T R I C O R D

The Tricord TBD

BETA 2 Manual:

Not for Release. This Beta Manual is a Work-In-Progress and may contain errors. Please use as a reference ONLY.

Tricord® TBD Manual

810002-00

Revision A

Beta 2

Data contained in this manual is based on the most current information and software revision level that is available at the time of printing. In accordance with Tricord's policy of consistent product improvement, this manual is subject to change with out notice. You can obtain manual updates at www.tricod.com. Be sure to cross reference the manual revision level with the software revision level in the "Revision Log" in the Appendix and make certain that you are using a manual that is consistent with the software that you are using on the Tricord TBD.

The Tricord TBD is to be used only for its intended and stated purpose. Any other use of the TBD constitutes a misuse of the product, voids the Tricord warranty and releases Tricord from liability related to misuse. The Tricord TBD is a sealed unit. Breaching the seal voids the Tricord warranty.

Technical Support

If you have question or comments concerning the operation of the Tricord TBD , a member of our Technical Support Staff will be happy to assist you. Ask for Technical Support at: 763.551.6359 or 1.800.TRICORD.

Tricord®
2905 Northwest Blvd., Suite 20
Plymouth, MN 55441

WARNING

This is a sealed unit and should not be opened under any circumstance.

Opening the unit can put you at risk of electrocution.

Opening the unit can damage the unit and will void the warranty.

CAUTION

Read and understand the user manual before using this unit.

Failure to follow directions could result in a loss of data.

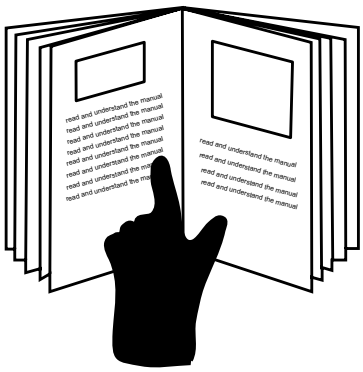


Table of Contents

Acronyms

Glossary

Appendix

Warranty/Service

Index

Introduction

The Tricord TBD

The Tricord TBD

Contents:

Tricord TBD
Standard AC Power Cord
(2) 10/100 Ethernet Cable
Rubber Feet
Installation/IP Setup CD-ROM

What You Will Need:

A Computer with:
Windows 95, 98, 2000 or NT
Internet Explorer 5.5
Internet Access (optional)
CD-Rom Drive

Network Requirements:

For a Storage Network:
100 Base Tx Switch (Recommended)
or 100 Base Tx Hub (not on beta 2)

For a Private Network:
100 Base Tx Switch

Optional:

19” Mounting Rack
Rack Mounting Brackets
Compatible Drawer Slide Kits

Introducing The Tricord TBD

Introducing the technical reality of the future; today. Based on a revolutionary storage system technology, these intelligent , single purpose Tricord TBD features seamless aggregation with unprecedented ease of management. The Tricord TBD represents a breakthrough technology in storage appliance systems, capturing and goes beyond the limitations of independent storage devices with a file system that has no boundaries.

Tricord's unique technology will allow our server appliances to operate as a single pool of storage. A simple plug-and-play operation will aggregate appliances, adding both performance and capacity. As the number of appliances grows, performance continues to scale to match capacity. This is achieved without expensive system administration or downtime due to the ability of our appliances to operate as a single unit.

The Tricord TBD features:

- Automatic resource balancing across all nodes.
- Unlimited scalability using automatic recognition of all Shares in a Cluster.
- RAID algorithm that allows any node to fail without interruption.
- Single Cluster management rather than multiple node management.
- Intuitive, easy to use browser interface.
- One file system that spans the Cluster
- Reliability through RAID across the Cluster
- Universal access to data from any appliance in the Cluster
- Automatic allocation of data across the Cluster
- Automatic recovery from failures of an appliance in the Cluster
- Continuous availability
- Dynamic and automatic allocation and reallocation of data across the appliances in a Cluster
- Continuous availability during any administration or single node failure
- Ability to scale the Cluster to large numbers of appliances

Tricord's TBD will implement TFS on top of the LINUX operating system. Access to the appliance is through standard network file interfaces, such as CIFS and NFS.

Tricord's unique technology for appliance aggregation allows customers to achieve all of the benefits of server appliances without the trade-offs. The Tricord TBD brings you innovation, quality and reliability at an exceptional value.

