under the *Bridge Menu*, indicating that a system reboot is necessary. To reboot the Bridge, click on the *Reboot* button located in the *Bridge Menu* at the left side of the web interface.

7.4.2 Updating Firmware Manually

It is also possible to download new firmware versions and update manually.

Contact Bridgeworks support at support@4bridgeworks.com providing the serial number of your product to receive the latest version of the firmware.

| | |
|---|---|
|  | <p>Warning: Do not load on a firmware which has an earlier release revision unless you have been instructed to by the Bridgeworks support team. Always ensure that you have the correct firmware for your product. If in any doubt, please contact Bridgeworks support. See Appendix E: Useful Links for contact information.</p> |
|---|---|

Once you have downloaded the new firmware to your local machine:

1. Click on the *Choose file* button to locate the file you have downloaded from the Bridgeworks website.

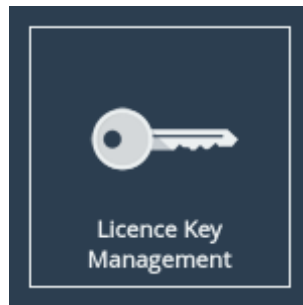
-
2. Click on the *Update* button to start. A progress bar labelled *Uploading* will appear showing the progress in uploading the new firmware on to the ESAS.
 3. When the label above the progress bar changes to *Progress*, you can navigate away from this page and the installation will continue.

Updating the firmware will take a few minutes. After the update is complete, a notification will appear under the *Bridge Menu*, indicating that a system reboot is necessary. To reboot the Bridge, click on the *Reboot* button located in the *Bridge Menu* at the left side of the web interface.

7.5 Licence Key Management

This page allows you to view, upload, download or remove licence keys installed on the Bridge. Licence keys are required to enable features on installed feature cards.

From the Home screen, select the *Licence Key Management* icon from the *Bridge Maintenance* section.



The following page will be displayed:

Licence Keys

Node Menu

- [Home](#)
- [Reboot](#)
- [Logout](#)
- [Support](#)
- [Help](#)

Installed Licence Keys

| ID | Feature Type | Limit | Expires |
|------------|---------------|-------|---------|
| 315953172 | Fibre Channel | 1 | Expired |
| 777490233 | Fibre Channel | 1 | 5 Days |
| 2018560049 | WAN | 8 | N/A |
| | iSCSI | 8 | |
| | SAS | 8 | |
| 2125412457 | Fibre Channel | 8 | N/A |

Some of your licence keys have expired. Functionality may be missing from your node as a result. Please remove the expired licence keys.

Licence Key Upload

Licence Key File:

Choose file

 No file chosen

The *Installed Licence Keys* table displays the installed licence keys with the following information:

Feature Type The feature that the licence key enables.

Limit The number of interfaces that the feature may be mapped to.

Expires The amount of time left until a temporary licence key expires. If *N/A* is in this column, it indicates the licence key is not temporary.

When a temporary licence key has expired, there will be a warning on the page and the *Expires* field will say *Expired* as shown in the image above. At the point of expiration, an event will be displayed below the *Bridge Menu* similar to the one shown below.

Events

!

4 May 13:42


Licence key with feature Fibre Channel has expired

7.5.1 Uploading a Licence Key

To upload a licence key:

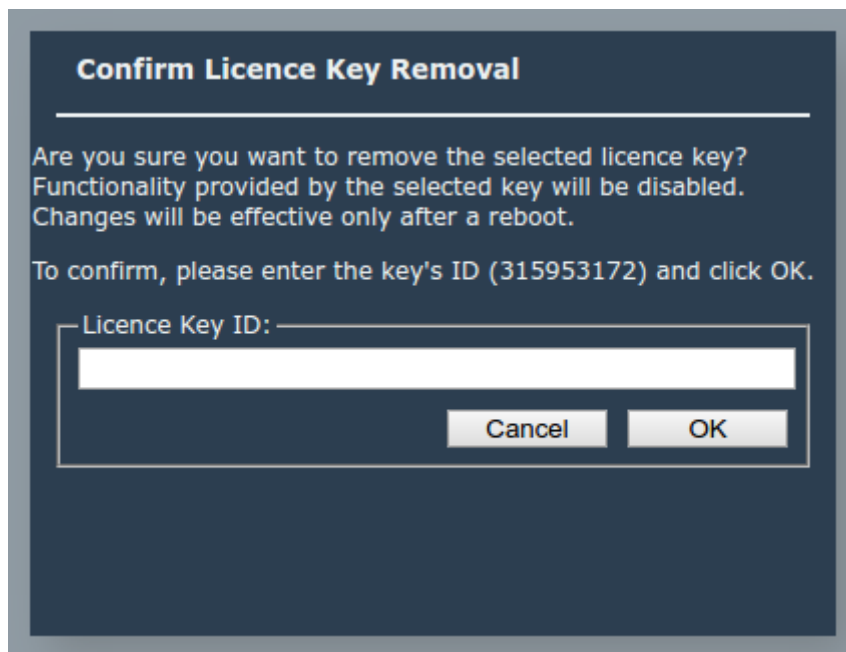
1. Click the *Choose file* button in the *Licence Key Upload* section.
2. Locate and select the licence key to upload.
3. Click the *Upload* button.

After the upload completes, a valid licence key will appear in the *Installed Licence Keys* table.

| | |
|---|--|
|  | Important: The Bridge will require a reboot for the licence key to be activated. |
|---|--|

7.5.2 Removing a Licence Key

To remove a licence key, select the licence key from the *Installed Licence Keys* table, then click the *Remove* button. This will open a dialog box, as shown below.



Copy the licence key ID into the *Licence Key ID* field and click *OK*. The licence key will be removed from the Bridge and will no longer be displayed in the *Installed Licence Keys* table.

7.5.3 Downloading a Licence Key

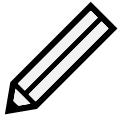
To download a licence key, select the licence key from the *Installed Licence Keys* table, and click *Download*.

7.6 Diagnostics

In the unlikely event that a problem arises with your ESAS, you may be requested by Bridgeworks Support to provide a diagnostic file.

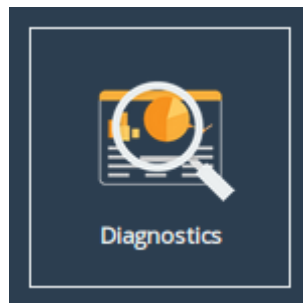


Important: If an issue arises with your ESAS, check Chapter 8: [Troubleshooting](#) for information on how the issue may be resolved.



Note: The following instructions are demonstrated in the Bridgeworks Support Video “WANrockIT: Downloading Diagnostic Information” found at <https://www.youtube.com/watch?v=8RZXFGCy3ZU>.

To download the diagnostic file, click on the *Diagnostics* icon on the Home screen:



Then click on the *Click Here to Download* button.

Diagnostic Download

[Click Here to Download](#)

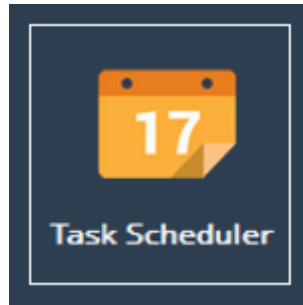
This will cause the ESAS to collect data regarding various modules and store them in a single file. Once this process is complete, a download for “diagnostics.bin” will begin.

7.7 Task Scheduler

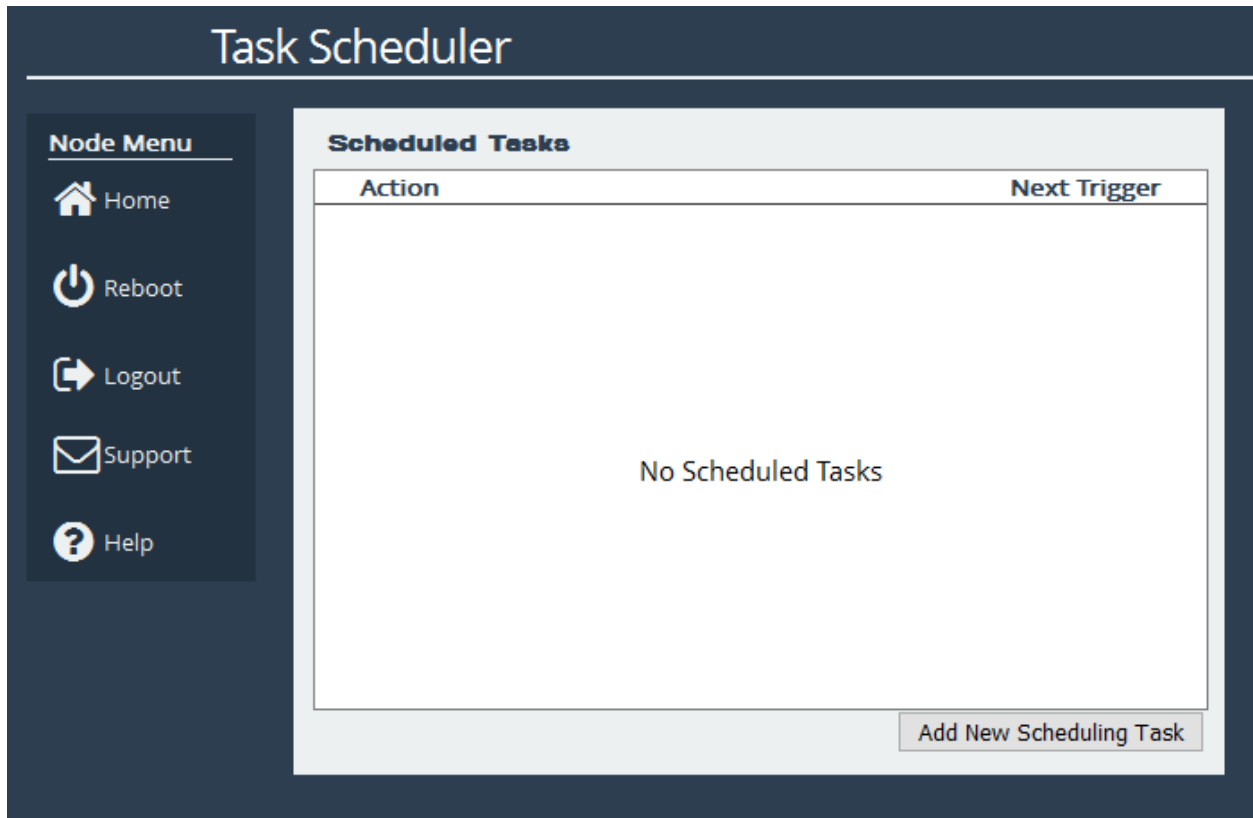
This page allows the administrator to schedule tasks with the following action:

Email Performance Statistics This will email the log of the throughput rate to a given email address(es).

From the Home screen, select the *Task Scheduler* icon from the *Bridge Maintenance* section.



The web interface will now display the following:

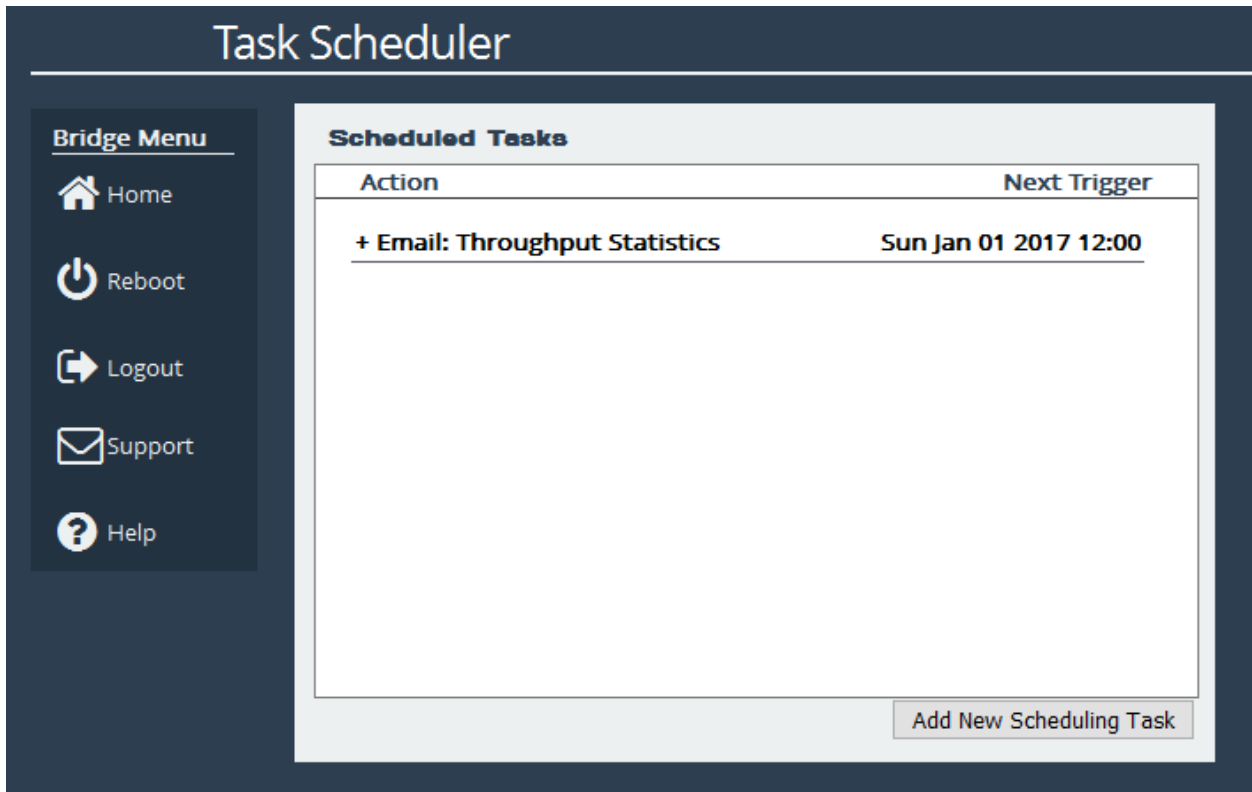


7.7.1 Adding Tasks

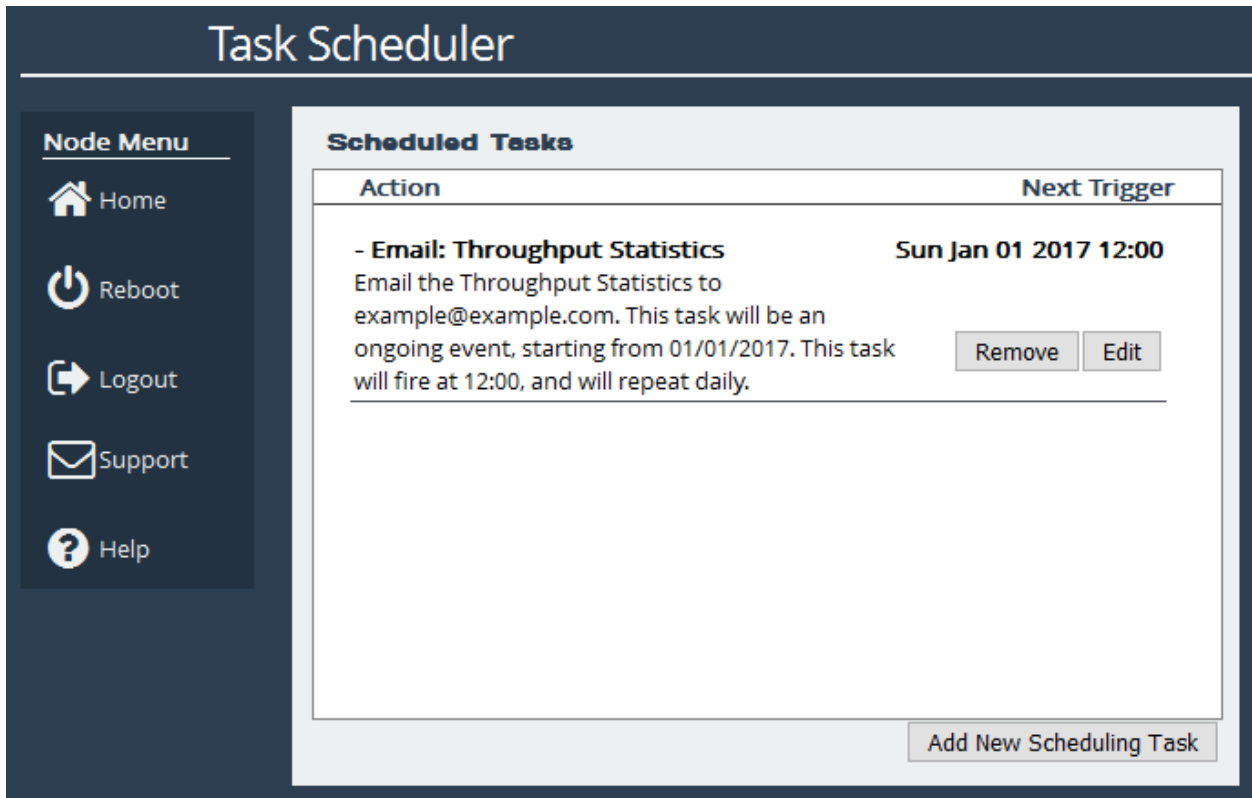
Tasks can be added by clicking on the *Add New Scheduling Task* button, which will start the task wizard.

7.7.2 Removing/Editing Tasks

If you already have some tasks added, they will be listed in the Scheduled Tasks window as shown:



Clicking on a task will expand it as shown:



Clicking the *Remove* button will remove the task from the task scheduler. Clicking the *Edit* button will start the task wizard for the task, allowing it to be edited.

7.7.3 Task Wizard


The task wizard will guide you through the adding or editing of scheduled tasks. There are a few common buttons across the individual sections of the wizard:

Help Clicking this button will display the Online Help page for the Task Scheduler.

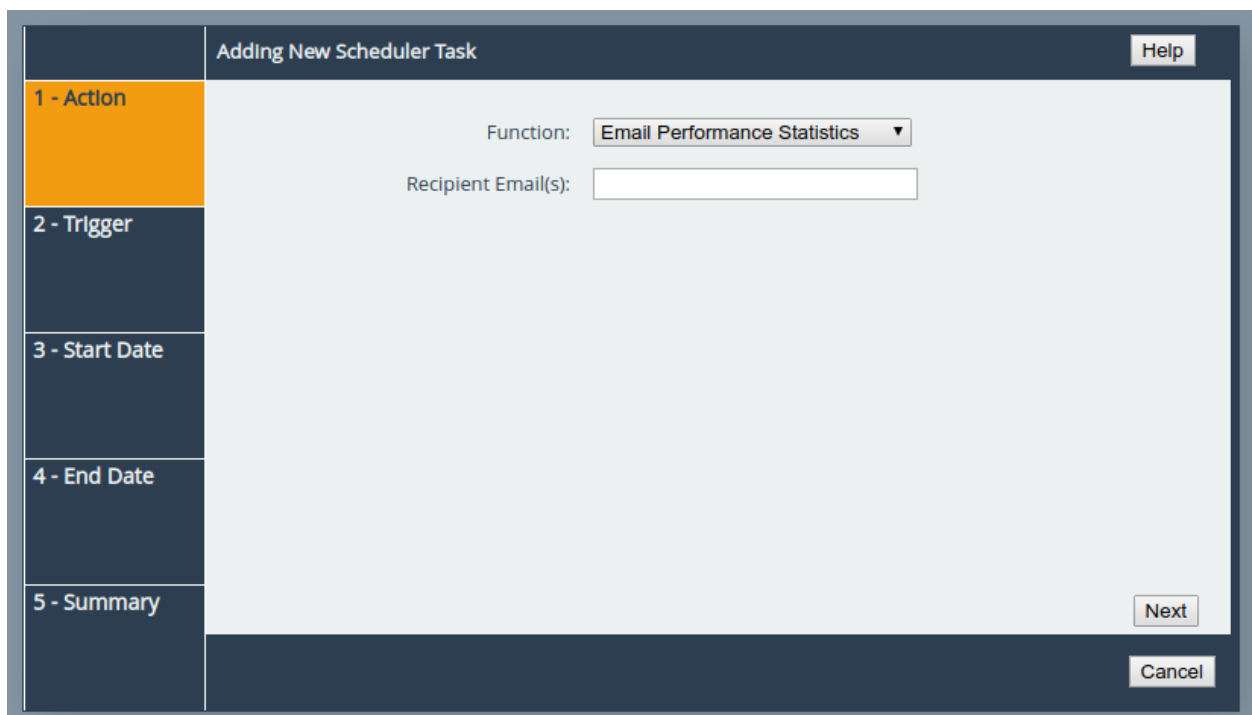
Cancel Clicking this button will discard the changes being made to the task and close the wizard.

Next If present, this button will navigate you to the next section of the wizard.

Previous If present, this button will navigate you to the previous section of the wizard.


| | |
|---|---|
|  | Note: The currently active section of the wizard will be highlighted in orange on the left-hand side. |
|---|---|

7.7.3.1 Action - Email Performance Statistics



The screenshot shows a wizard window titled "Adding New Scheduler Task". On the left, there is a vertical navigation pane with five sections: "1 - Action" (highlighted in orange), "2 - Trigger", "3 - Start Date", "4 - End Date", and "5 - Summary". The main content area displays "Function: Email Performance Statistics" in a dropdown menu and "Recipient Email(s):" followed by an empty text input field. In the top right corner, there is a "Help" button. In the bottom right corner, there are "Next" and "Cancel" buttons.

On the Action section of the wizard, enter the recipient email(s), separating multiple emails with semi-colons.

| | |
|---|---|
|  | Important: If you see the following image, click on the yellow box to be taken to the Service Control page where SMTP can be set up. See Section 3.3.3: Email . |
|---|---|

Adding New Scheduler Task Help

1 - Action

Function:

Please setup SMTP Settings before scheduling this function. Click here to take you straight to the setup page.

2 - Trigger

3 - Start Date

4 - End Date

5 - Summary

Next

Cancel

7.7.3.2 Trigger

Adding New Scheduler Task Help

1 - Action

How often would you like it to trigger?

2 - Trigger

3 - Start Date

4 - End Date

5 - Summary

Previous

Next

Cancel

On the Trigger section of the wizard, you can pick the frequency of the event. The options are:

Once This means the action will be performed at the specified time and not repeat.

Daily This means the action will be performed every day at the specified time.

Weekly This means the action will be performed on specified days every week at the specified time. When selecting this option, you will be able to pick which days to trigger the action by

selecting checkboxes. Each day will have its own checkbox, as shown:

Adding New Scheduler Task Help

1 - Action

How often would you like it to trigger?

Select days to trigger on:

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

2 - Trigger

3 - Start Date

4 - End Date

5 - Summary

7.7.3.3 Start Date

Adding New Scheduler Task Help

1 - Action

Please select start date for new task: Time for the first trigger:

2 - Trigger

3 - Start Date

4 - End Date

5 - Summary

On the Start Date section of the wizard, you can pick the starting date and time for the new task. Enter a time into the *Time for the first trigger* box and select your start date using the calendar. The selected date will be marked with a red cross.

7.7.3.4 End Date

The screenshot shows the 'Adding New Scheduler Task' wizard at the 'End Date' step. The left sidebar contains five steps: 1 - Action, 2 - Trigger, 3 - Start Date, 4 - End Date (highlighted in orange), and 5 - Summary. The main content area displays the text 'Ongoing Event' with a checked checkbox and the instruction 'Please select end date for new task:'. Below this is a calendar for September 2019. The date 17 is selected, indicated by a red cross. A 'Display today' button is located below the calendar. At the bottom of the wizard, there are 'Previous', 'Next', and 'Cancel' buttons. A 'Help' button is in the top right corner.

On the End Date section of the wizard, you can pick the end date for the new task. You can either select the *Ongoing Event* checkbox for a task that should run until cancelled, or select a date using the calendar. The selected date will be marked with a red cross.

7.7.3.5 Summary

The screenshot shows the 'Adding New Scheduler Task' wizard at the 'Summary' step. The left sidebar contains five steps: 1 - Action, 2 - Trigger, 3 - Start Date, 4 - End Date, and 5 - Summary (highlighted in orange). The main content area displays the title 'Summary' and the following text: 'Email the Throughput Statistics to example@example.com. This task will be an ongoing event, starting from 01/10/2019. This task will fire at 12:00, and will repeat daily.' At the bottom of the wizard, there are 'Previous', 'Save', and 'Cancel' buttons. A 'Help' button is in the top right corner.

On the Summary section of the wizard, a brief description of the task will be displayed. If you are happy with this task, click the *Save* button to add the task to the task scheduler. Saving will automatically close the wizard.

8 Troubleshooting

8.1 Network Connectivity Problems

Under normal operation, you should be able to “ping” the network address of the Bridge and receive a response. If this fails, run through the following list to identify and solve the problem.

- Ensure the Bridge is powered on. This can be verified on hardware appliances by checking that the power LED is illuminated.
- Ensure that the Ethernet cable is plugged in at both ends.
- For hardware appliances, ensure the *Link indicator* LED of the Ethernet connector is illuminated. If it is not, check with your Network Administrator. Refer to the *Visual Indicators* appendix within the relevant hardware manual for help identifying the LED.
- If you are using a Bridge with two Management ports and only one network cable, try using the other network address and/or the other Management port.
- If the Bridge is transferring large amounts of data, then the response from the web interface may seem slower than usual as the process that controls the web interface has the lowest priority for Network and CPU resources.
- If you can “ping” the Bridge but the web interface fails to appear, check the settings within the web browser you are using. If you are directly connected to the Bridge then any proxy settings will require adjustment and may require you to contact your Network Administrator.
- Ensure you are using the correct network address and netmask. See Appendix B: [Accessing the Bridge from Windows using a static IP Address](#).

If none of the above resolves your problem, then after consulting with your Network Administrator, please contact support. See Appendix E: [Useful Links](#) for information on how to contact Bridgeworks Support.

8.2 SCSI Device Related Problems

Once the Bridge has finished booting up, and the target devices have finished initialising, these devices should be available on the host machine. After checking that you have correctly configured the initiator, run through the following list to identify and solve the problem.

- Ensure that the devices are powered on and are ready - some libraries can take 5 minutes or more before they are ready and appear on the Bridge. The power up status of libraries are usually displayed on the front panel.
- Ensure that the cables between the Bridge and the devices are connected.
- Ensure that the CHAP settings for the initiator and the Bridge are the same.
- Force a rediscovery from the initiating iSCSI host.
- Reboot the devices and the Bridge.

If none of the above resolves your problem, please contact support. See Appendix [E: Useful Links](#) for information on how to contact Bridgeworks Support.

8.3 Network Performance Problems

Poor network performance can be caused by many differing reasons. The following list is provided as a guide to where you may find ways to improve performance.

- Ensure that the entire network cabling between the network and the Bridge is of the correct standard.
- Ensure your network and Bridge are communicating at the fastest possible network speed. Current link speeds can be found next to each interface on the *Network Connections* page. The link speed should be *1000Mb/s* on a 1 Gigabit network link. If it is 10 or 100Mb/s, this will limit the performance dramatically. See Section [3.1: Network Connections](#) for help finding the *Network Connections* page.
- Packet loss can be a cause of poor performance. Within the *Link Status Box* check the number of *TX* and *RX* errors for relevant network interfaces that are displayed on each *Network Port* page. This should be zero or a very small number. If these are showing large numbers of errors, check the connections between the Bridge and the network. See Section [3.1.7: Port Settings](#) for help finding the *Network Port* page.

The screenshot displays a network interface configuration page with a dark blue background and white text. It is organized into three main sections: Link Status, Settings, and Mapped Protocols. The Link Status section shows the link is up at 10Gb/s with zero errors. The Settings section lists IPv4, IPv6, and IPv6 Link addresses, an MTU of 1500, and a gateway. The Mapped Protocols section includes a 'Management' button.

| Link Status | |
|-------------|----------|
| Link State: | Up |
| Link Speed: | 10Gb/s |
| RX Bytes: | 28386535 |
| TX Bytes: | 61629826 |
| RX Errors: | 0 |
| TX Errors: | 0 |

| Settings | |
|--------------------|--|
| IPv4 Address: | 10.10.64.186 /255.255.0.0 |
| IPv6 Address: | 2a00:2381:1a72:b:20c:29ff:fe9b:6a9d /64 |
| IPv6 Link Address: | fe80::20c:29ff:fe9b:6a9d%port1 /64 |
| MTU: | 1500 |
| Gateway: | Global default via 10.10.10.1 fe80::222:19ff:fe66:c080 |

| Mapped Protocols | |
|----------------------------|--|
| Management | |

If none of the above resolves your problem, then after consulting with your Network Administrator, please contact support. See Appendix [E: Useful Links](#) for information on how to contact Bridgeworks Support.

8.4 iSCSI Performance Problems

Poor iSCSI performance can be caused by many differing reasons. The following list is provided as a guide to where you may find ways to improve performance in addition to those found in Section 8.3: [Network Performance Problems](#).

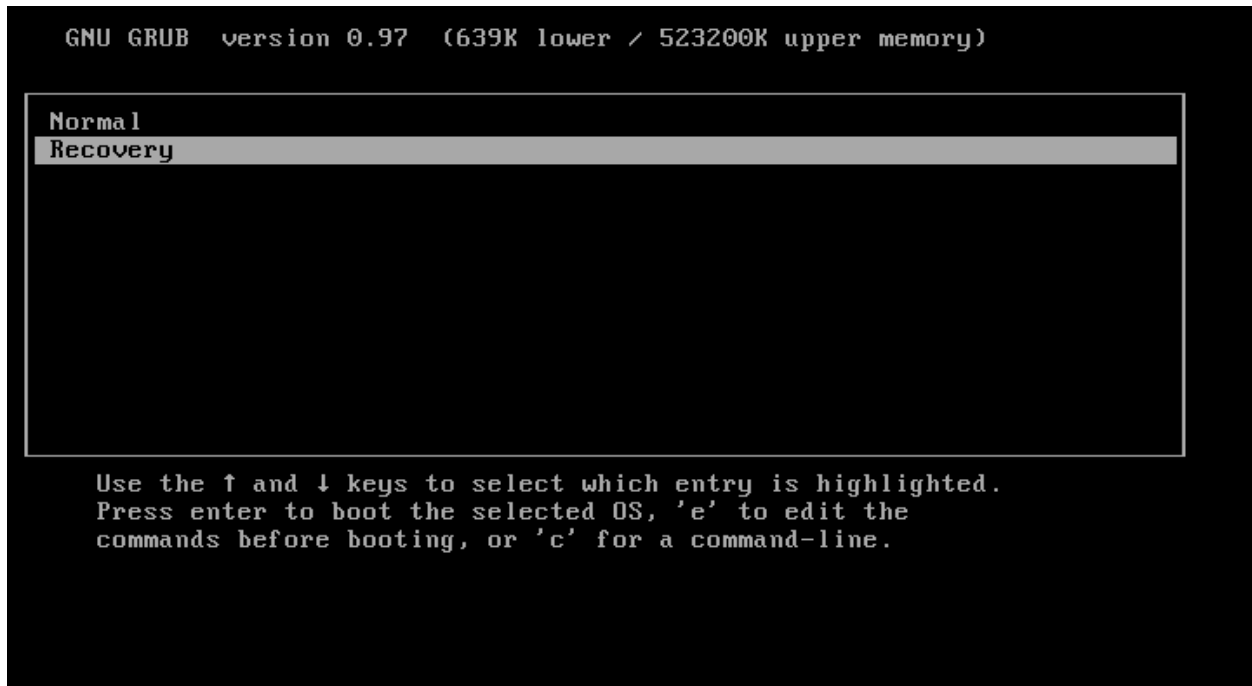
- *Data Digests* are an extra level of error checking on top of the standard TCP/IP checksum error checking (configured on the initiator). However, the calculation of these extra checksums can greatly affect overall performance. Therefore, *Header and Data Digests* should only be enabled where the integrity of the network connection is in doubt. Refer to Appendix C: [Connecting to an iSCSI Device using the Microsoft iSCSI Initiator](#) for more information.
- By enabling *Jumbo Frames* as explained in Section 3.1.7.2: [Setting the MTU](#) you can improve the throughput performance of the Bridge. This will only work if *all* of the components in the infrastructure between the initiator/target and the Bridge are enabled for jumbo frames. That includes the Host Bus Adapter (HBA), all switches and routers, and the Bridge itself. If any of the components are not enabled or not capable of handling jumbo frames, then unexplained packet loss or corruption may occur.

If none of the above resolves your problem, please contact support. See Appendix E: [Useful Links](#) for information on how to contact Bridgeworks Support.

8.5 Recovery Wizard

If access to the system is being disrupted because of problems with the configuration file then, in consultation with Bridgeworks support, the following procedures can be used to recover your system.

To access the Recovery Wizard press the *Esc* key during the unit's boot sequence as soon as you see the message "GRUB loading, please wait..." Select the *Recovery* option on the menu that follows.

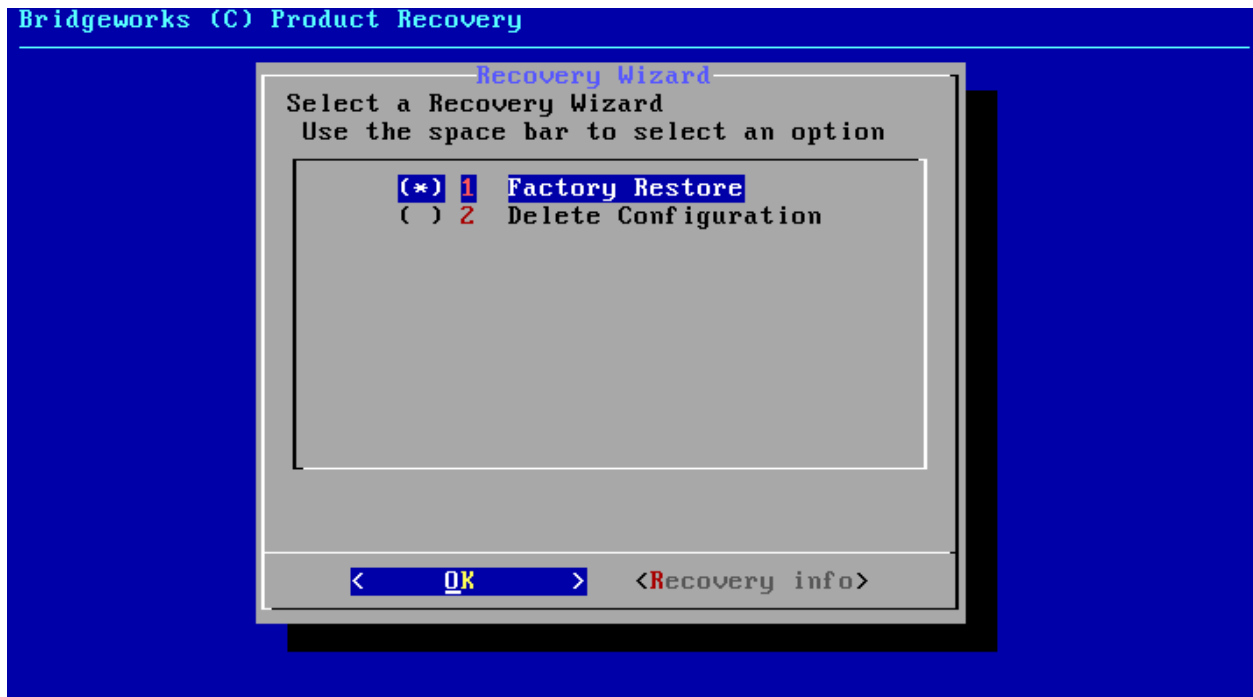


The Recovery Wizard provides two options for system recovery: restoring your unit to factory defaults, and deleting your configuration file.

8.5.1 Factory Restore

This option will restore your unit to its factory defaults, removing any current configuration on your system including your current firmware and licence keys.

To restore your unit to defaults, ensure that the *Factory Restore* option is highlighted in the Recovery Wizard menu and press the *Space Bar* to select it. Press the *Enter* key to start the factory restore process.