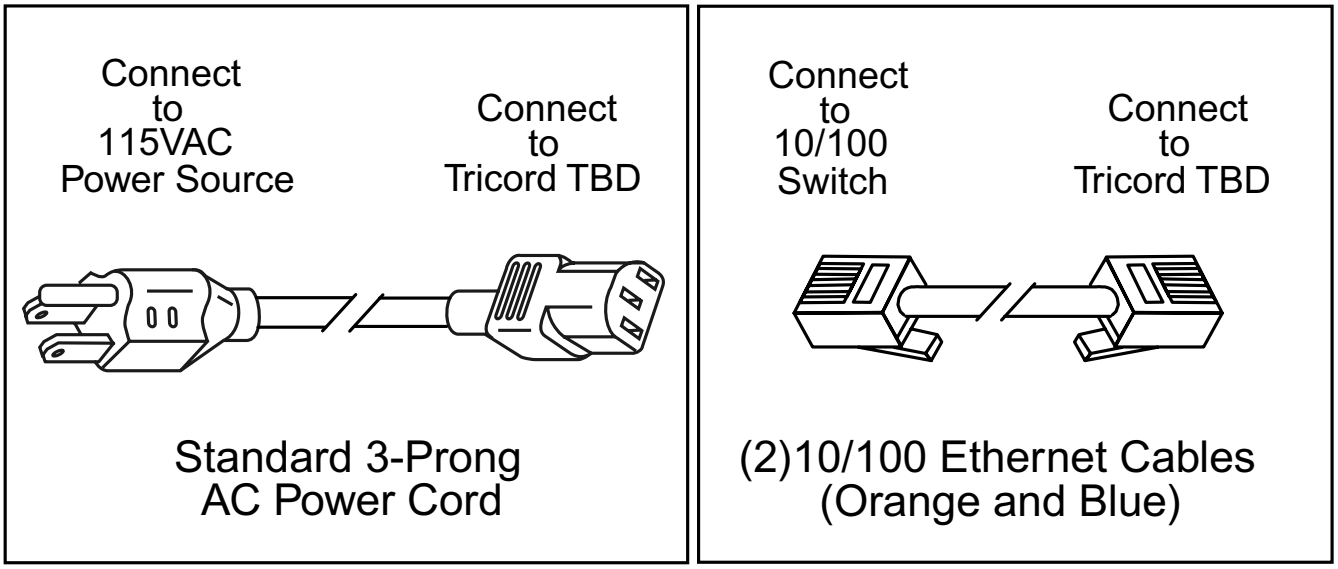
Hardware
Installation and Connections

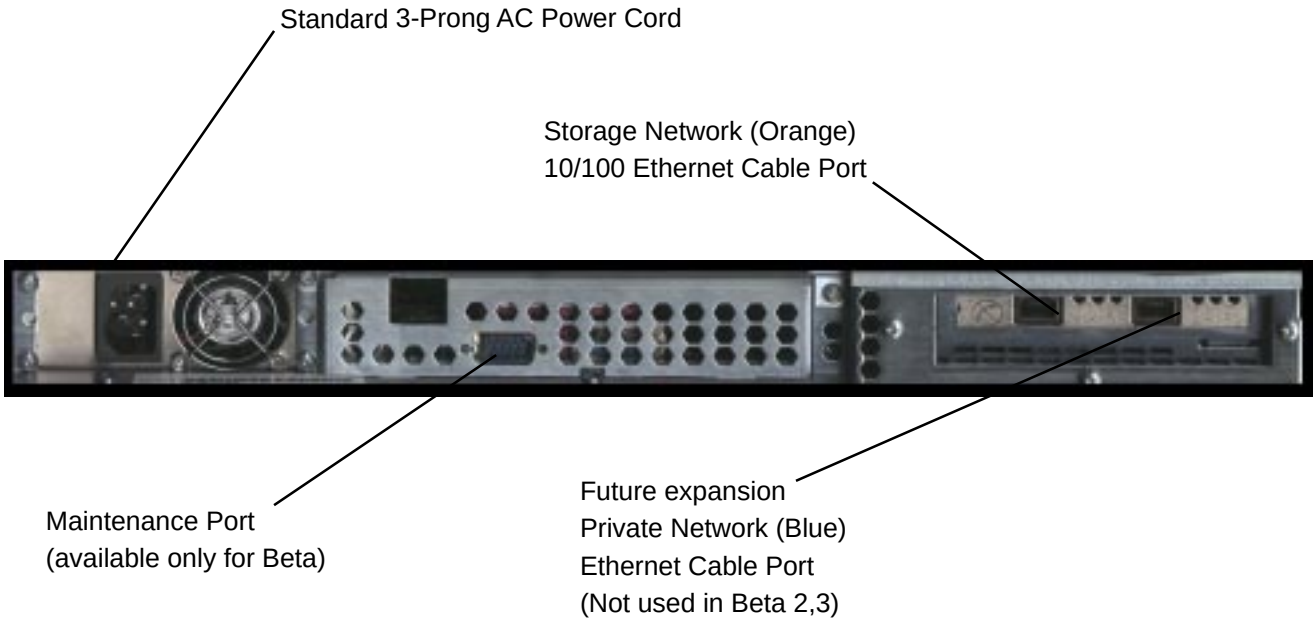
Tricord TBD Cable Connections

Tricord supples a standard, grounded, 3-Prong power cord and two 10/100 ethernet cables for each Tricord TBD.

- Connect the standard 3-Prong AC power cord as shown below.
- Connect the Storage Network (orange) ethernet cable as shown below.
- Connect the Private Network (blue) ethernet cable as shown below.

(Not available beta 2,3)



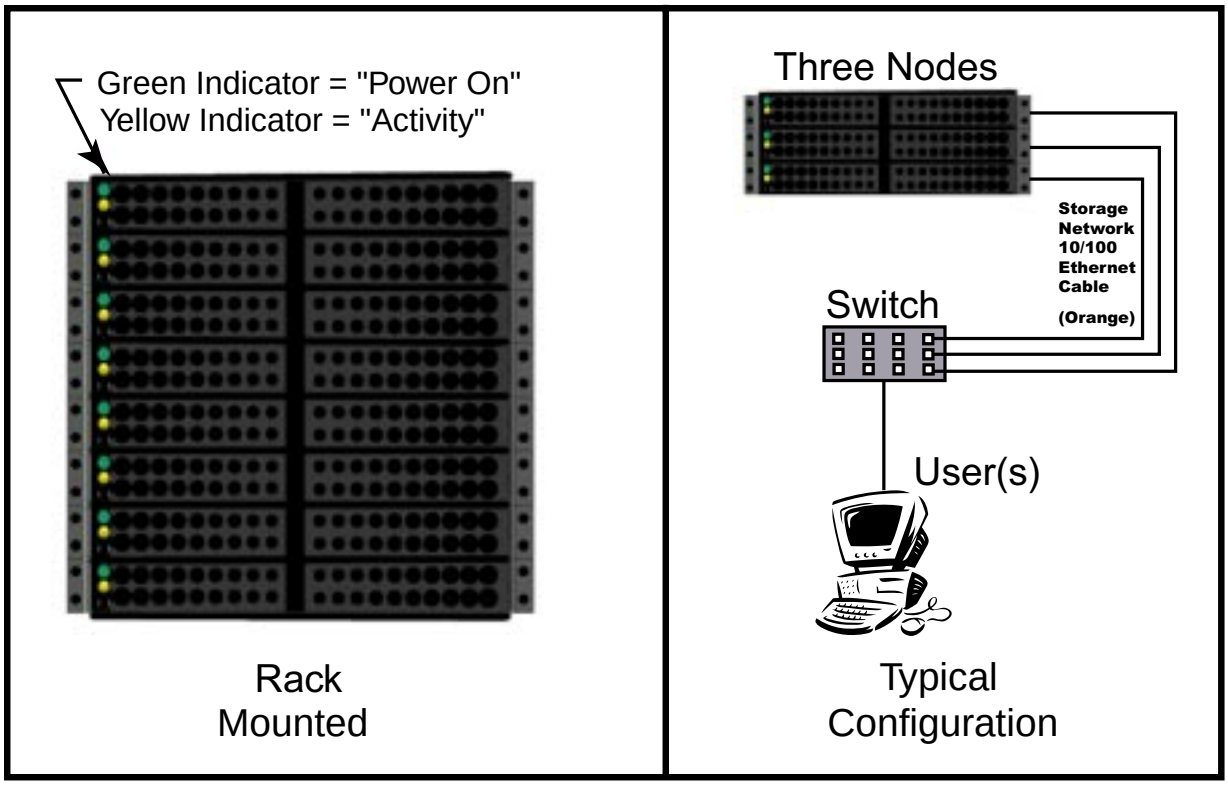


Tricord TBD Front Panel Indicators

The green light indicates that the power is “On” and the node is active.

The yellow light indicates that there is activity on the node (e.g., data transfer).

NOTE: The Tricord TBD does not have a Power On switch. The Tricord TBD powers “On” when you plug it in.



RACK MOUNTING FOR AC POWERED DEVICES

INSTALLATION:

If the chassis is installed in a closed or multi-rack assembly, the operating temperature of the rack environment may be greater than the ambient temperature. Be sure to install the chassis in an environment that is compatible with the maximum rated ambient temperature. Acceptable ambient temperature range is 5 to 40 degrees C.

When mounting the equipment in the rack make sure mechanical loading is even to avoid a hazardous condition, such as loading heavy equipment in the rack unevenly. The rack should safely support the combined weight of all equipment it supports. The Tricord TBD weighs approximately 32 pounds.

When connecting the equipment to the supply circuit be sure to check equipment name-plate ratings to avoid overloading circuits which may cause damage to over-current protection devices and supply wiring.

Be sure to maintain reliable earth ground for rack-mounting equipment. Pay particular attention to supply connections.

Installation of the TBD in a rack without sufficient air flow front to back can cause the unit to overheat.

Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, maintain a minimum of 3 inch clearance on the front and rear.

Do not attempt to service this product yourself, as opening or removing covers and/or components may expose you to dangerous high voltage points or other risks. Refer all servicing to Tricord Technical Support at 1-800-TRICORD (beta 2 clients please refer to your Tricord beta account managers)

BATTERY INSTRUCTIONS AND MARKING

The Tricord TBD is a sealed unit. If you open the Tricord TBD Chassis, you will void your warranty. If you experience any problems with the TBD, contact Tricord Technical Support at 1-800-TRICORD (beta 2 clients please refer to your Tricord beta account managers).

If you ignore this statement, open the unit and for reasons known only to you, you attempt to replace the guaranteed, lifetime lithium battery, Tricord is constrained to advise you of the following:

DANGER : If the battery is incorrectly replaced, it can explode. Replace battery with the same or equivalent as recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

What is...