This procedure cannot be undone once complete; only continue if you are sure that you wish to do so. You will be asked to confirm that you wish to proceed. Choosing Yes will restore your unit to defaults and No will exit the Recovery Wizard menu and drop to the shell.



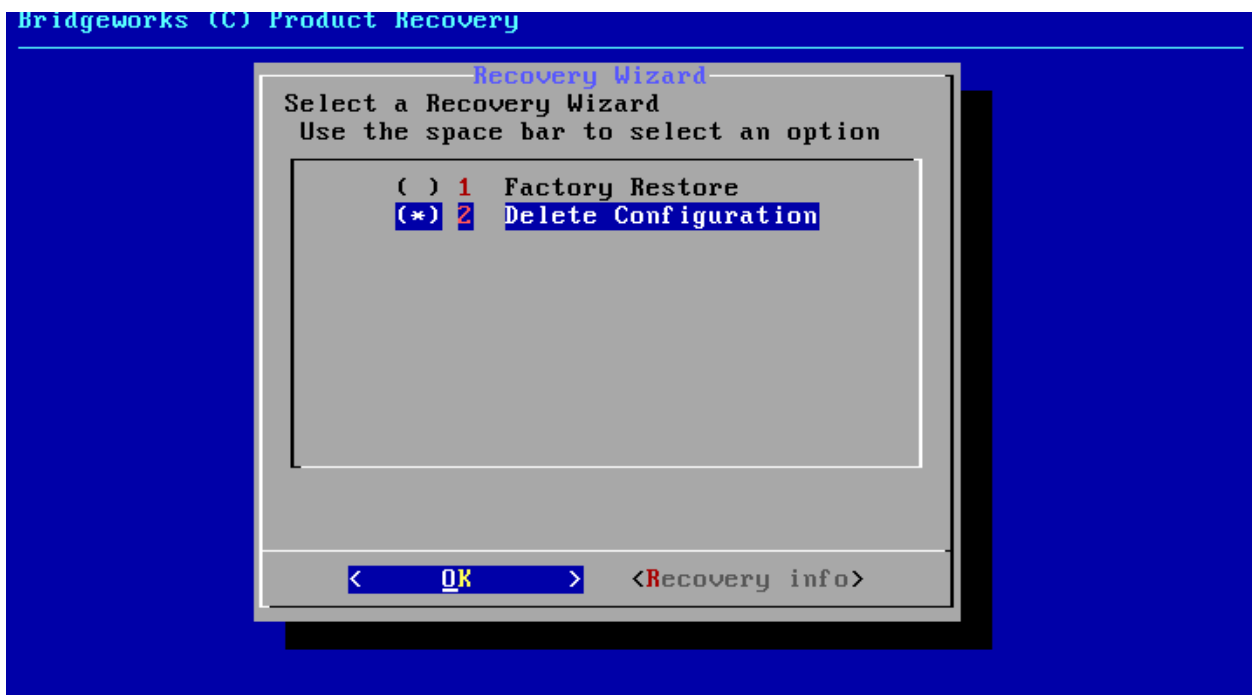
Once the factory restore procedure has completed successfully you will need to reboot your system.



8.5.2 Delete Configuration

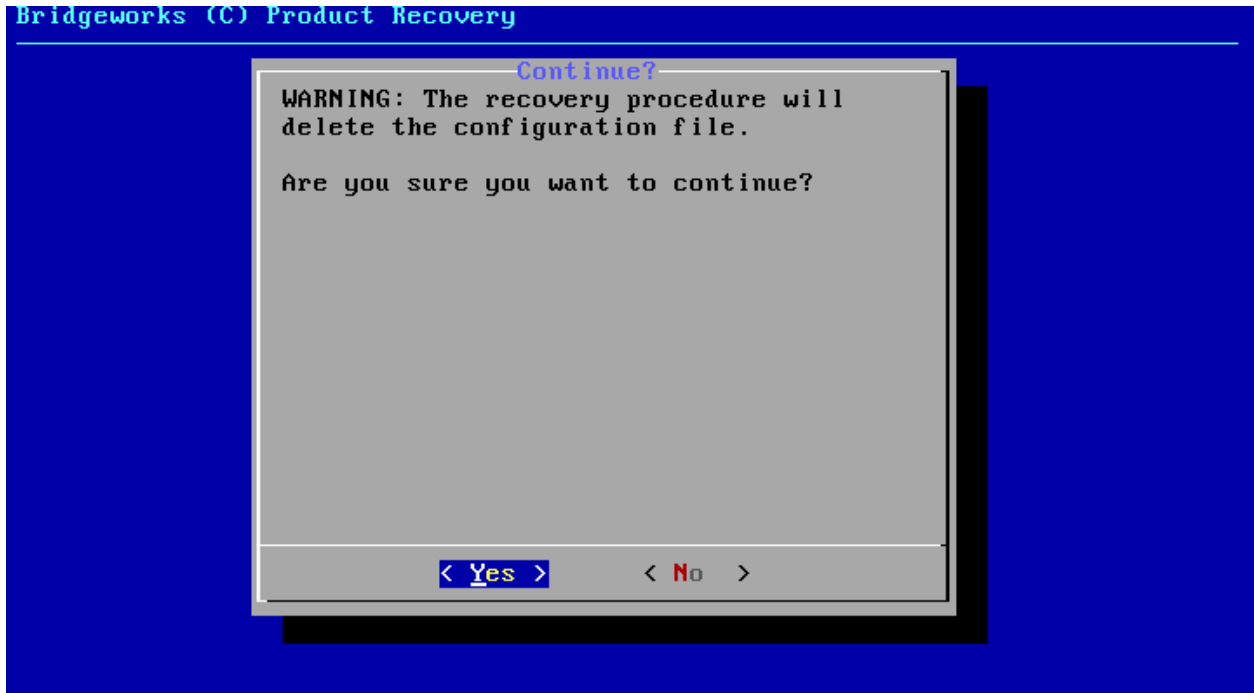
This option will delete your configuration file, removing any current configuration on your system but keeping your current firmware and licence keys.

To delete your configuration file, ensure that the *Delete Configuration* option is highlighted in the Recovery Wizard menu and press the *Space Bar* to select it. Press the *Enter* key to start the deletion process.

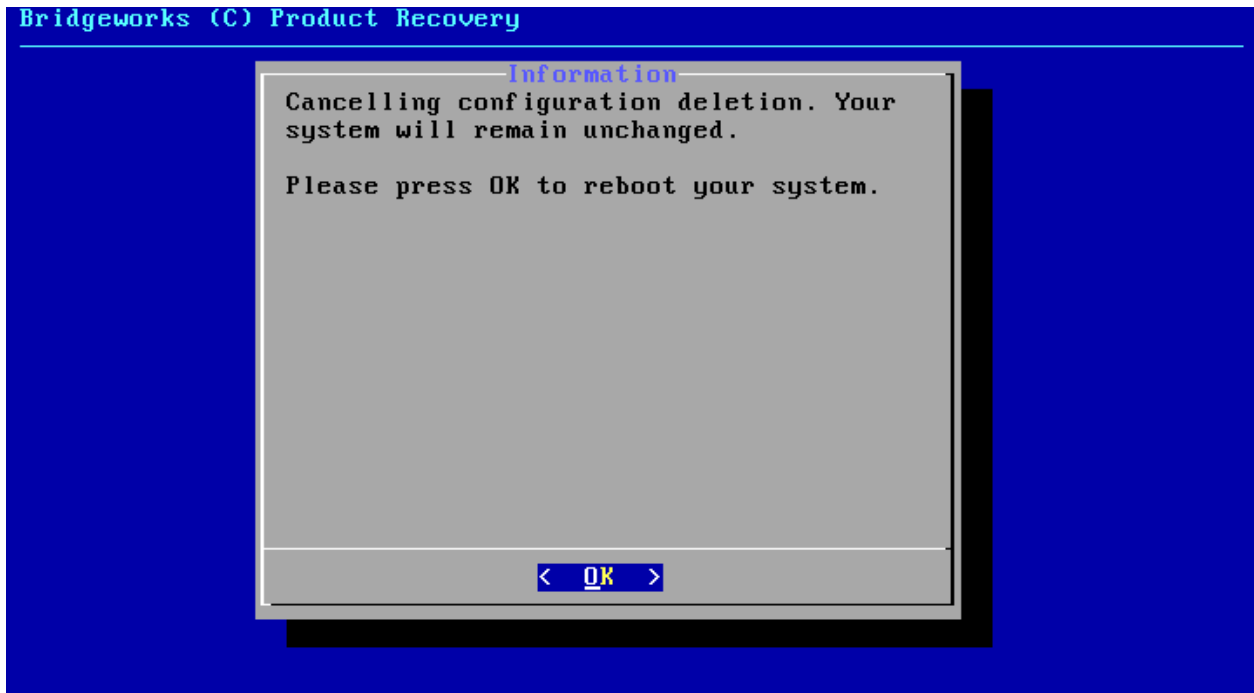


This procedure cannot be undone once complete; only continue if you are sure that you wish

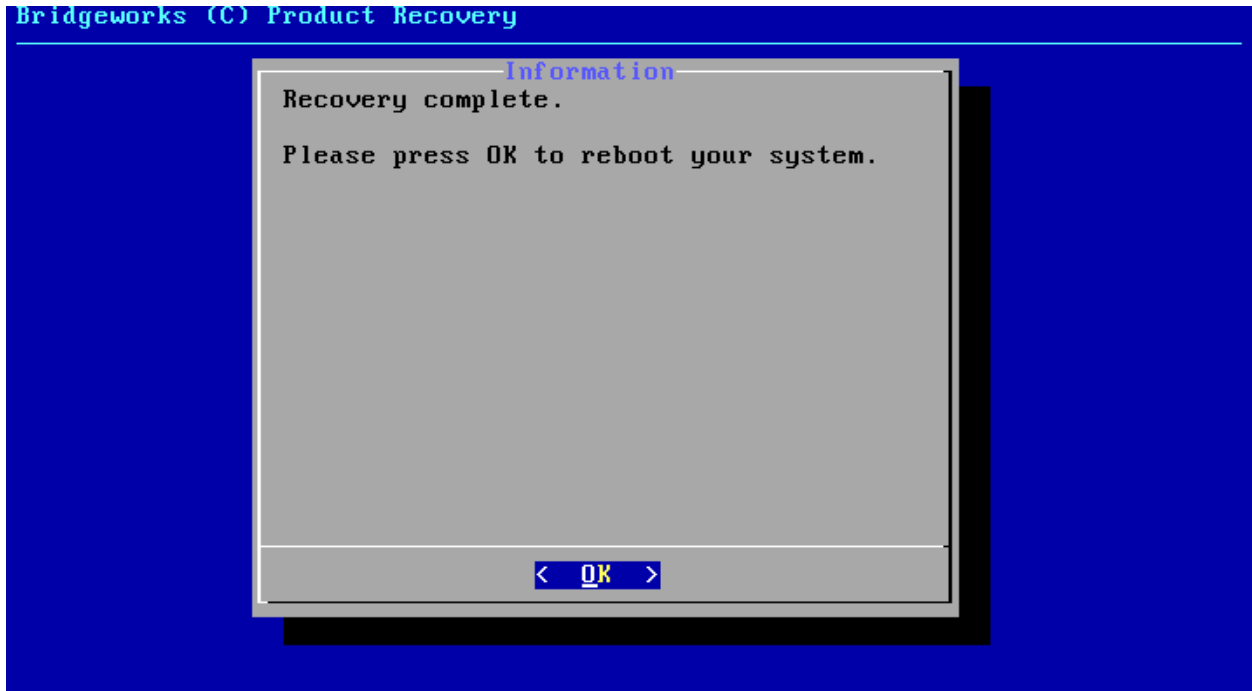
to do so. You will be asked to confirm that you wish to proceed. Choosing Yes will delete your configuration file and No will cancel the configuration deletion wizard.



If you cancel the deletion wizard at this point nothing on your system will be affected.



Once the delete configuration procedure has completed successfully you will need to reboot your system.



When the Recovery Wizard completes and you connect to the web interface of your unit, it will be reset to its original configuration. For help re-establishing your setup see Section [2.2: Connecting to the Web Interface](#).

A IP Protocols and Port Numbers

For the Bridge to be able to communicate with other network hosts, it may be necessary to contact your network administrator to ensure that the required IP protocols & port numbers are available.

A.1 Inbound LAN Protocols and Port Numbers

| Protocol/Port | Name | Description |
|---------------|-------|--|
| TCP 22 | SSH | Required to access the configuration console through management interfaces when SSH is enabled. See Section 3.2.5: Secure Shell (SSH) . |
| TCP 80 | HTTP | Required to access the web interface through management interfaces when HTTP is enabled. |
| TCP 443 | HTTPS | Required to access the web interface through management interfaces when HTTPS is enabled. |
| TCP 860/3260 | iSCSI | The iSCSI Target can be configured to use one or both ports. See Chapter 5: iSCSI Target Configuration . |
| UDP 161 | SNMP | Required for management interfaces to respond to Simple Network Management Protocol requests, see Section 3.3.2: Simple Network Management Protocol (SNMP) . |


A.2 Outbound LAN Protocols and Port Numbers

| Protocol/Port | Name | Description |
|---------------|------|---|
| TCP 25 | SMTP | Simple Mail Transfer Protocol, see Section 3.3.3: Email . |
| TCP 3205 | iSNS | Internet Storage Name Service protocol, see Section 3.3.6: Internet Storage Name Service (iSNS) . |
| UDP 123 | NTP | Network Time Protocol, see Section 3.3.1: Network Time Protocol (NTP) . |
| ICMP | | Internet Control Message Protocol. Required by dead gateway detection (see Section 3.1.2.5: Dead Gateway Detection) and network debugging tools (see Section 3.1.6: Network Tools). |


B Accessing the Bridge from Windows using a static IP Address

This appendix describes how to configure a Windows host to access the Bridge's web interface from its default static IP address, if DHCP is not enabled on the Bridge.

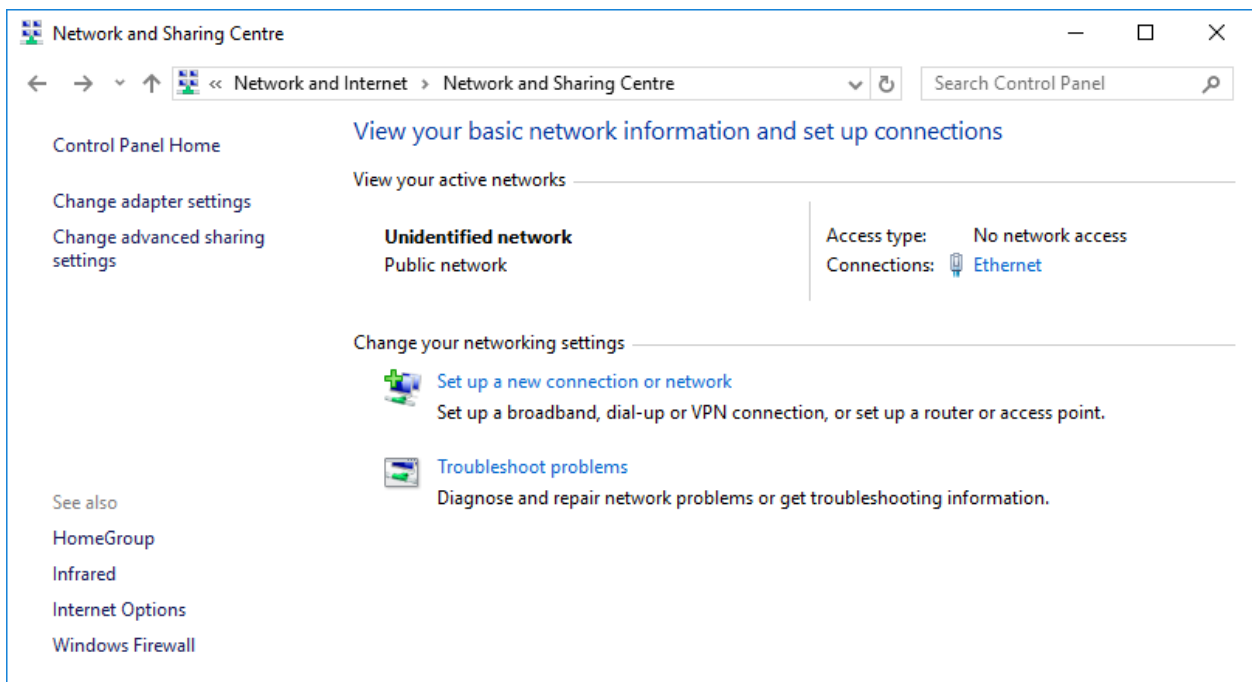
These instructions apply to Windows Vista, 7, 8, 10 and to Windows Server 2008, 2012, 2016, 2019 and their respective R2 versions.

| | |
|---|---|
|  | Warning: Administrative privileges may be required to modify network device settings. |
|---|---|

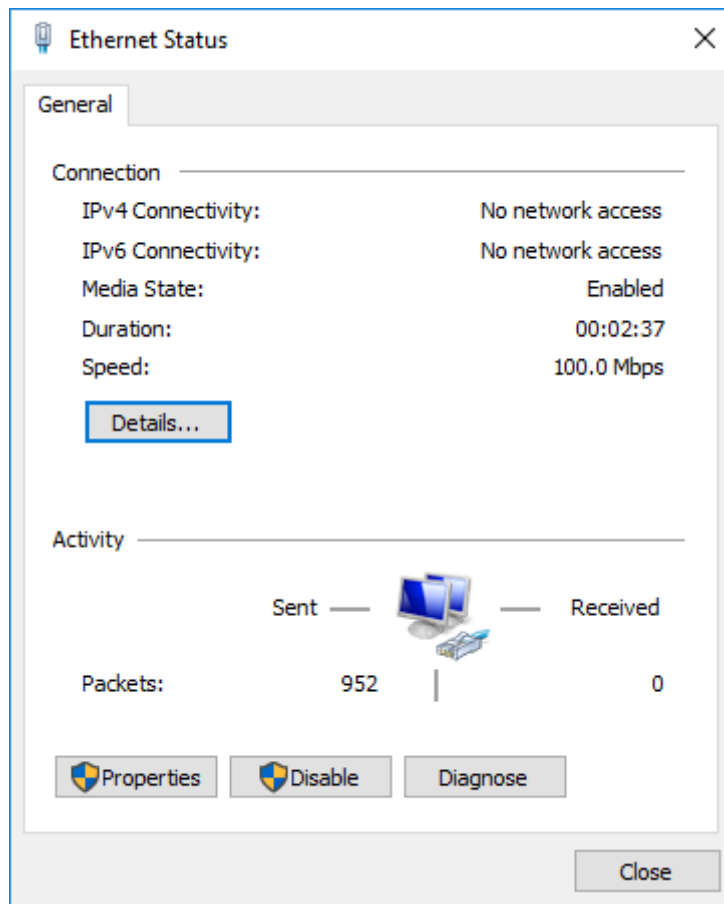
From the Start menu, select *Control Panel*.

| | |
|---|--|
|  | Important: It may be required to search for "Control Panel" in the Start menu before it appears as an entry. |
|---|--|

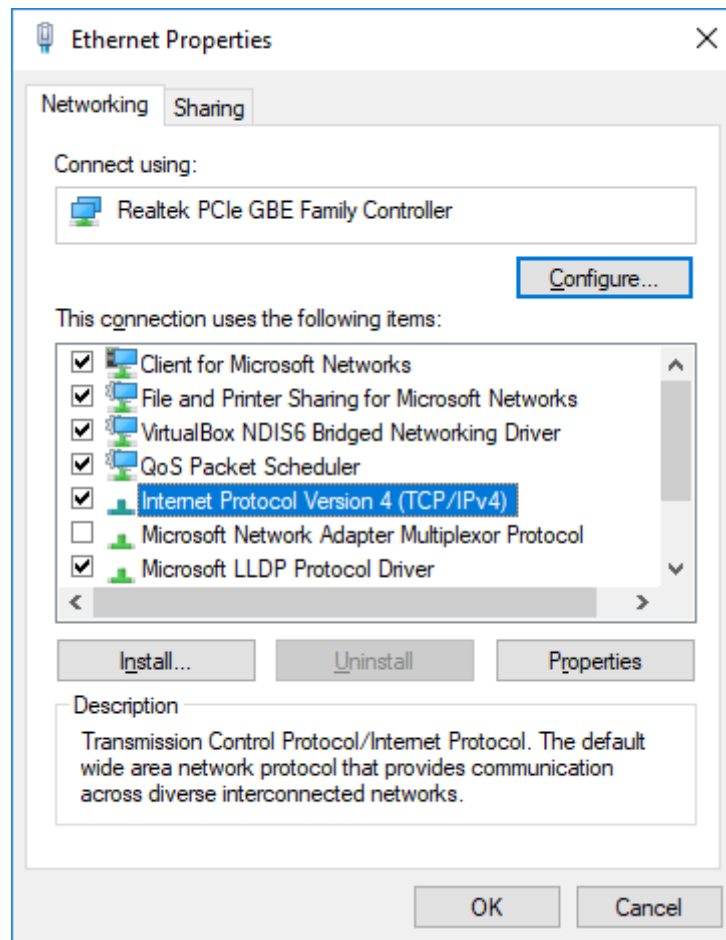
From the Control Panel select the *Network and Internet* link, followed by the *Network and Sharing Centre* link. Click on the link next to "Connections" for your respective network. This is named "Ethernet" in the screenshot below.



A general status page will be displayed. From within this page select *Properties*.

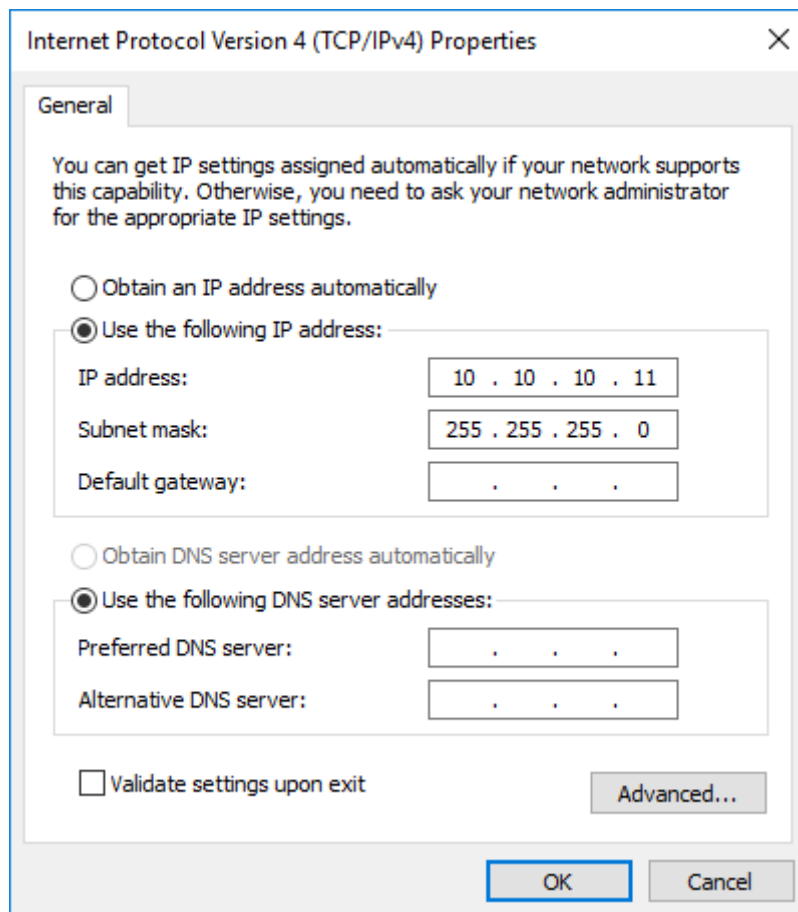


Select the *Internet Protocol Version 4 (TCP/IPv4)* entry and then *Properties*.



Before continuing, make a note of your current configuration as it will be modified. Afterwards,

1. Click *Use the following IP Address*.
2. Enter *10.10.10.11* into the *IP Address* field.
3. Enter *255.255.255.0* into the *Subnet Mask* field.
4. Finally click the *OK* button.



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

Obtain an IP address automatically

Use the following IP address:

IP address: 10 . 10 . 10 . 11

Subnet mask: 255 . 255 . 255 . 0

Default gateway: . . .

Obtain DNS server address automatically

Use the following DNS server addresses:

Preferred DNS server: . . .

Alternative DNS server: . . .

Validate settings upon exit

Advanced...

OK Cancel



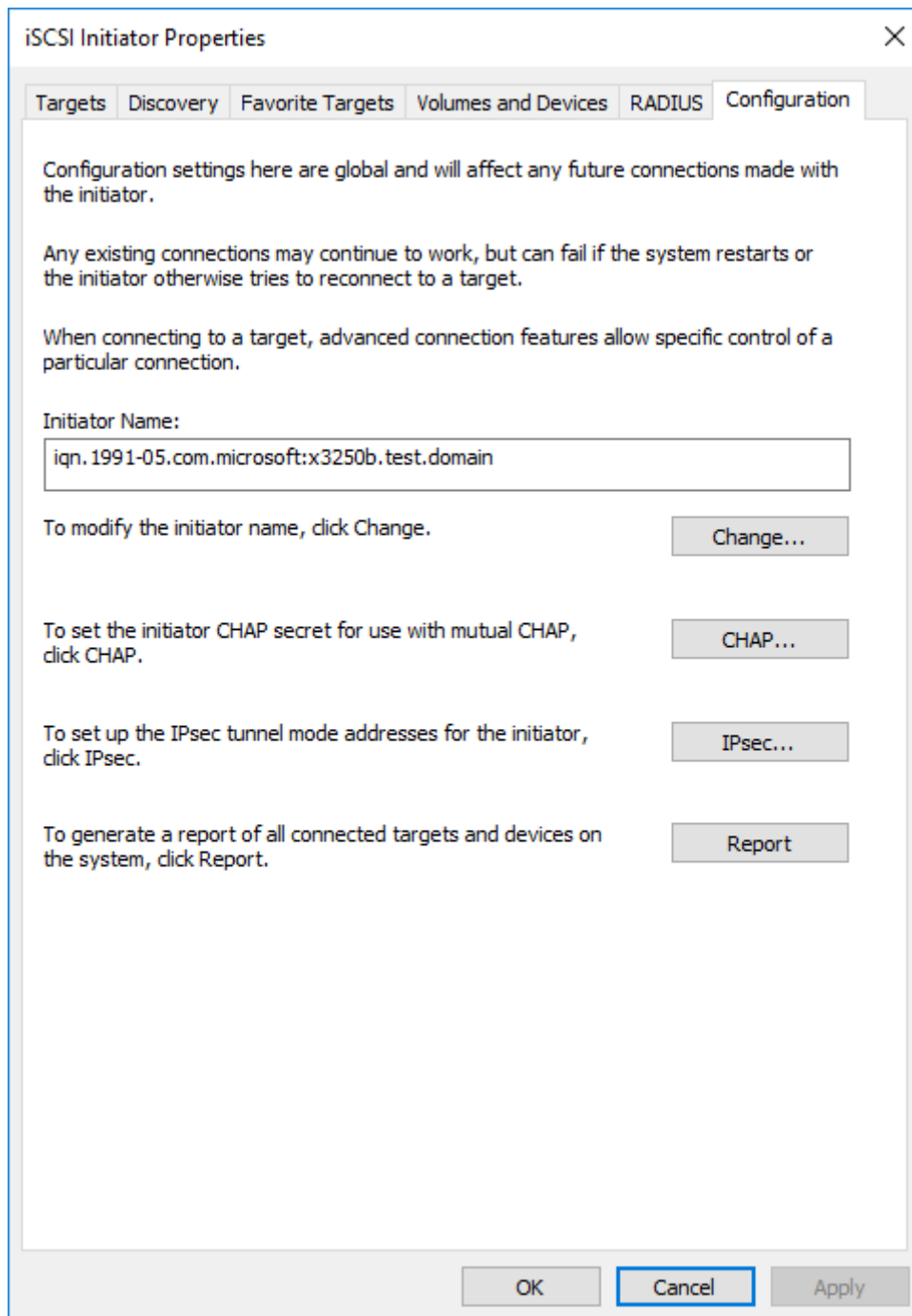
Note: Once you have completed the initial set up of the Bridge, return your computer to the original settings and reconnect to the Bridge.

C Connecting to an iSCSI Device using the Microsoft iSCSI Initiator

There are many iSCSI Initiators available. However, for the purpose of this user guide we shall concentrate only on the Microsoft iSCSI Initiator. In this example we have used the Microsoft iSCSI Initiator that is available with Microsoft Windows Server 2019. However, the following procedure is similar for all versions of Microsoft iSCSI Initiator.

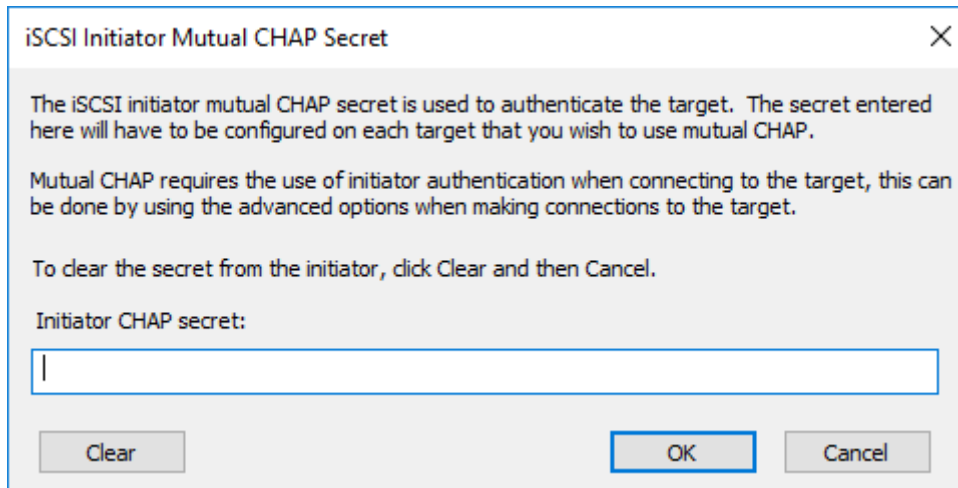
C.1 General Set up

Open the iSCSI initiator and then click on the *Configuration* tab. You should see the following page:



From this page, you are able to configure the initiator name, specify the initiator secret and set up the IPsec connections. For the purpose of this document we shall leave the initiator name as the default.

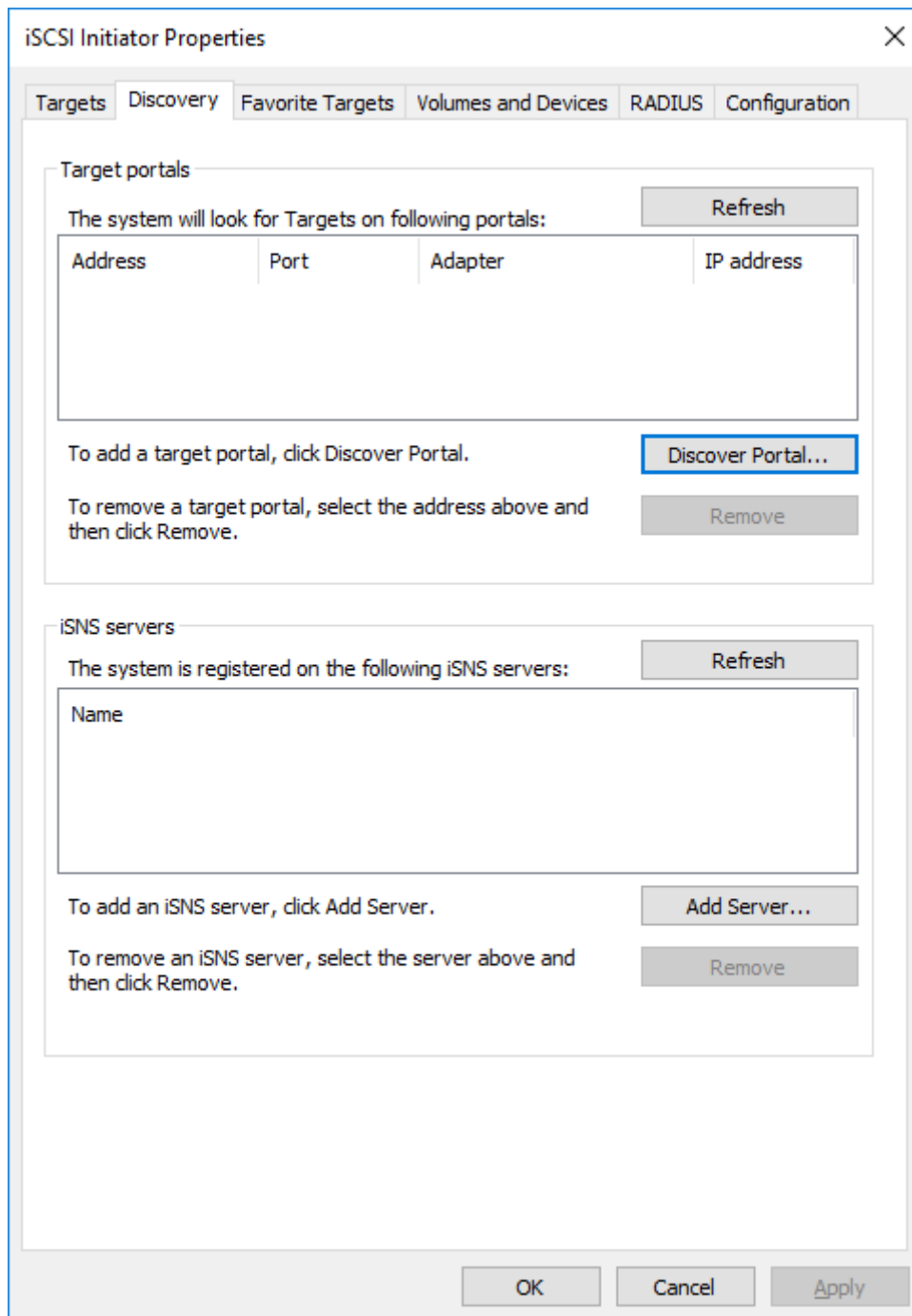
If you intend to use Mutual CHAP authentication you must enter the Initiator secret from this page. Click on the *CHAP...* button and the following window should be displayed:



Enter in the Initiator CHAP secret and click OK. The secret should be between 12 and 16 characters. Make a note of this secret as you will need to enter this as part of configuring CHAP on the iSCSI Bridge.

C.2 Discovery of Devices

Before you can connect to an iSCSI Target, the iSCSI targets must be discovered. Click on the *Discovery* tab and you should see the following page:

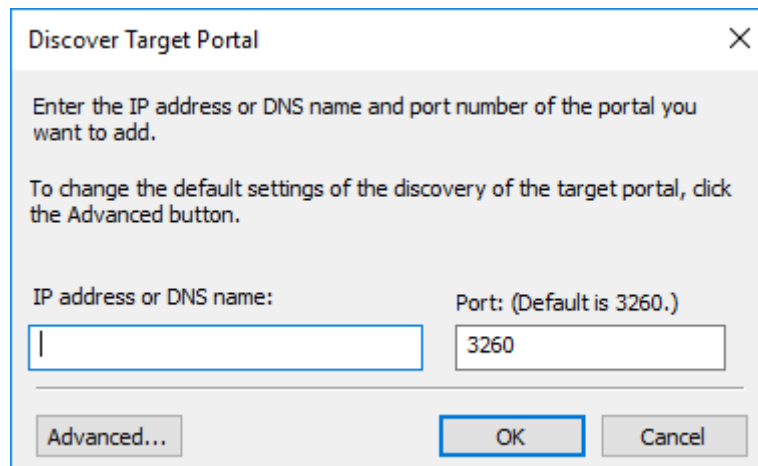


Devices can be discovered in one of two ways:

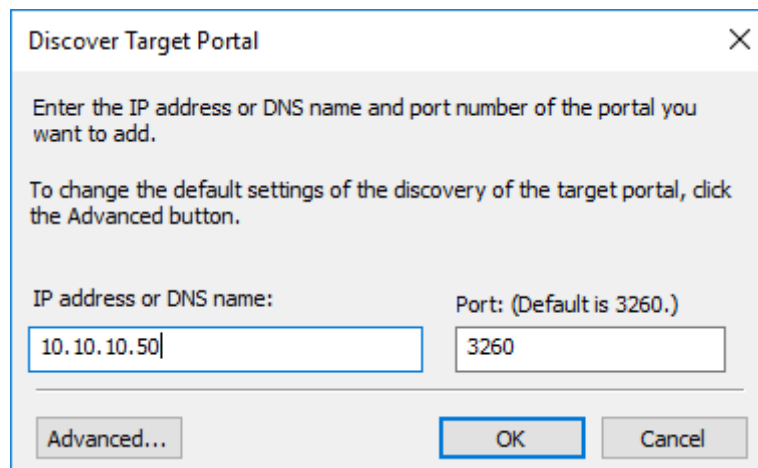
- Adding an iSCSI target portal and directly performing a discovery;
- Adding an iSNS server to which the target portal is registered.