Nodes, Clusters, Shares and Hot Spare Nodes

For the purpose of this manual, the following Tricord definitions apply:

A Tricord TBD node is an individual physical Tricord server appliance.

A Tricord Cluster consists of one or more Nodes aggregated together to form, and function as, a single logical server appliance (or storage pool)

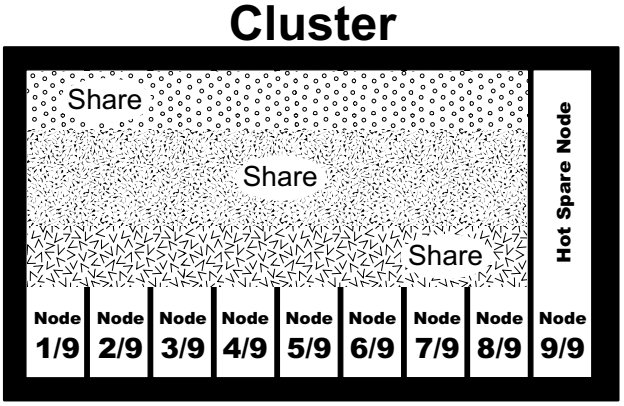
A Tricord Share is an exported folder analogous tot he network share definition in Windows environments. Tricord has simplified the creation of shares by automatically creating the underlying directory structure. The administrator can easily create one or more shares, that automatically span (and are accessible from) all nodes in the cluster, without having to manage the complexity file system share mount points.

A Hot Spare Node is a node that is dedicated to replacing, without data access interruption, any failed node in a Cluster.

The figure below displays how data is shared in a Cluster across a series of eight nodes, with the ninth node designated as the Hot Spare Node. Data is striped and parity protected across all of the nodes in a Cluster, providing “node level” fault tolerance. If a node fails, the other nodes in the Cluster will reconstruct the data contained on the failed node with no loss of data and no interruption in service. After a defined time-out period, the Hot Spare Node will begin to rebuild the failed Node’s data. When it completes, the other Nodes in the Cluster stop reconstruction the data and instead use the data from the Hot Spare Node.

Each Individual node is assigned an IP address as well as a name designation and can be assigned to a Cluster. Information that is stored across the nodes in the form of Shares in the Cluster can be easily managed. Additional nodes can be introduced at any time, expanding Cluster capacity without any interruption in service. Alternately, additional nodes can form a new Cluster or assigned as Hot Spare Nodes.

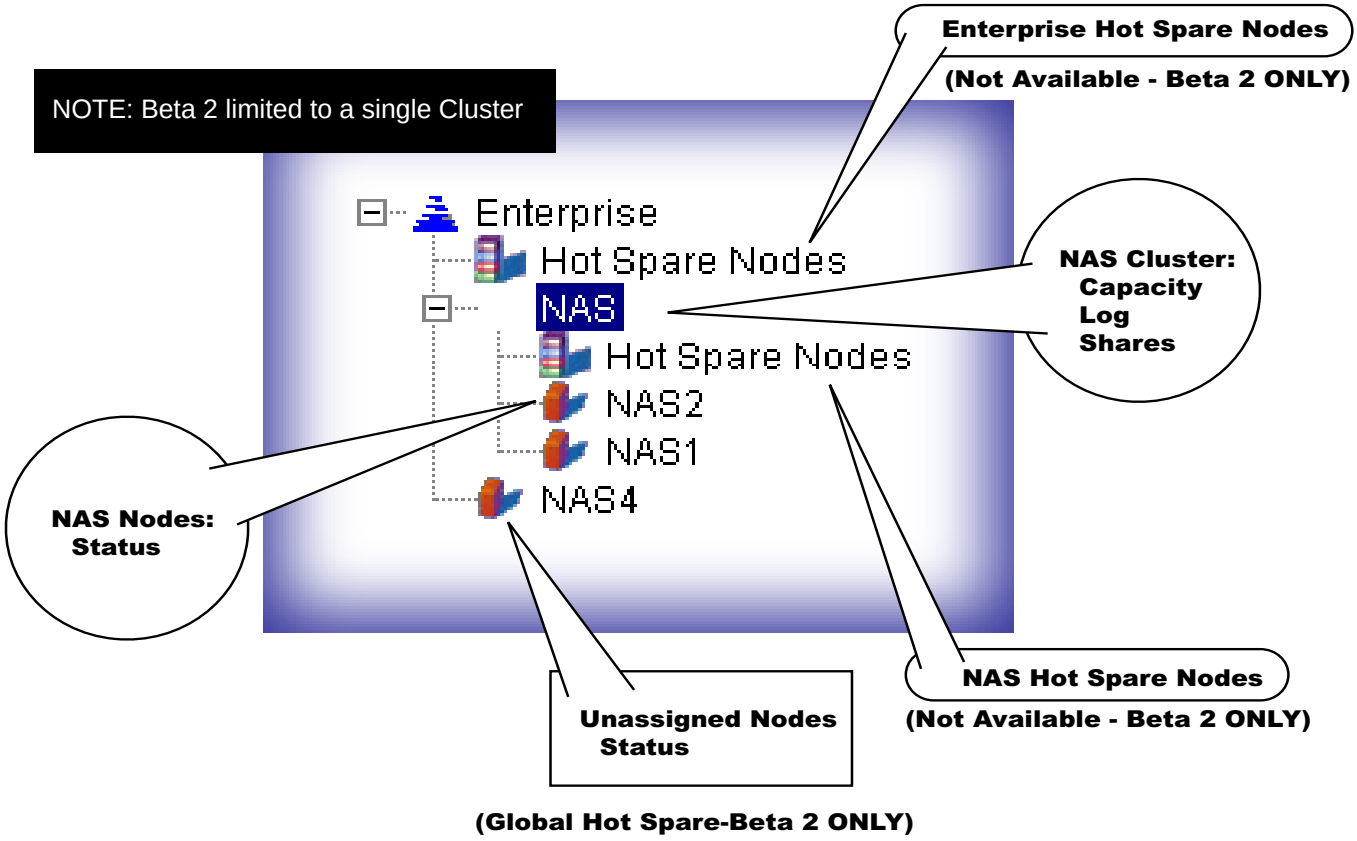
Two data security models are available. By default, all Shares are available to all network users. Or a Cluster can be configured to participate in the Windows domain security model. In this modes, lists of domain users and groups are automatically imported from the Windows network PDC, and individual or group access permissions can be assigned on a share by share basis.



The Enterprise Tree

The Enterprise Tree hierarchy is similar to Microsoft Windows Explorer®. The "Enterprise" icon is the entry point to the Storage Manager. Use the Storage Manager to create and access Clusters and Shares, set up Hot Spare Nodes and assign security. Each of the icons beneath the "Enterprise" access a specific screen or set of screens relative to storage management, as noted below:

Click on the plus signs to display the available screens within the enterprise.
Click on the "Enterprise" name or icon to access the Storage Management screen.
Click on a Cluster's name or icon (e.g., NAS) for Cluster and Share management.
Click on a Node's name or icon (e.g., NAS1) to review the nodes current status.



Note: **The factory default name for a Cluster is "NAS".**
The names that are used for the nodes in this example are NAS1, NAS2, NAS3, NAS4.
The name that you assigned to your nodes will appear on the Enterprise Tree in place of the default names.

See page 31 for the IP setup screens.
See page 39 for the Storage Manager Setup screens.
See page 47 for the Storage Manager screens (Administration and Enterprise Tree)

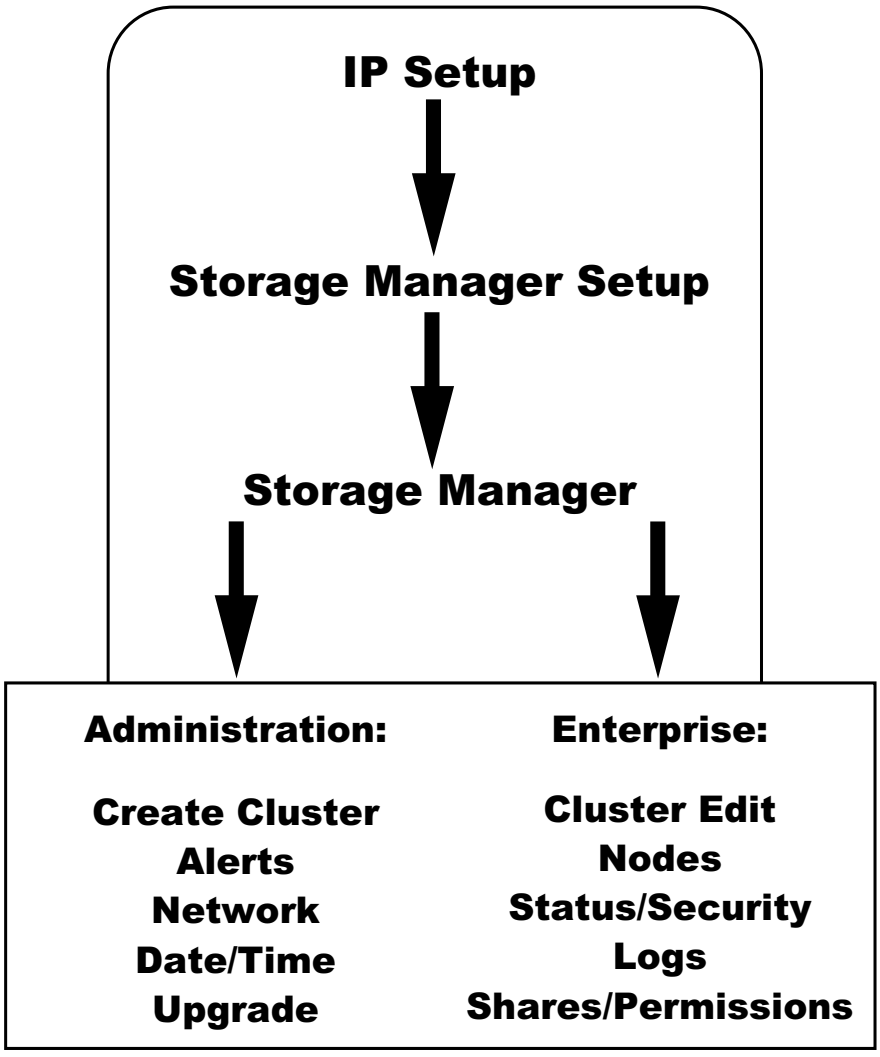
The Matrix

The Tricord TBD software matrix is designed for intuitive, quick access and easy use.

The IP Setup takes you through the initial IP Setup procedure. These screens will assist you in configuring a node or set of nodes. You will assign a name to a node and assign an IP address.

The Storage Management Setup takes you through the initial setup procedure. These screens will guide you through: Setting up an administration password; establishing an Email address for alerts; attaching your Tricord TBD to your network and entering the date and time.

The Storage Manager screens are divided into two sections; Administration and Enterprise Tree. The Administration section guides you through the set up procedures that apply globally to all of your nodes (global properties), such as alerts, network, date, time and upgrades. The Enterprise Tree section describes how to create and access Clusters and Shares, set up Hot Spare Nodes and assign security.



Tricord Software Worksheet

Tricord Software Worksheet

The IP Setup, the Storage Manager Setup and the Storage Manager sections of this manual will walk you smoothly through configuring a node or set of nodes, naming a node, assigning an IP address, setting up an administration password, setting up an email address for alerts, attaching your Tricord TBD to your network, creating Clusters and Shares, assigning access to the Shares on a Cluster to your users, setting security, upgrading your existing Tricord TBD system (not beta 2) and setting date/time stamp for logs.

You will need to record the following information BEFORE you run the Tricord TBD software.

Record Node Serial Number	*IP Address Main Network	*IP Address Back Channel	Node Name (abitrary)
*Administration Password			
*Email Address for Alerts			
*Mail Sever Address			
*DNS/Wins IP Address			
*Subnet number			
*Gateway number			
* indicates information that is supplied by the network administrator.			

IP Setup

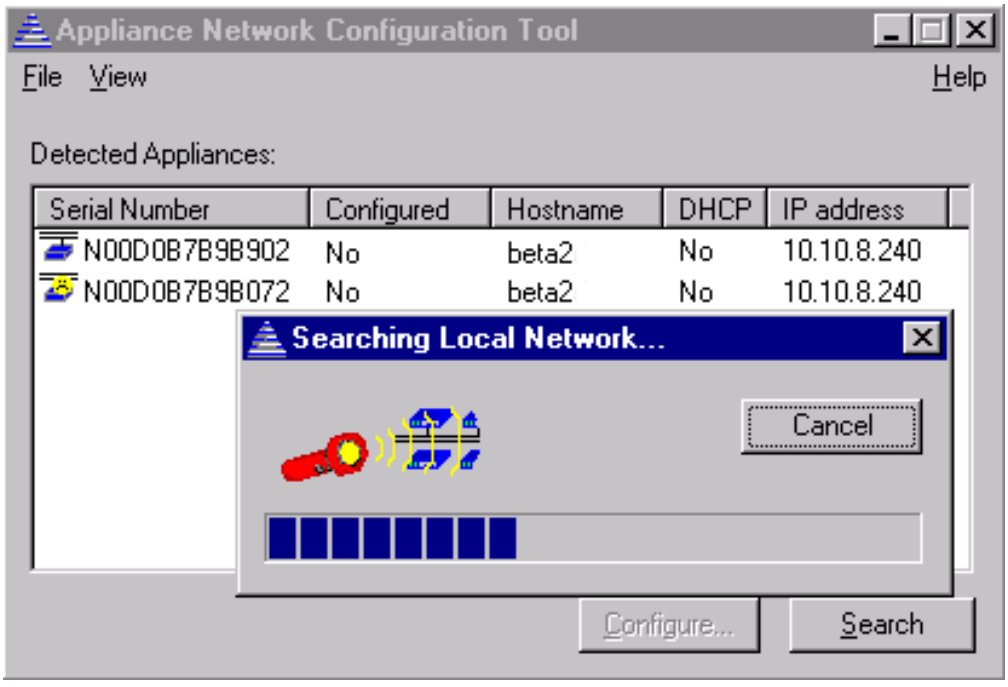
Tricord TBD One Time IP Setup

The IP Setup takes you through the initial IP Setup procedure. These screens will assist you in configuring a node or set of nodes. You will assign a name to a node and assign an IP address.

NOTE: BEFORE you run the IP Setup CD-Rom, take a minute to fill out the work sheet on page 27. You will need that information.

- Connect your computer and the Nodes to the same LAN.
- Apply AC power to the Tricord TBD nodes.
  (Beta 2 only apply power to nodes in initial Cluster)
- Wait 30 seconds.
- Run the IP Setup CD-Rom.

The Appliance Network Configuration dialog box will launch and automatically search your local network for new nodes which have not been configured . As you configure the nodes, they will appear with a “Yes” in the “Configured” column.
Note: In beta 2, you can not re-configure a node without resetting all of the nodes to factory default.



HINT: If the “Search local Network” has found all of the connected nodes, you may click on the “Cancel” button to discontinue any further searching. You will know if all of the connected nodes have been found when the nodes appear in the “Appliance Network Configuration” box.