C.2.1 Adding an iSCSI Target Portal

To add an iSCSI Target portal, click on *Discover Portal...* You should now be presented with the following window:



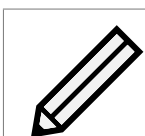
Enter the IP address for the iSCSI Target. In this example we shall use the IP address 10.10.10.50.



Leave the port at 3260 unless you have configured your iSCSI Bridge to only respond on port 860, in which case change it to 860. Click on the *Advanced* button to see the advanced options.

The *Connect using* section allows you to specify which iSCSI adapter to use and the Initiator IP. The *Local adapter* should only differ from Microsoft iSCSI Initiator if an iSCSI offload card has been installed. For the purpose of this guide, we shall only use the Microsoft iSCSI Initiator. Leaving this setting as *Default* will also use the Microsoft iSCSI Initiator.

The *Initiator IP* is used to specify upon which network adapter the discovery will be done. In most cases you will want to leave this as default. If multiple network interfaces are installed in the Server and you wish to select a particular interface, select the IP address of that network interface from the drop down list.

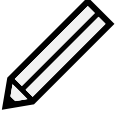


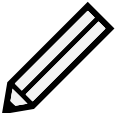
Note: You may need to select a specific local adapter in order to chose certain initiator IP addresses.

CRC/Checksum settings allow you to specify whether the discovery is done using Data and/or

Header Digests. Unless the iSCSI device is on a poor quality network where data corruption is likely, it is recommended that Header and Data Digests are left disabled, as performance will be affected.

If the iSCSI Bridge has CHAP enabled, or you wish to authenticate the iSCSI Bridge, click on the checkbox *Enable CHAP log on* to enable CHAP. Now enter the username and target secret that are configured on the iSCSI Bridge. If you wish to authenticate the iSCSI Bridge, select *Perform mutual authentication*.

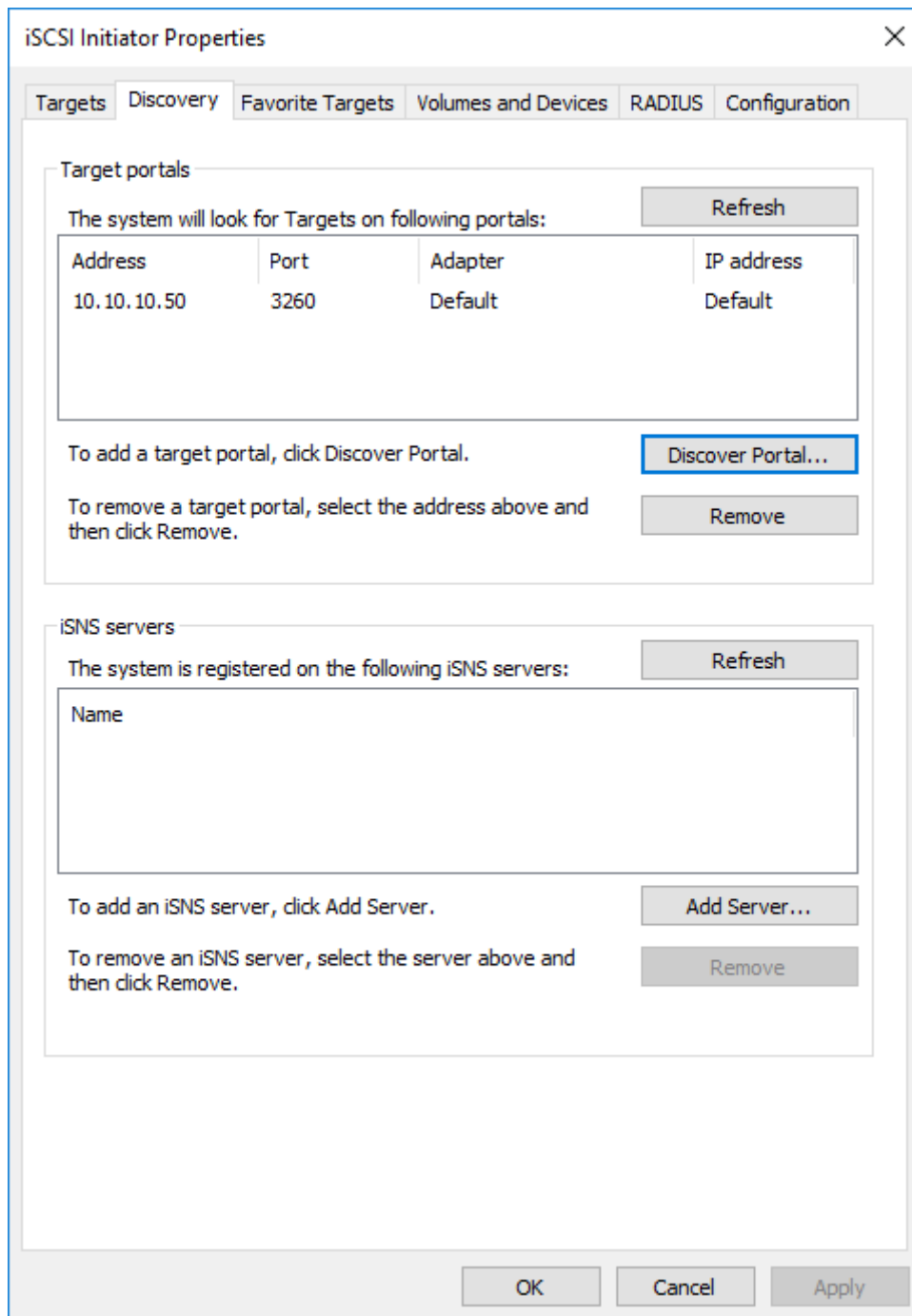
| | |
|---|---|
|  | Note: For mutual CHAP to be performed, the <i>Initiator Secret</i> must be set on the general tab, and be the same as the one configured on the iSCSI Bridge. |
|---|---|

| | |
|---|--|
|  | Note: The use of RADIUS is beyond the scope of this guide. |
|---|--|

Once you are satisfied that all advanced options are correct, click OK.

Now click OK in the *Discover Target Portal* window, and the Microsoft iSCSI Initiator shall perform the discovery. This is usually a quick process, but can take up to a minute with multiple network ports.

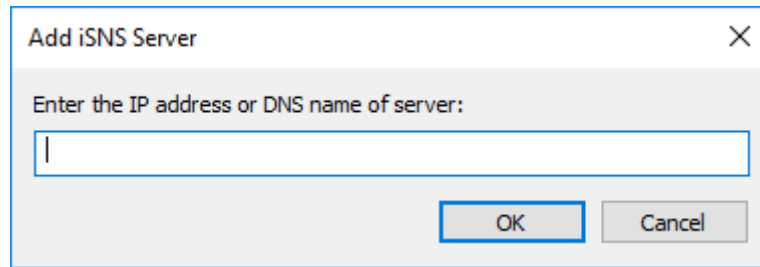
Once the discovery is complete, you should see the target listed in the *Target portals* list:



C.2.2 Adding an iSNS Server

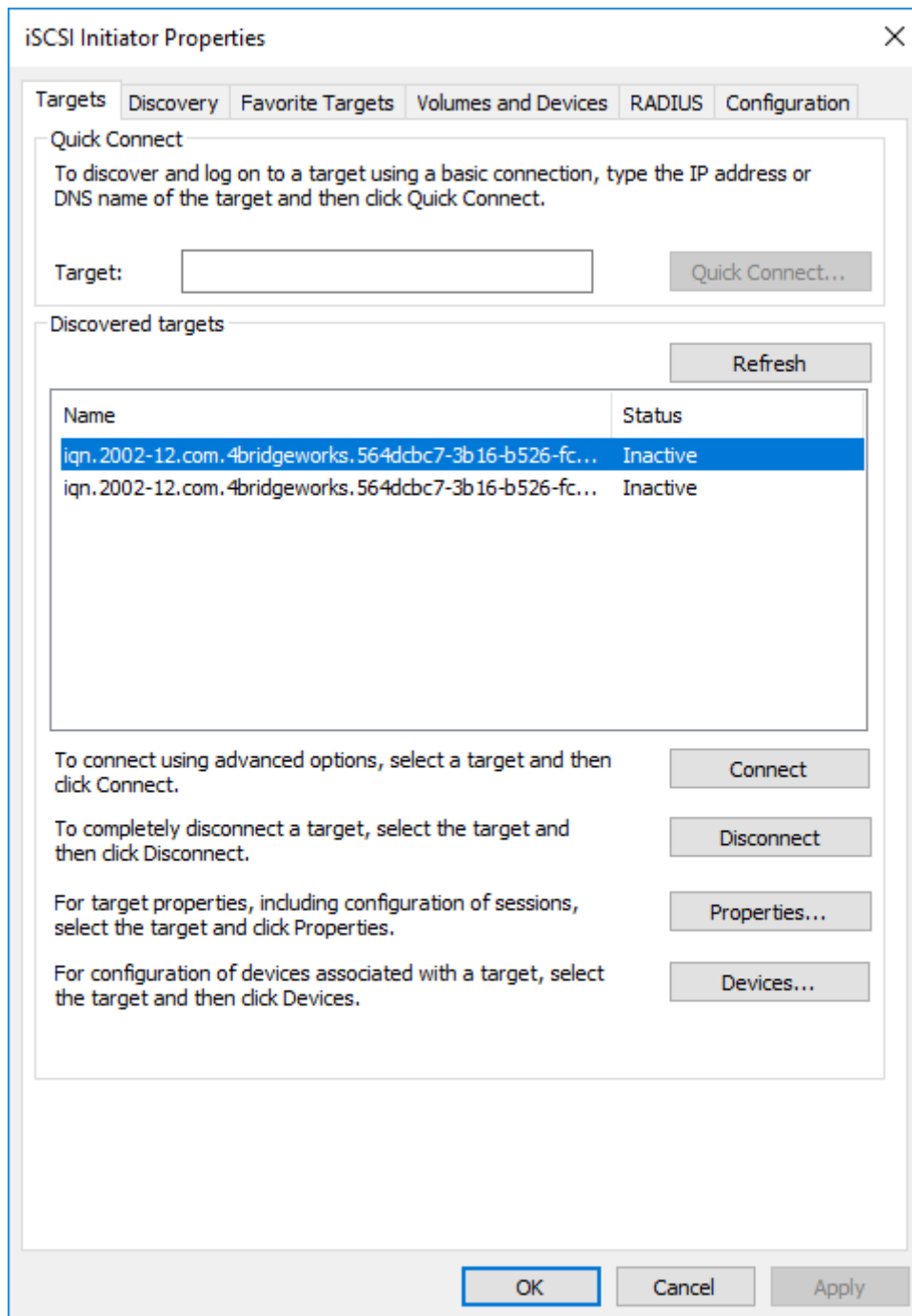
To discover iSCSI targets using this method, your iSCSI Bridge must be registered with your designated iSNS server. See Section 3.3.6: [Internet Storage Name Service \(iSNS\)](#) for more information.

Under *iSNS servers*, click *Add*. The following window should appear:



Enter the address of the iSNS server with which your iSCSI Bridge is registered, then click *OK*. The Microsoft iSCSI Initiator will now query the iSNS server and perform discoveries on registered target portals.

Click on the *Targets* tab. The discovered devices should now be listed.

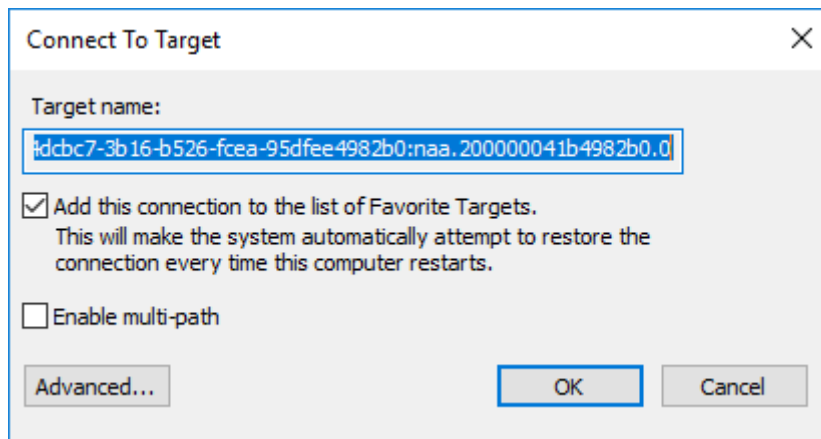


In this example two iSCSI targets have been discovered. The first device is the tape drive, and the second is the media changer. If no devices are displayed, check that the settings used to perform the discovery, including CHAP settings, are correct. Then return to *Targets* tab and click *Refresh*.

If still no devices are displayed, check network cables and that the iSCSI Bridge is operational.

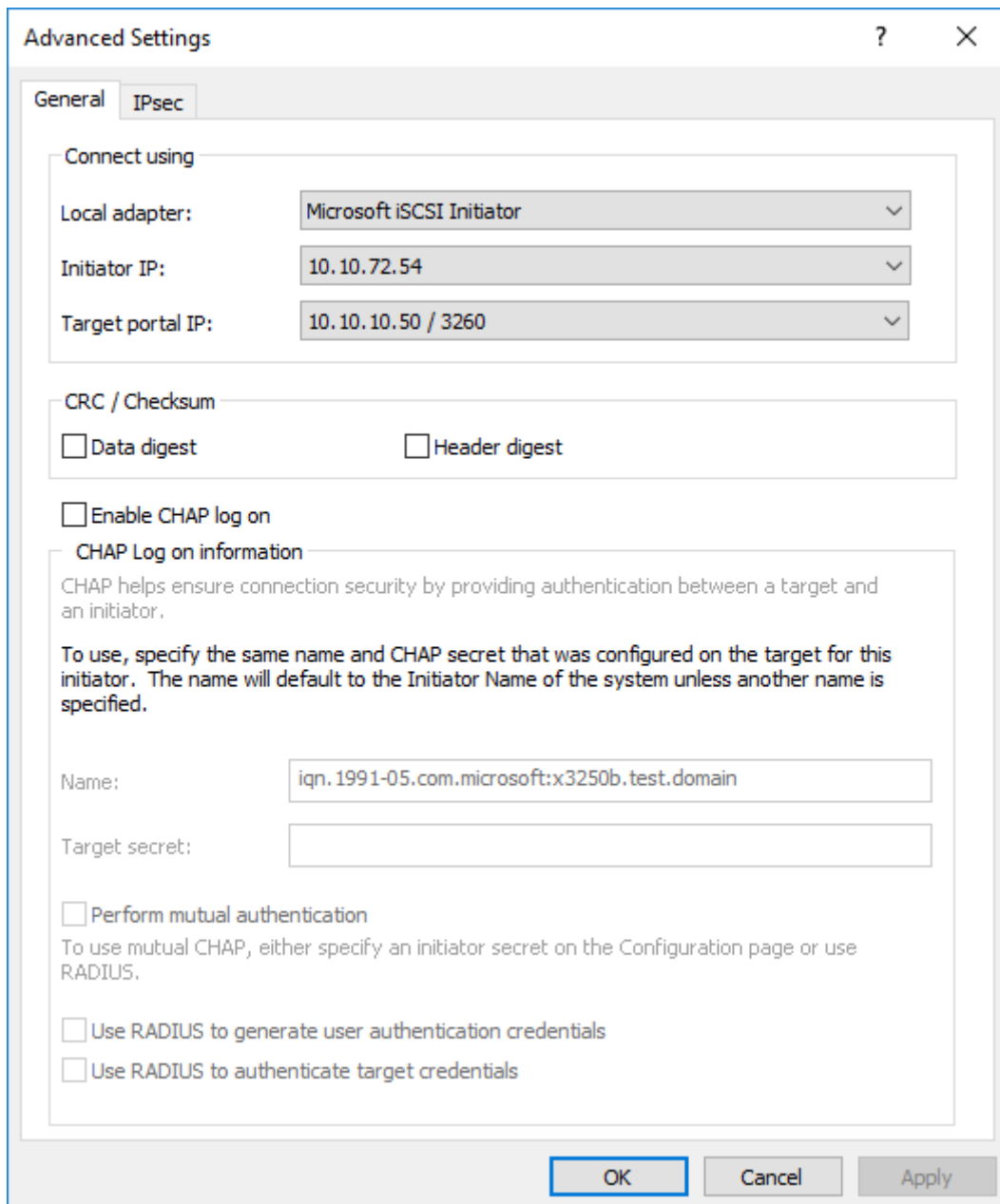
C.3 Connecting to a Target

To connect to one of the displayed iSCSI targets, click on its list entry, then click the *Connect* button. In this example we have chosen the first target. The following window should appear:



If you wish to reconnect to the target automatically when this Windows server reboots, select the *Add this connection to the list of Favorite Targets* checkbox.