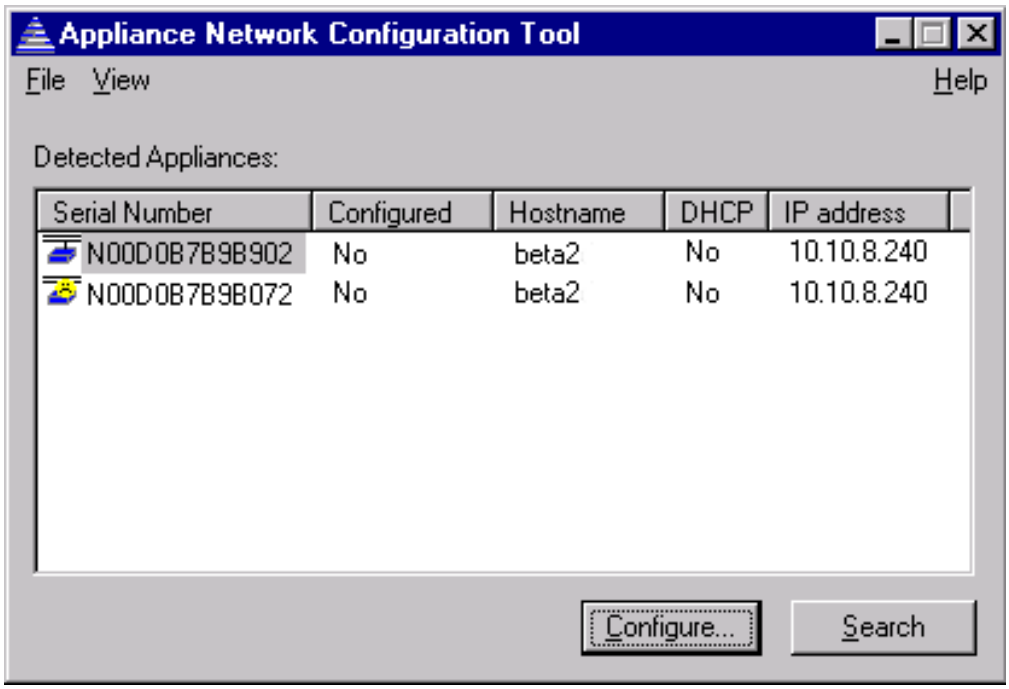
Tricord TBD One Time IP Setup (continued...)

The new, unassigned node(s) will appear in the “Detected Appliances” window.

The following information is available on each node:

- The factory assigned Serial Number.
- Has it been configured (Y/N).
- The Host Name (default name shown).
- Is the IP Address assigned by the DHCP (Domain Host Configuration Protocol) (Y/N)
- The IP Address (default shown).

If you have more nodes attached than what is displayed in the “Detected Appliances” window, then check all of your connections and make sure all of the nodes are getting power. If everything is kosher and the “Detected Appliances” window still fails to display a node, call tech support. If everything is not kosher, then make it so and click on the “search” button.



All new nodes must be configured before becoming a part of a Cluster.

To configure a new node:

- Click on the node’s Serial Number to highlight it.
- Click on the “Configure” button.

Tricord TBD One Time IP Setup (continued...)

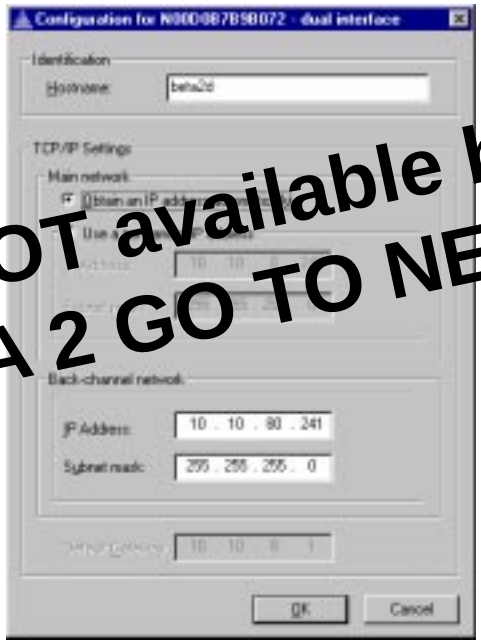
The “Configuration/Dual Interface” dialog box for the node that you have chosen will launch. Use this dialog box to set the identification and to chose the TCP/ IP setting for the node. If you have more than one node, configure each node individually.

To Assign the IP Address Automatically Using the DHCP (Dynamic IP):

- In the “Host Name” box, Type the name that you want to assign to the node.
- Click on “Obtain an IP Address Automatically”.
  The DHCP will act to assign the IP Address, as well as find the Subnet and Gateway. These area will be grayed out and the information is transparent.
- Go to the back channel section and type the unique back channel IP Address in the “Ip Address” box.
- Go to the back channel section and type the unique back channel subnet mask in the “Subnet Masks” box.

  If a back channel is not installed, the back channel portion of the dialog box will not appear.
  If you have a back channel, however it is not connected, use the default back channel settings.
  If you have a back channel connected, enter a unique Ip address and Subnet Mask.
  If you do not enter a unique IP Address, the “Parameter Conflict Warning” dialog box will appear.
  To avoid an IP Address conflict, click on “No” and reenter a unique IP Address.

- Click on “OK” to accept your settings and return to the Appliance Network Configuration dialog box.



NOT available beta 2
BETA 2 GO TO NEXT PAGE

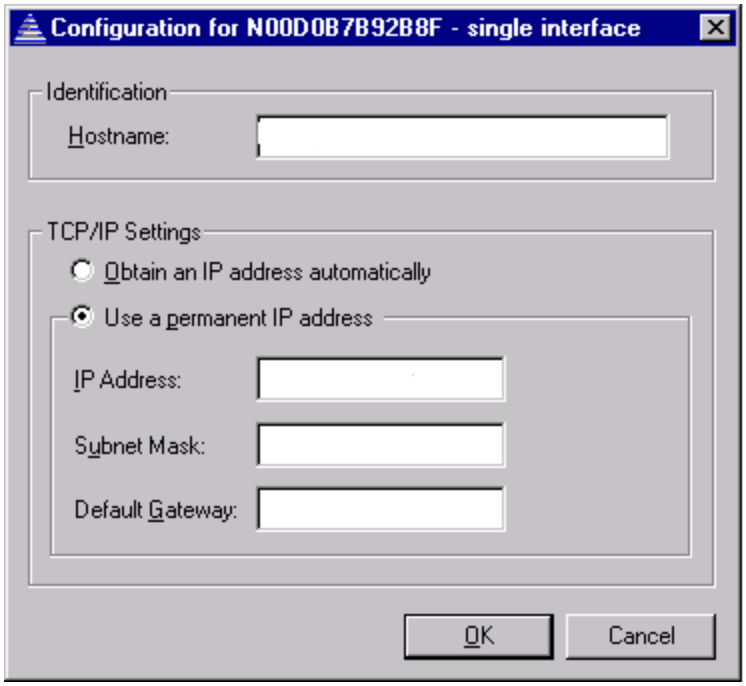
Tricord TBD One Time IP Setup

To Assign the IP Address Manually (Static IP):

- In the “Host Name” box, Type the name that you want to assign to the node.
- Click on “Use a Permanent IP Address”.
- In the “IP Address” box, type the IP Address.
- In the “Subnet Mask” box, type the subnet mask.
- In the “default gateway” box, type the default gateway.

Hint: **You only need to enter the default gateway once. The Tricord TBD will remember it and automatically enter it for you during additional node configurations.**

- Click on “OK” to accept your settings and return to the Appliance Network Configuration dialog box.



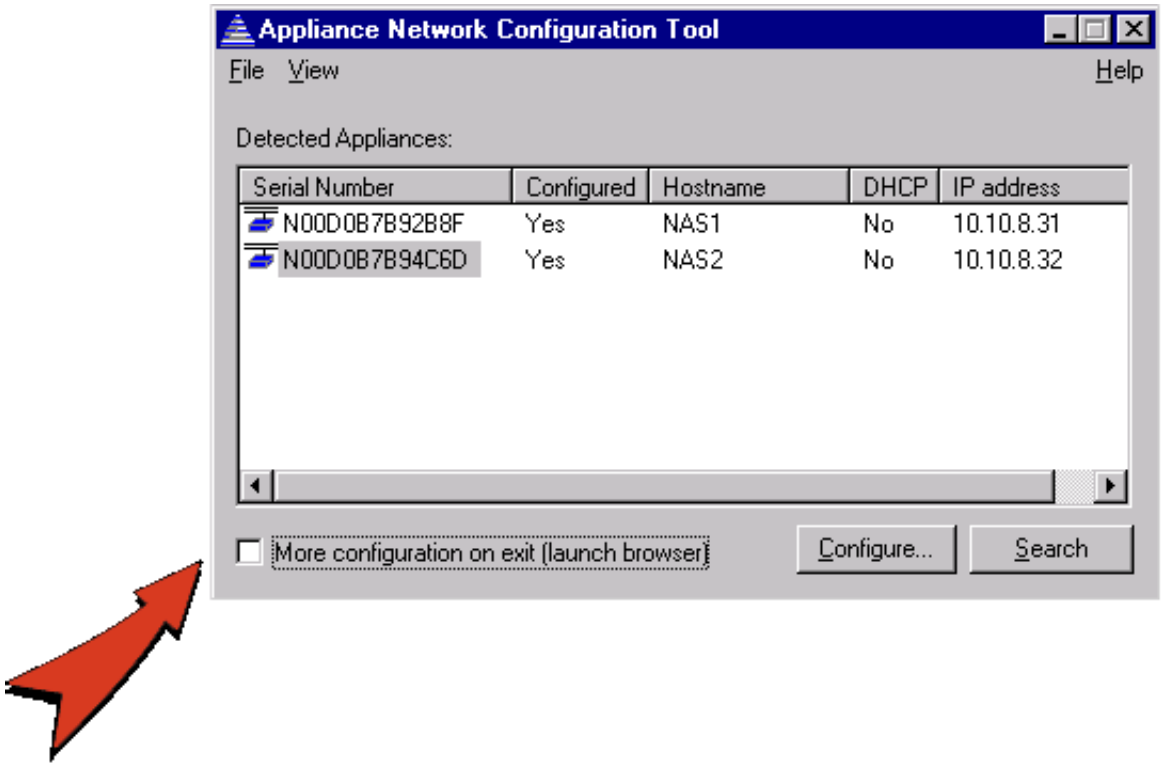
Tricord TBD One Time IP Setup (continued...)

Continue to configure your nodes by choosing the node and clicking on the “Configure button.”

When you have configured all of your nodes, you are ready to exit the IP Setup and continue with the Storage manager set up.

To Exit the IP Setup:

- Choose “More configuration on exit (launch browser)” to launch the Storage Manager Setup when you exit the IP Setup.
- Choose File/Exit from the pull down menu or click on the “X” box to exit the IP Set Up.



The Storage Manager Setup will launch on your browser. The Storage Manager Setup will step you through the procedure to establish Clusters, Shares, alerts, upgrades and security protocols.

Storage Manager Setup

Tricord TBD Storage Manager Setup

The Storage Management Setup takes you through the initial setup procedure. These screens will guide you through:

Setting up an administration password.
Establishing an email address for alerts.
Attaching your Tricord TBD to your network.
Entering the date and time.

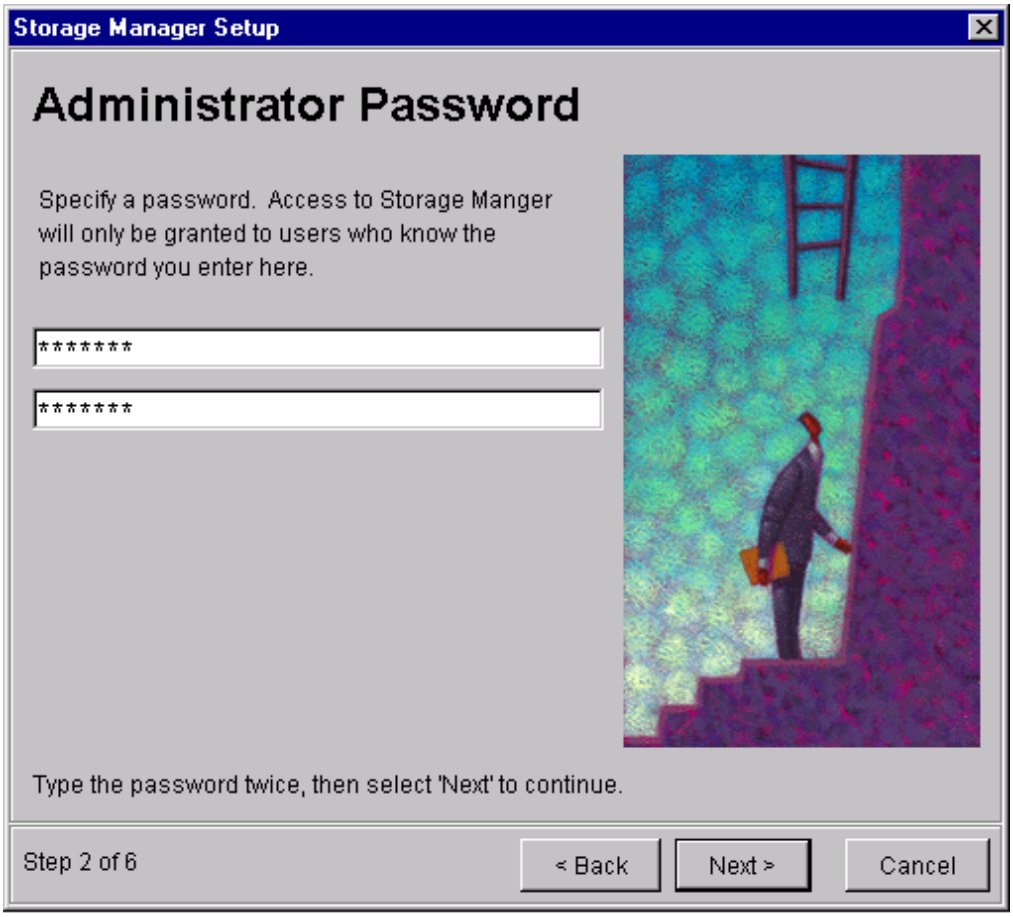
NOTE: You will need the information that you recorded in the work sheet (page 27) BEFORE you run the Storage Manager Setup.

Tricord TBD Storage Manager Setup (continued...)

Type your password in the first box

Tab to the second box and type in the same password again.

Keep a record of your password. The administration of your Tricord TBD can only be accessed with your password.