Click on the *Advanced* button to see the advanced settings. The following window should appear:



The Advanced Settings page is the same as that of the discovery except for one addition. In the *Connect using* section, there is a *Target portal IP* option. This allows you to choose which interface of the iSCSI Bridge will be used to make the connection to the target. In this example we have chosen to connect to the IP address 10.10.10.50 on port 3260.

To see how this relates to the iSCSI Bridge configuration, note the IP addresses in the Network Interfaces subsection, on the iSCSI Target page of the iSCSI Bridge's web interface:

Hostname

[Home](#)

[Reboot](#)

[Logout](#)

[Support](#)

[Help](#)

Authorisation

! While secrets longer than 16 characters are allowed, they may be unsupported by some hosts.

Enable CHAP:

Username:


Initiator Secret:

Target Secret:

Network Interfaces

| Interface | Configured TCP Port(s) |
|-----------------------|------------------------|
| Port 2 (10.10.10.50): | 3260 ▼ |
| Port 3 (10.10.11.50): | 3260 ▼ |

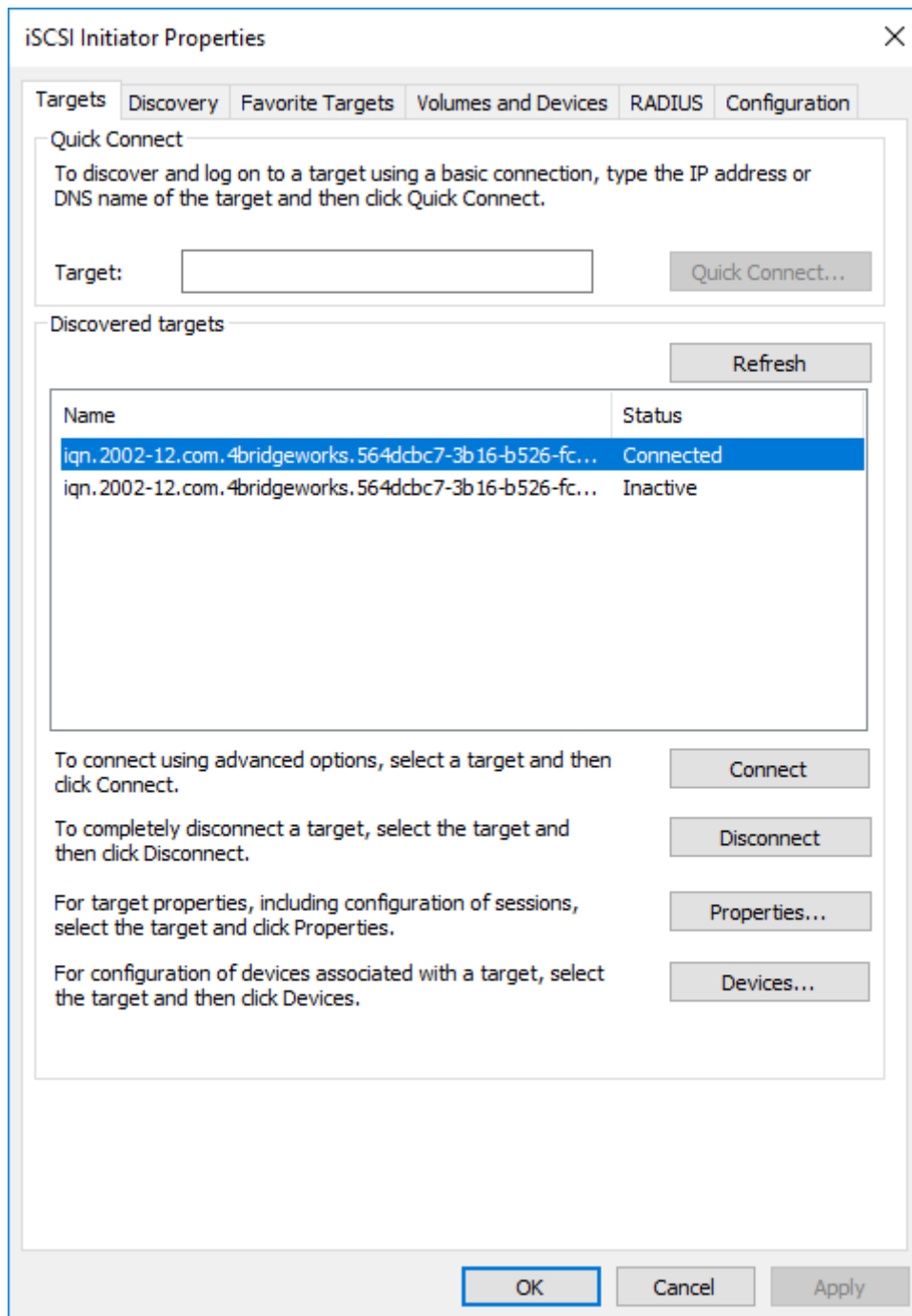
See Chapter 5: [iSCSI Target Configuration](#) for more information.



Important: If you wish to connect to a target over multiple network interfaces, see Appendix C.5: [Creating Multiple Connections \(Optional\)](#). For now, select the *Initiator IP* and *Target portal IP* for the first connection to the target.

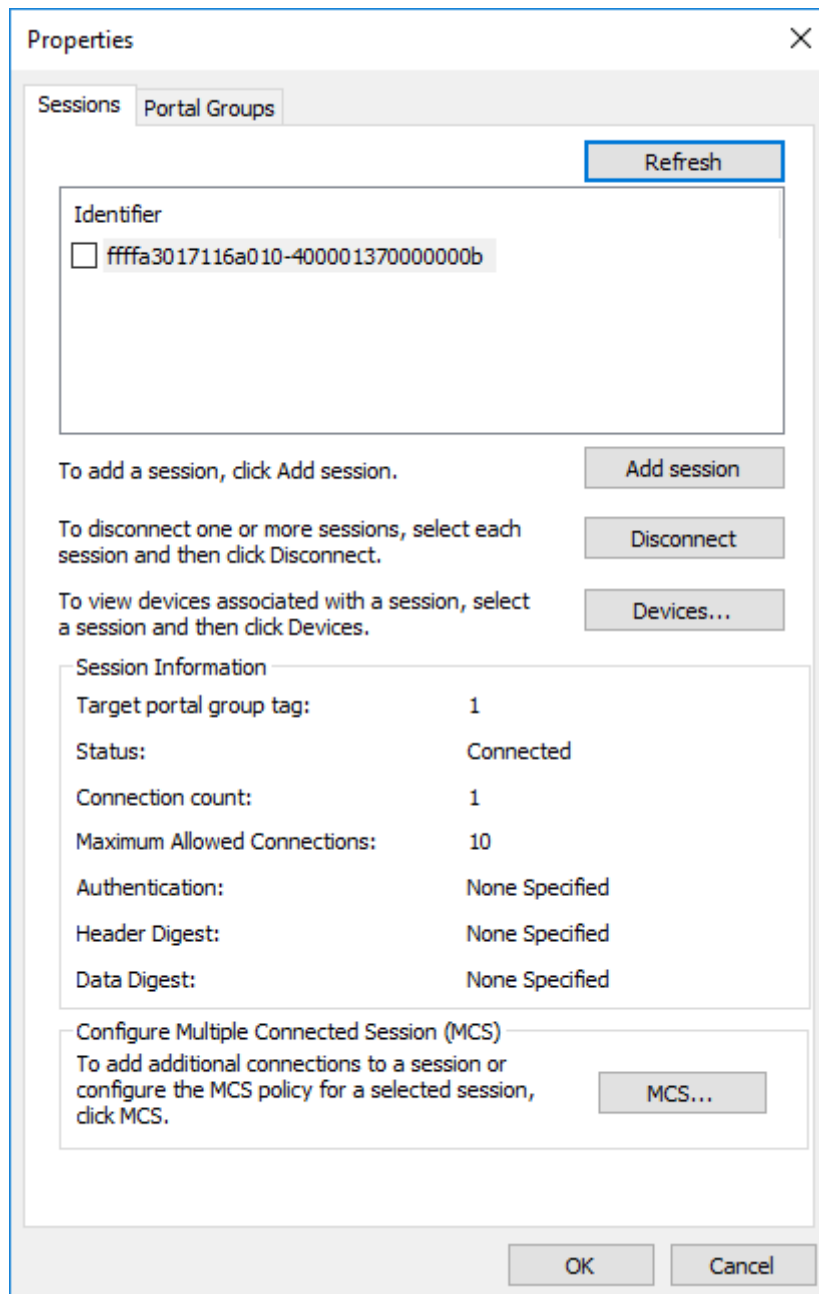
To set up the Digest and CHAP settings, see Appendix C.2: [Discovery of Devices](#).

The list entry for the target should now display *Connected* in the *Status* column:



C.4 Viewing iSCSI Session Details

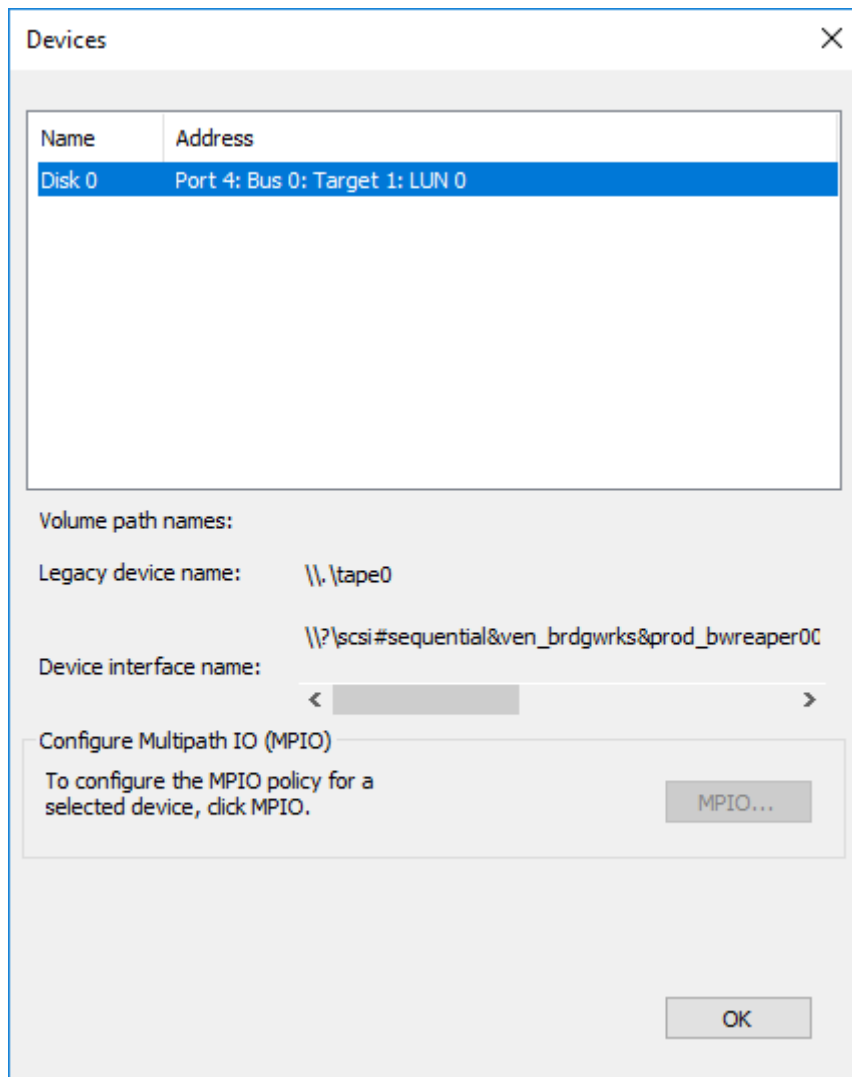
When you have connected to an iSCSI Target, you can check that the device is connected by clicking on the *Properties...* button. The following window will appear:



In this window you can view the iSCSI Sessions associated to the iSCSI Target, how many connections are attached to each iSCSI Session, and the Target Portal Group.

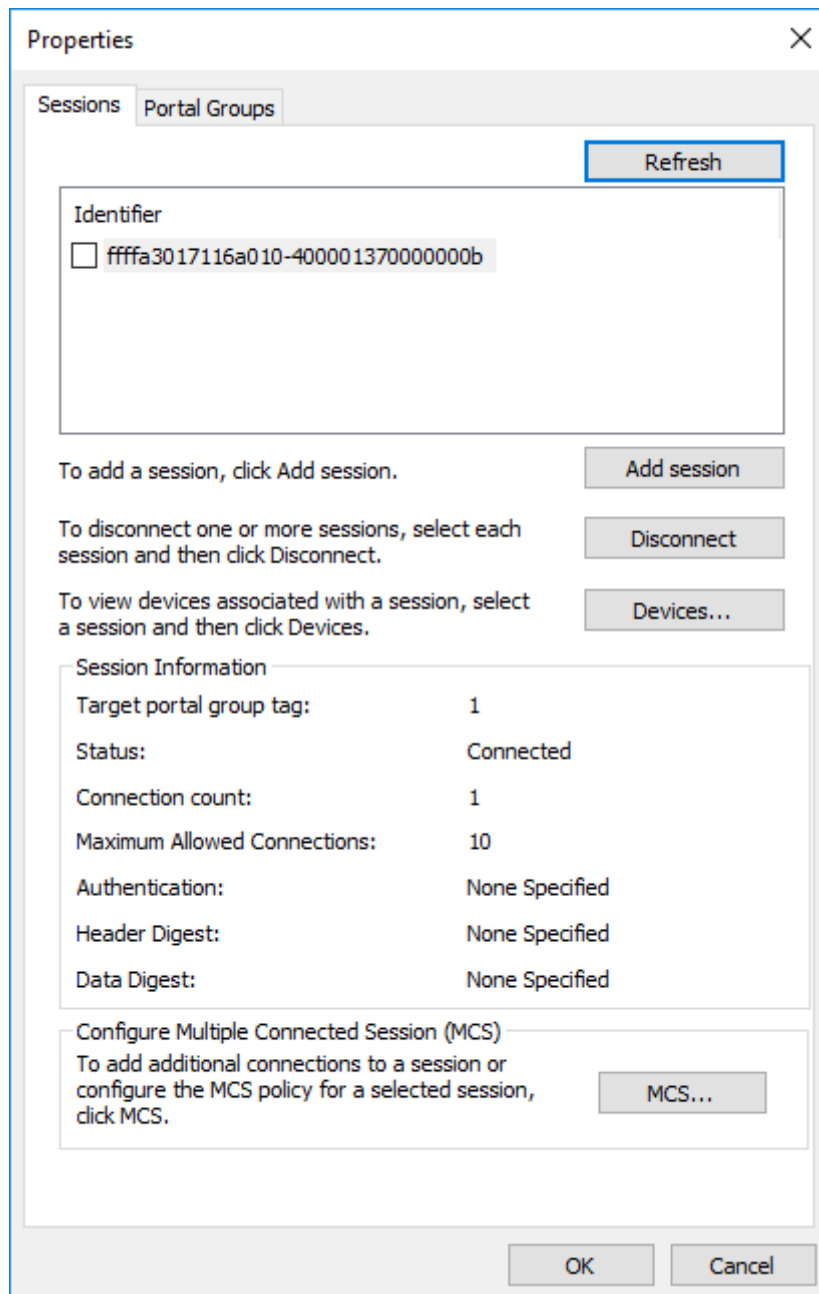
If you click on the *Devices...* button, details of the target device will be displayed. Here for example, we can see that the device is a tape drive. Indicated by it's legacy device name of

.
tape0.

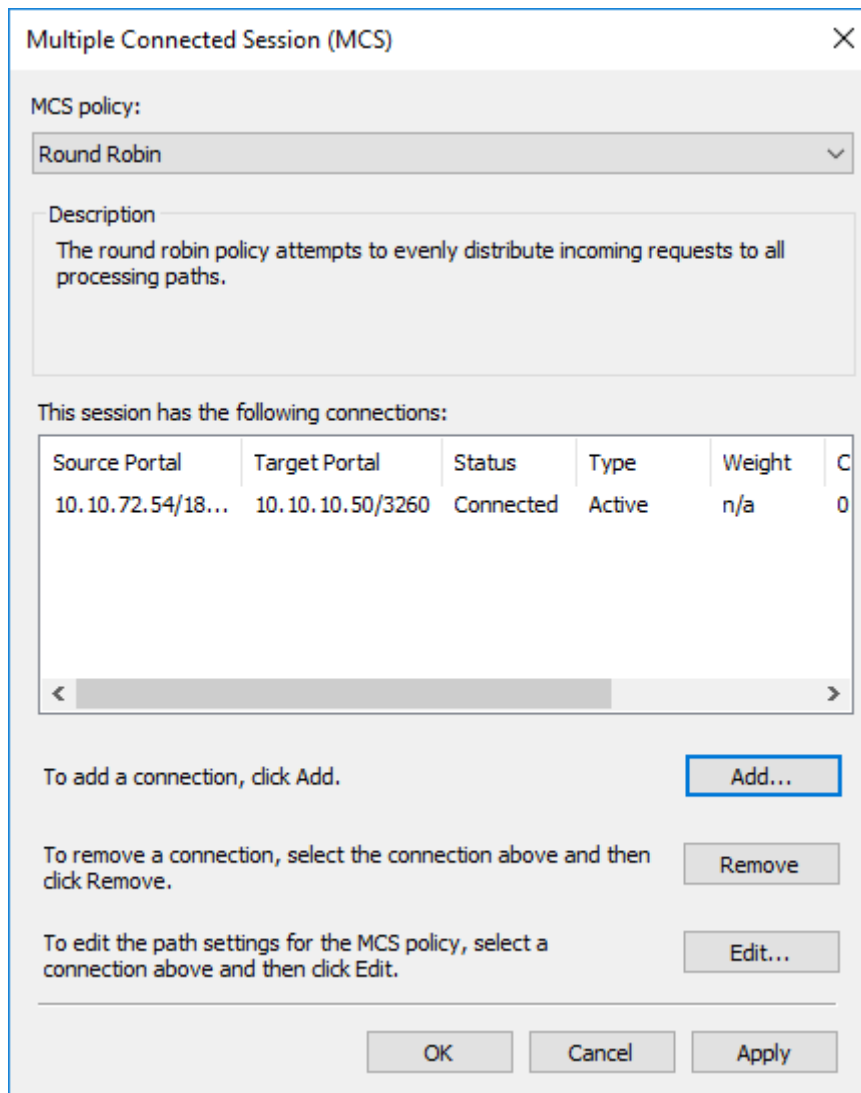


C.5 Creating Multiple Connections (Optional)

To set up Multiple Connections per Session (“MCS”), open the target properties window, by selecting the target from the *Discovered targets* list on the *Targets* tab and clicking *Properties...*




Click on the *MCS...* button to open the *Multiple Connected Session (MCS)* window:

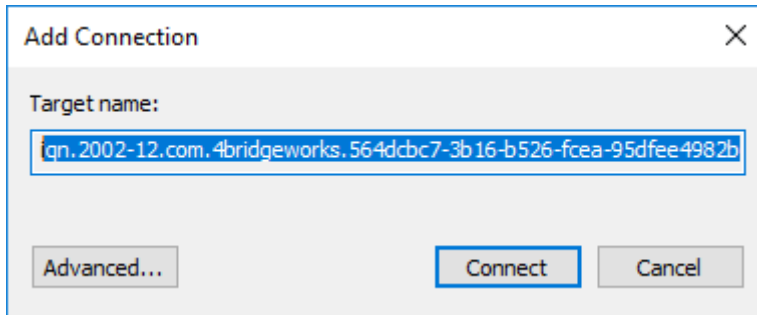


This shows how many iSCSI Connections are active and the type of load balance used. For all iSCSI Sessions, there will be at least one leading connection.