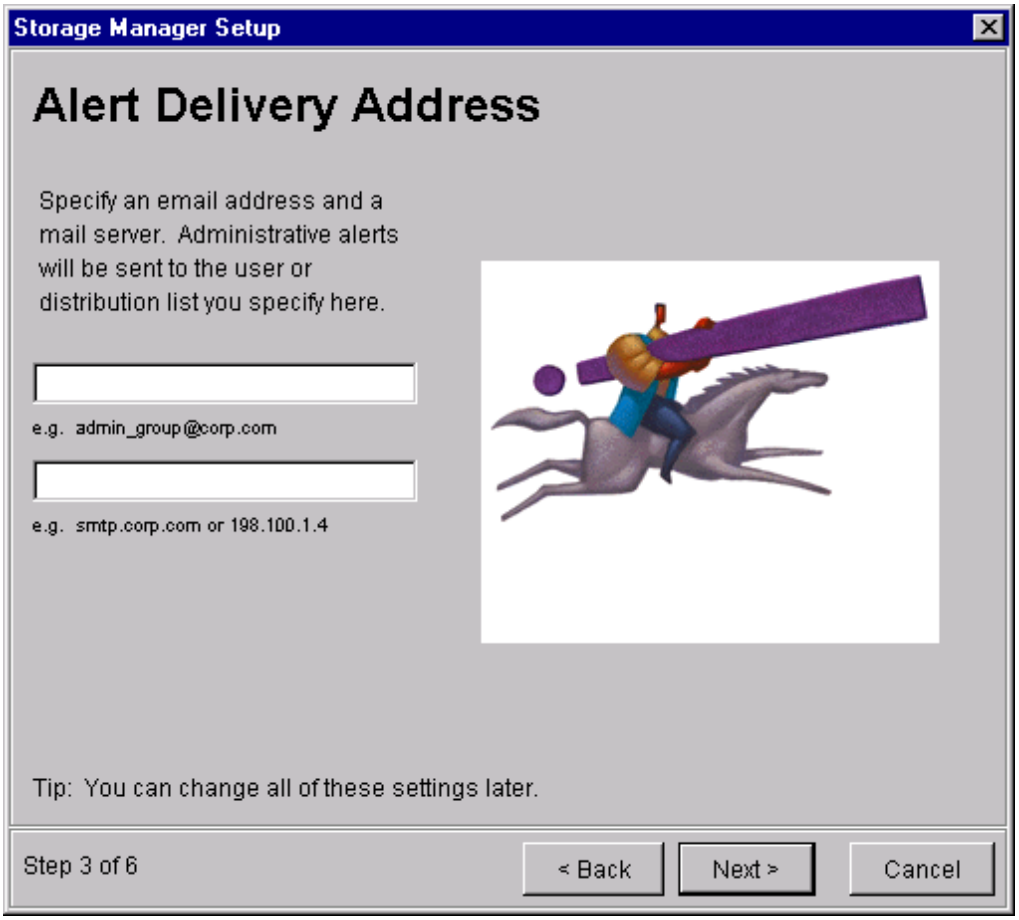
- Click on “Next” to continue.
- Click on “Back” to backup one screen.
- Click on “Cancel” to discontinue and leave the Storage Management Setup.

Tricord TBD Storage Manager Setup (continued...)

Type an email address (e.g., admin_group@corp.com) in the first box.

Tab to the second box and type in either the name or IP address of the mail server in the second box (smtp.corp.com or 198.100.1.4).

This information can be changed, as needed, at a future date.

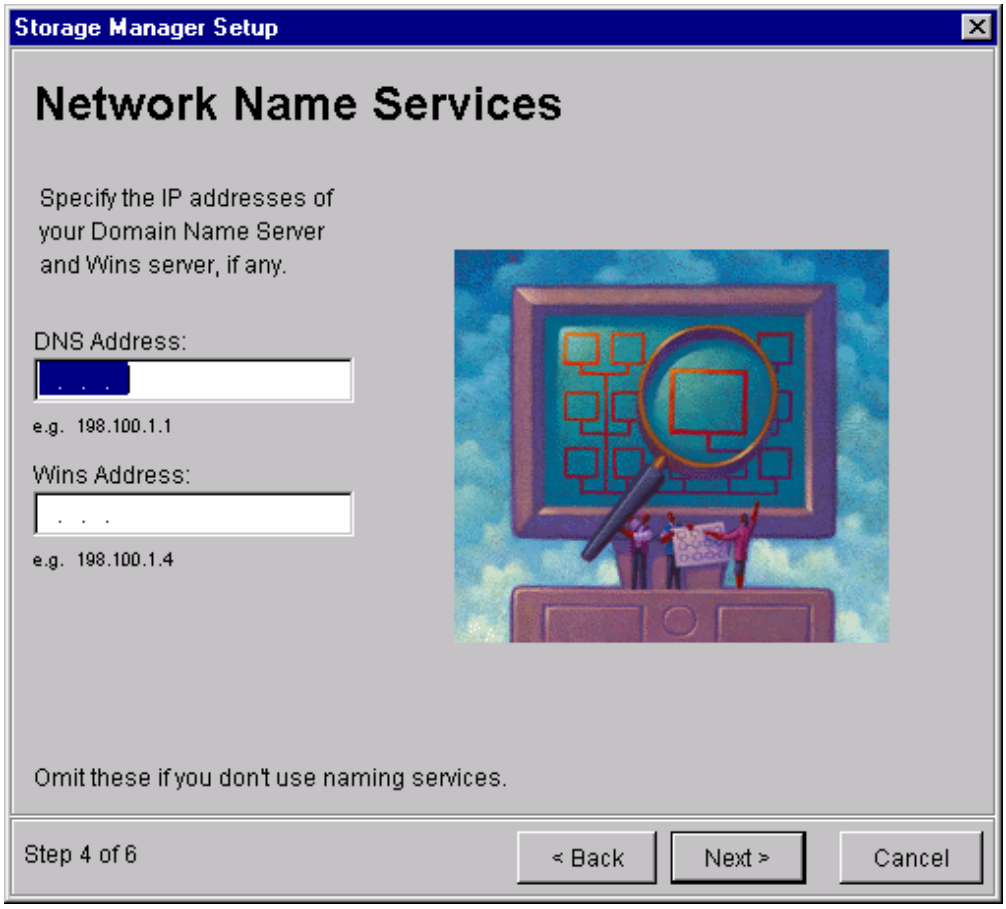


- Click on “Next” to continue.
- Click on “Back” to backup one screen.
- Click on “Cancel” to discontinue and leave the Storage Management Setup.

BETA 2 NOTE: This feature will not be available to edit in the “Storage Manager” screens during beta 2. Exercise care when you fill in this information, as you will not be able to change it once you have accepted these changes.

Tricord TBD Storage Manager Setup (continued...)

Type the IP Address of your DNS (Domain Name Server) in the first box. Tab to the second box and if you have a Wins server, type that address. If you do not use these services, leave these boxes blank.



- Click on “Next” to continue.
- Click on “Back” to backup one screen.
- Click on “Cancel” to discontinue and leave the Storage Management Setup.

Tricord TBD Storage Manager Setup (continued...)