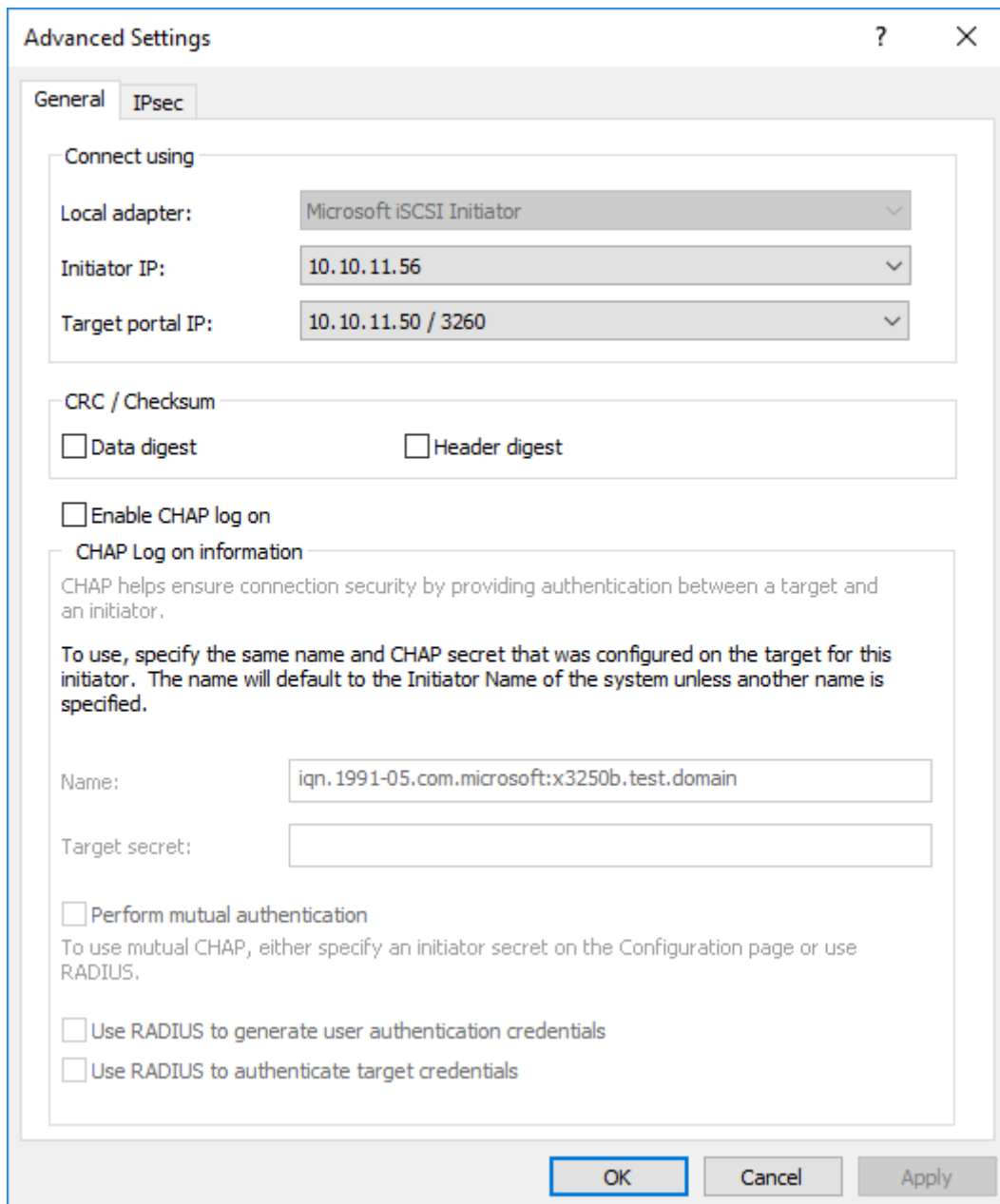
iSCSI connections can be added and removed at any time, all apart from the leading connection, which can only be removed when the iSCSI Session is logged off.

| | |
|---|---|
|  | <p>Note: The <i>MCS policy</i> specifies how the data is distributed over multiple connections. Unless you have reason to select one of the more advanced policies, <i>Round Robin</i> and <i>Fail Over Only</i> are recommended.</p> <p>Round Robin will utilize all connections for data and evenly distribute the data.</p> <p>Fail Over Only will use the <i>Active</i> connection for data transfer. If a connection should go down then the data transfer shall switch to one of the <i>standby</i> connections.</p> <p>Round Robin With Subset combines <i>Round Robin</i> and <i>Fail Over</i> operating as <i>Round Robin</i> until all <i>Active</i> paths have failed, where upon <i>standby</i> paths will be tried.</p> <p>Least Queue Depth assigns each new operation to the connection with the fewest commands already queued.</p> <p>Weighted Paths allows the administrator to assign a path weight per connection, operations are queued to the least weighted available path.</p> <p>For most purposes, <i>Round Robin</i> will provide the best performance.</p> |
|---|---|

To add a new connection to a session, click on the *Add...* button to open the following window:

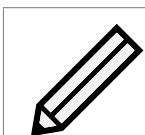
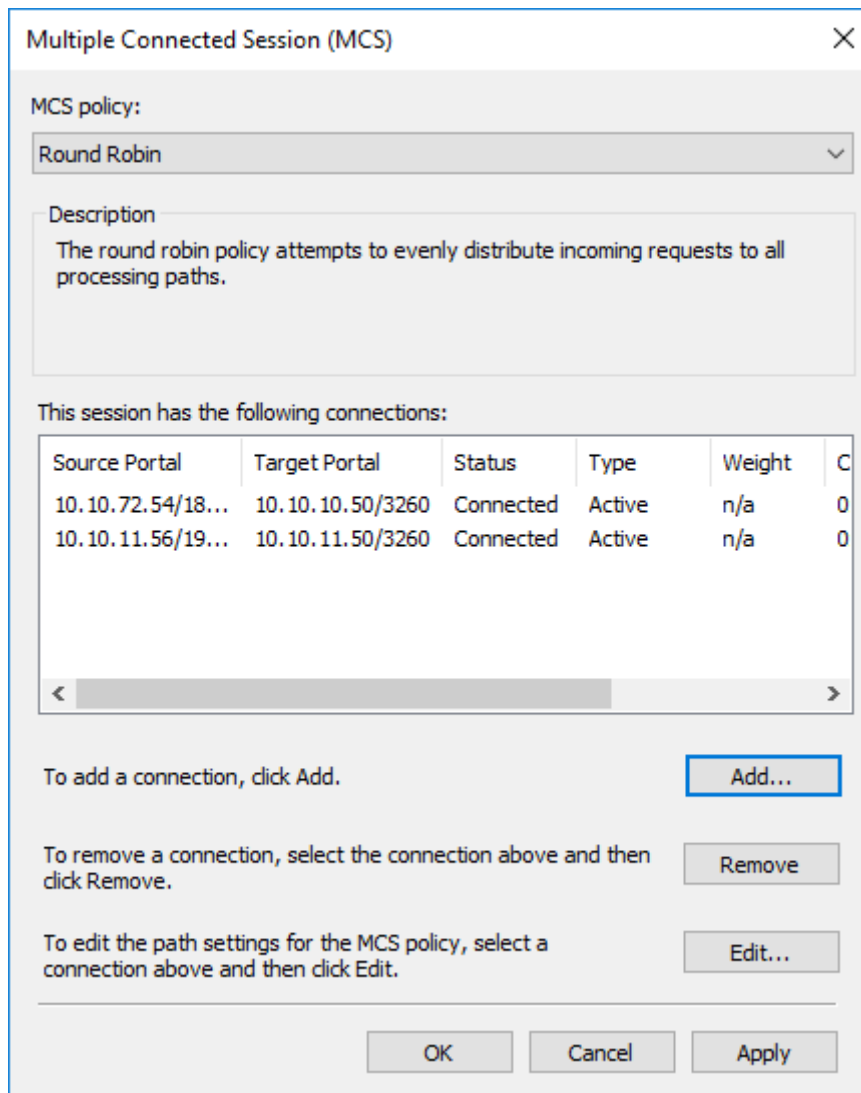


Then click *Advanced...* to open *Advanced Settings*:



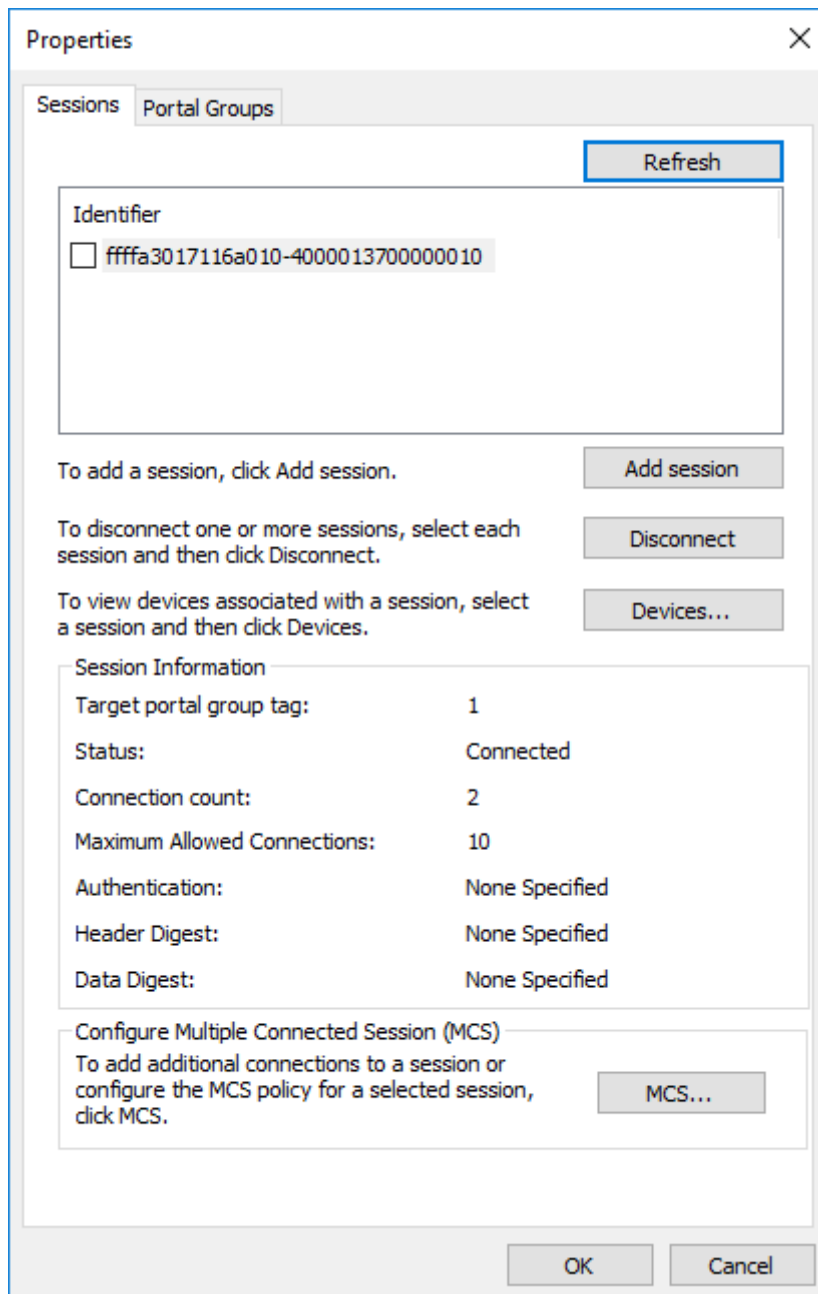
In the *Connect using* section, select the *Initiator IP* address and the *Target portal IP* address for the new connection. In most instances these should be different from the source and target addresses of the original connection. In this example we have connected to 10.10.10.50 / 3260 as the leading connection, and the second connection will be 10.10.11.50 / 3260.

Configure CHAP and Header/Data Digest, and click OK. Then click OK within the *Add Connection* window and now you should see the new, additional connection listed in the *Multiple Connected Session (MCS)* window.



Note: Up to 10 connections can be added to one session.

Once you have completed setting up the connections, click OK to return to the *Properties* window. Under *Session Information*, you will see that the *Connection count* value has increased:



Now click on OK to return to the Microsoft iSCSI Initiator main window.



Important: If you have been experiencing a performance decrease when transferring data to more than one device using multiple connections, please refer to Chapter 8: [Troubleshooting](#).

C.6 Logging off an iSCSI Session

To log off an iSCSI Session, follow the following procedure.

1. Open the Microsoft iSCSI Initiator and click on the *Targets* tab.
2. Click on the iSCSI session that you wish to log off and then click *Properties....*

-
3. In the *Properties* window, select the *Sessions Tab* and select the identifier that is to be logged off.
 4. Click the *Disconnect* button. This will log off all connections associated with the iSCSI Session.
 5. The session identifier should now be removed from the identifier list. Click *OK* to return to the main iSCSI Initiator window.

The iSCSI device should now show as inactive.

D Connecting to an iSCSI Device using iscsiadm



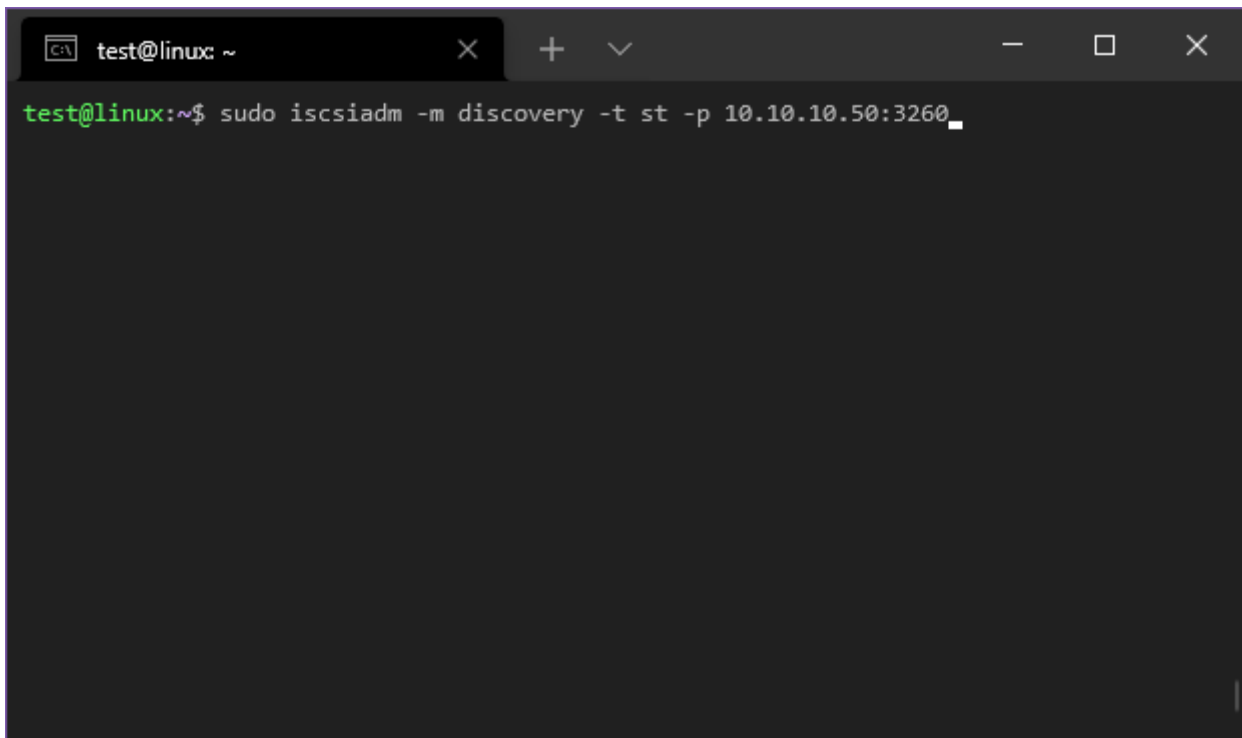
Important: The `iscsiadm` command may require root privileges to function. This guide will assume that the user has root privileges.

D.1 Discovering iSCSI Targets

To get a list of available targets on the Bridge, run a discovery using the following command:

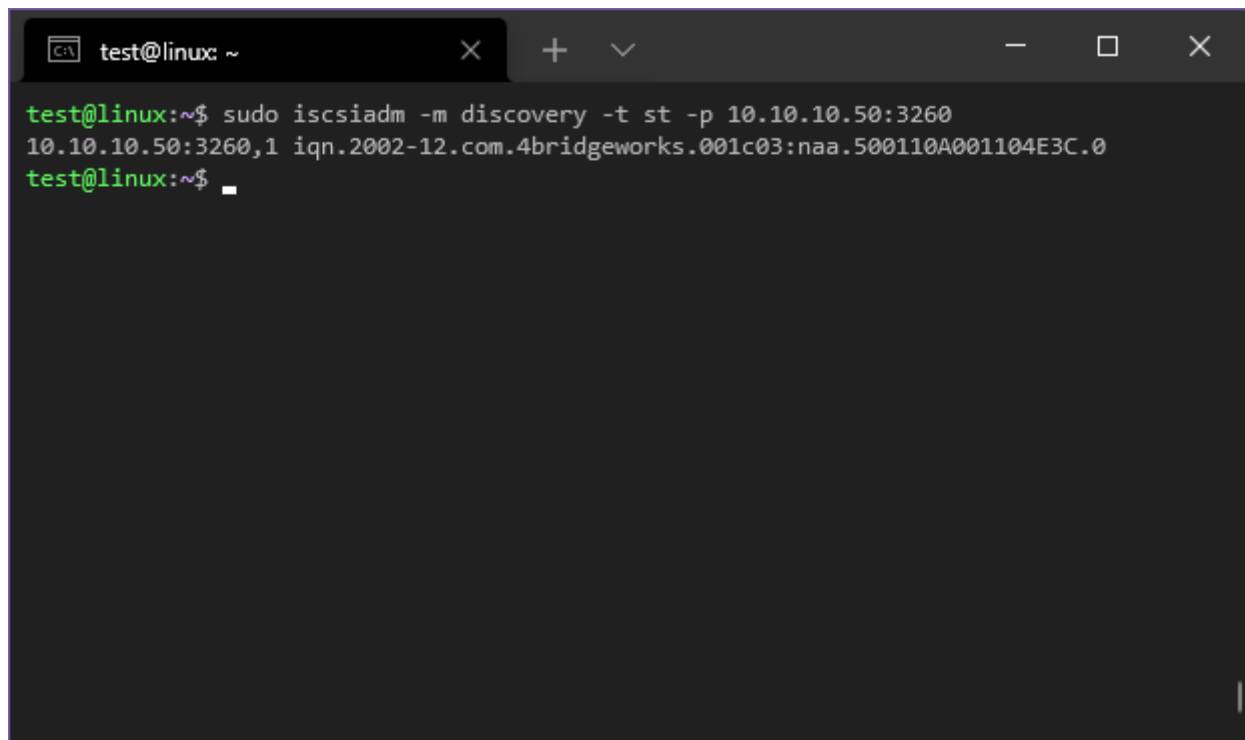
```
iscsiadm -m discovery -t st -p <Target IP Address>:<Port Number>
```

An example of this is shown below when performing a discovery on a target with the IP address 10.10.10.50 on port 3260.



```
test@linux: ~  
test@linux:~$ sudo iscsiadm -m discovery -t st -p 10.10.10.50:3260
```

When the command is run, you should see a list of available targets as shown below:

A terminal window with a dark background and light text. The window title is 'test@linux: ~'. The prompt is 'test@linux:~\$'. The command entered is 'sudo iscsiadm -m discovery -t st -p 10.10.10.50:3260'. The output is '10.10.10.50:3260,1 iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0'. The prompt returns to 'test@linux:~\$' with a cursor.

```
test@linux:~$ sudo iscsiadm -m discovery -t st -p 10.10.10.50:3260
10.10.10.50:3260,1 iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0
test@linux:~$
```

D.2 Logging into a target

Once you have discovered the available targets, you can then login to the target. The following command will allow you to login to an individual target:

```
iscsiadm -m node -l -T <Complete Target Name> -p <Target IP Address>:<Port Number>
```

The example below shows logging into the discovered target
iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0:

```
test@linux: ~  
test@linux:~$ sudo iscsiadm -m node -l -T iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0 -p 10.10.10.50
```

When you have successfully logged in to the target device, the screen should update as shown below:

```
test@linux: ~  
test@linux:~$ sudo iscsiadm -m node -l -T iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0 -p 10.10.10.50  
Logging in to [iface: eth0, target: iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0, portal: 10.10.10.50,3260] (multiple)  
Login to [iface: eth0, target: iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0, portal: 10.10.10.50,3260] successful.  
test@linux:~$
```

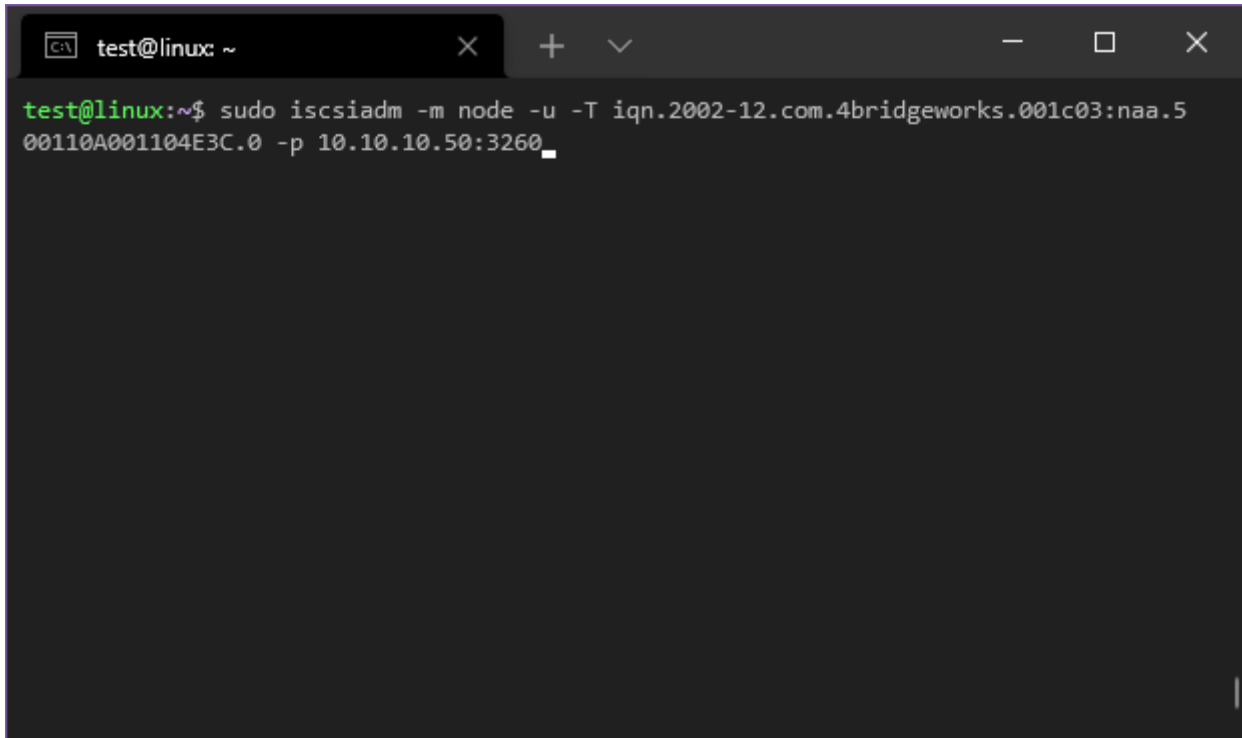
To login to all targets found, the following command can be used:

```
iscsiadm -m node -l
```

D.3 Logging out of a target

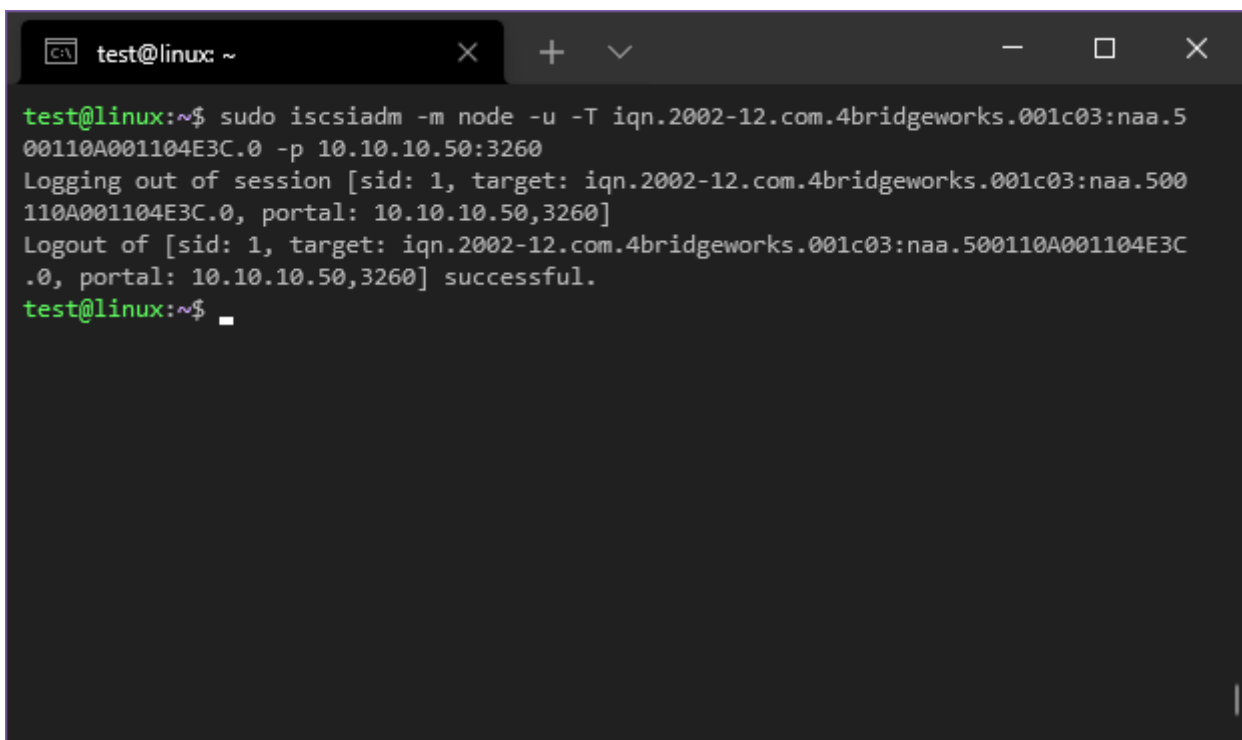
To log out of an individual target enter the following command at the prompt:

```
iscsiadm -m node -u -T <Complete Target Name> -p <Target IP Address>:<Port Number>
```



```
test@linux: ~  
test@linux:~$ sudo iscsiadm -m node -u -T iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0 -p 10.10.10.50:3260
```

When you have successfully logged out of the target device, the screen should update as shown below:

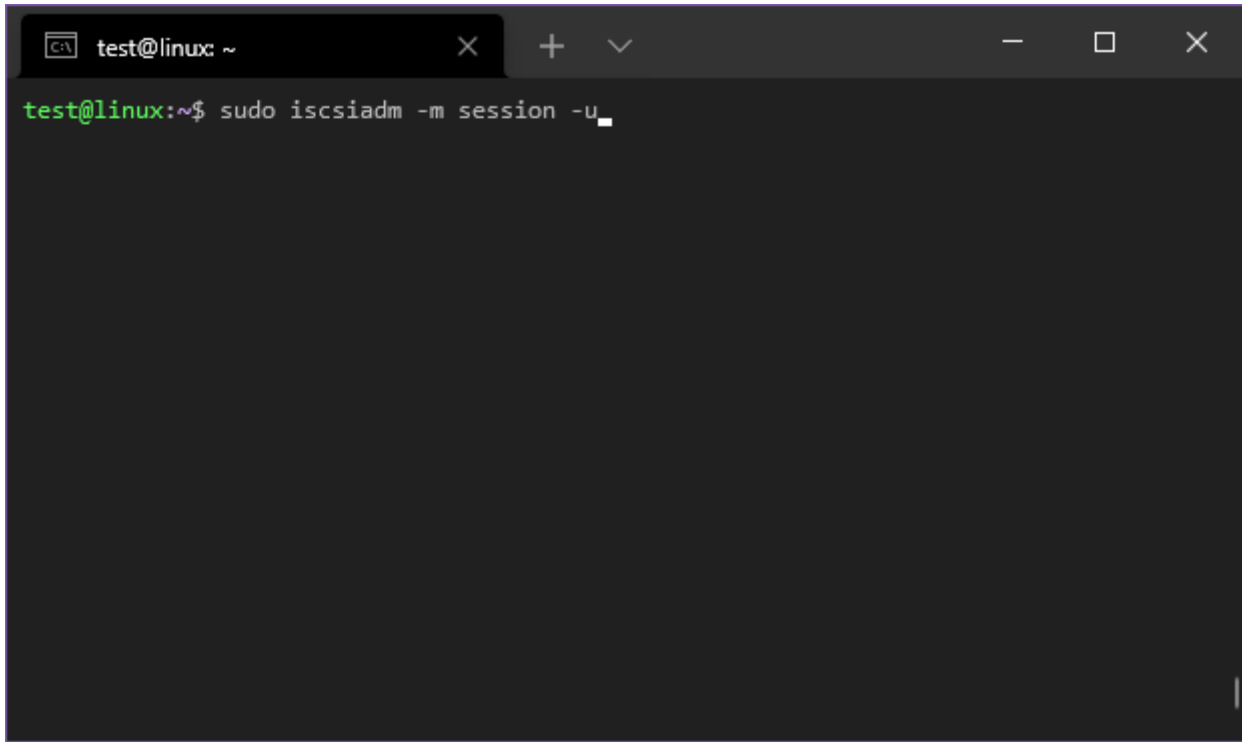


```
test@linux: ~  
test@linux:~$ sudo iscsiadm -m node -u -T iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0 -p 10.10.10.50:3260  
Logging out of session [sid: 1, target: iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0, portal: 10.10.10.50,3260]  
Logout of [sid: 1, target: iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C.0, portal: 10.10.10.50,3260] successful.  
test@linux:~$
```

D.4 Logging out of all targets

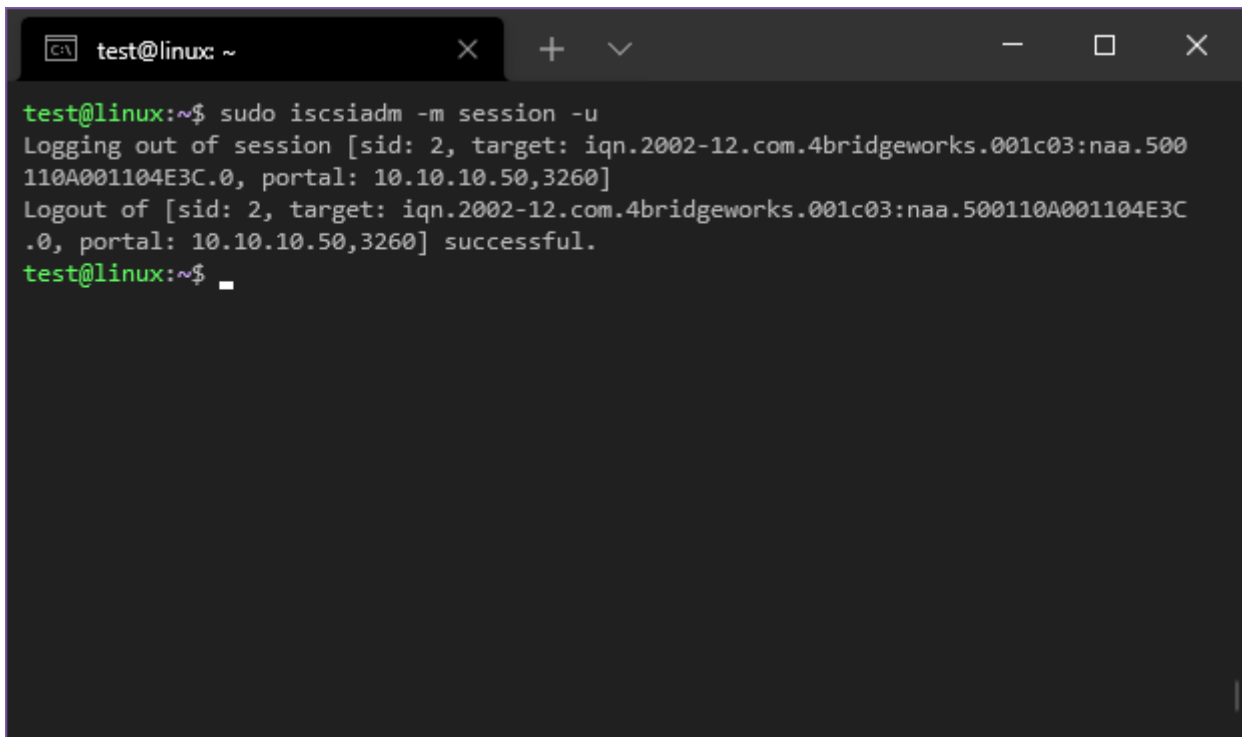
To log out of all targets enter the following command at the prompt:

```
iscsiadm -m session -u
```



```
test@linux: ~  
test@linux:~$ sudo iscsiadm -m session -u
```

When you have successfully logged out of the targets, the screen should update as shown below:



```
test@linux: ~  
test@linux:~$ sudo iscsiadm -m session -u  
Logging out of session [sid: 2, target: iqn.2002-12.com.4bridgeworks.001c03:naa.500  
110A001104E3C.0, portal: 10.10.10.50,3260]  
Logout of [sid: 2, target: iqn.2002-12.com.4bridgeworks.001c03:naa.500110A001104E3C  
.0, portal: 10.10.10.50,3260] successful.  
test@linux:~$
```

E Useful Links

Frequently Asked Questions If you experience problems with the ESAS, the frequently asked questions page may be able to help: <https://support.4bridgeworks.com/documents/faqs/>

Bridgeworks Support If you continue to experience problems with the ESAS, please contact support at <https://support.4bridgeworks.com/contact/>.

Bridgeworks Support Videos These videos will guide you through some of the instructions found in this manual. <https://www.youtube.com/user/SANSlide/>.

Product Manuals The latest product manuals can be found at <https://support.4bridgeworks.com/documents/manuals/>.