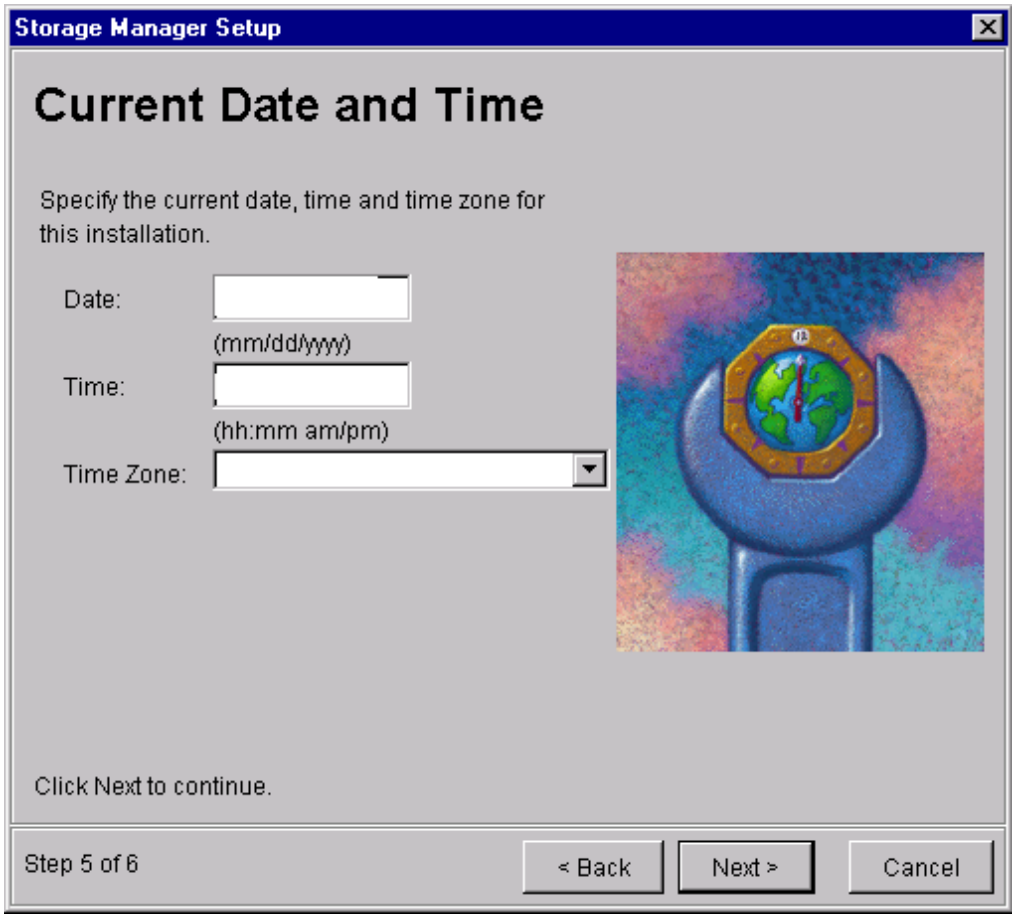
The current time and date will be available to the Storage Management logs if you enter the current information in this screen.

Type the month, day, year in the "Date" box (mm/dd/yyyy) in the first box

Type the hour, minutes, AM or PM in the "Time" box (hh:mm/am or pm).

Use the pull down menu in the "Time Zone" box to select your time zone.

HINT: **If you do not want to use the date/time stamp, you can leave these boxes blank and continue, however Tricord recommends that you use this feature.**



- Click on "Next" to continue.
- Click on "Back" to backup one screen.
- Click on "Cancel" to discontinue and leave the Storage Management Setup.

Tricord TBD Storage Manager Setup

You have completed the Storage Manager Setup. As noted below, you can
Cancel these settings.
Back up and redo your settings.
Save these settings and launch the storage manager screens.

X **NOTE: The global parameters specified in the Storage Manager Setup will be propagated to all nodes on the Enterprise.**

Humble suggestion/NOTE: The settings that you have specified in the "Storage Manager Setup" will be applied globally to all of the Nodes.

- Click on "Finish" to save your settings.
  The "Storage Manager" screen will launch automatically.
- Click on "Back" to backup one screen.
- Click on "Cancel" to discontinue the Storage Management Setup.
  Your settings will not be saved.

Storage Manager

Administration and Enterprise Tree

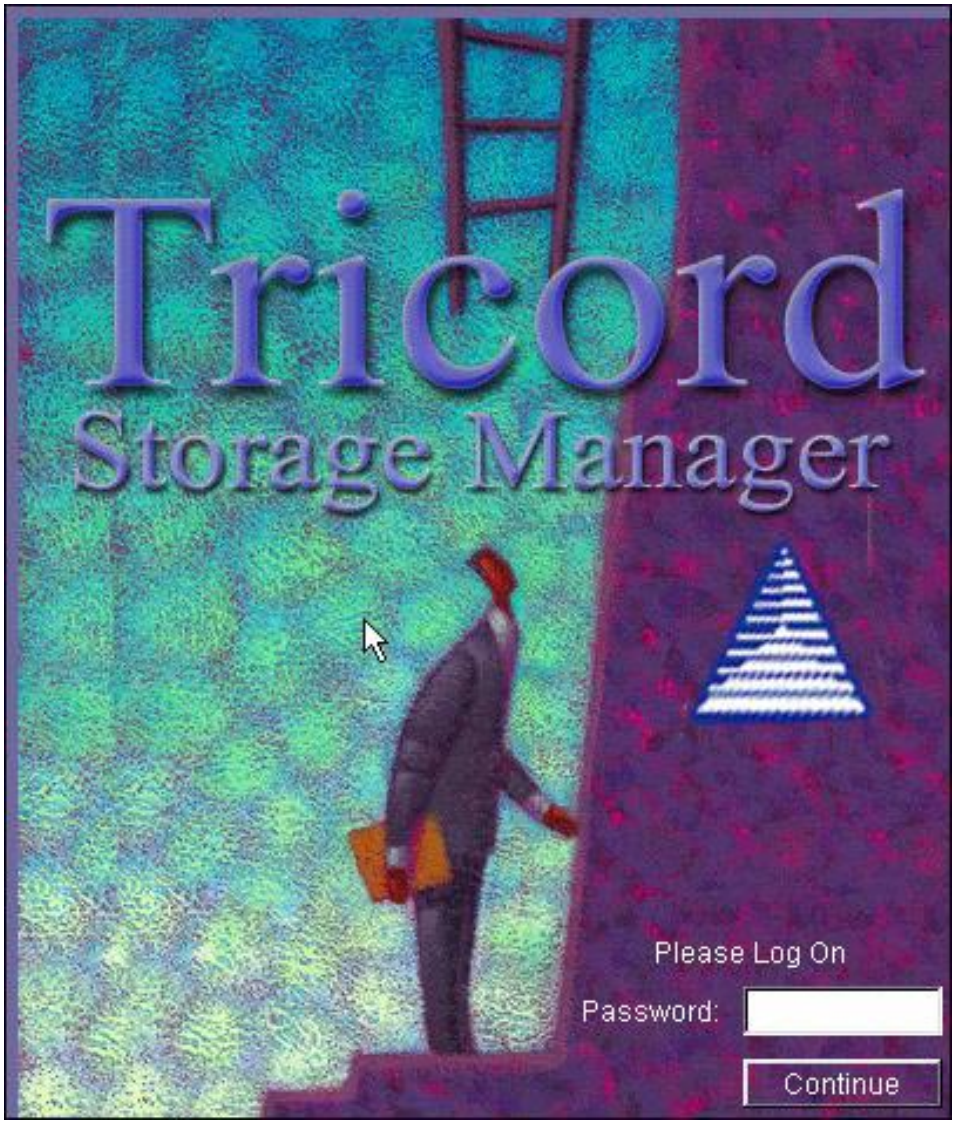
Tricord TBD Storage Manager

The Tricord Storage Manager screens are divided into two sections; Administration and Enterprise Tree.

The Administration section guides you through the set up procedures that apply globally to all of your nodes (global properties), such as alerts, network, date, time and upgrades.

The Enterprise Tree section describes how to create and access Clusters and Shares, set up Hot Spare Nodes and assign security.

- Enter your administrator password and click on “Continue”. Your administrator password is the password that you entered in the Storage Manager Setup.



Hint: **See page 21 for a description of Nodes, Clusters, Shares and Hot Spare Nodes**
See page 22 for a description of the Enterprise Tree.

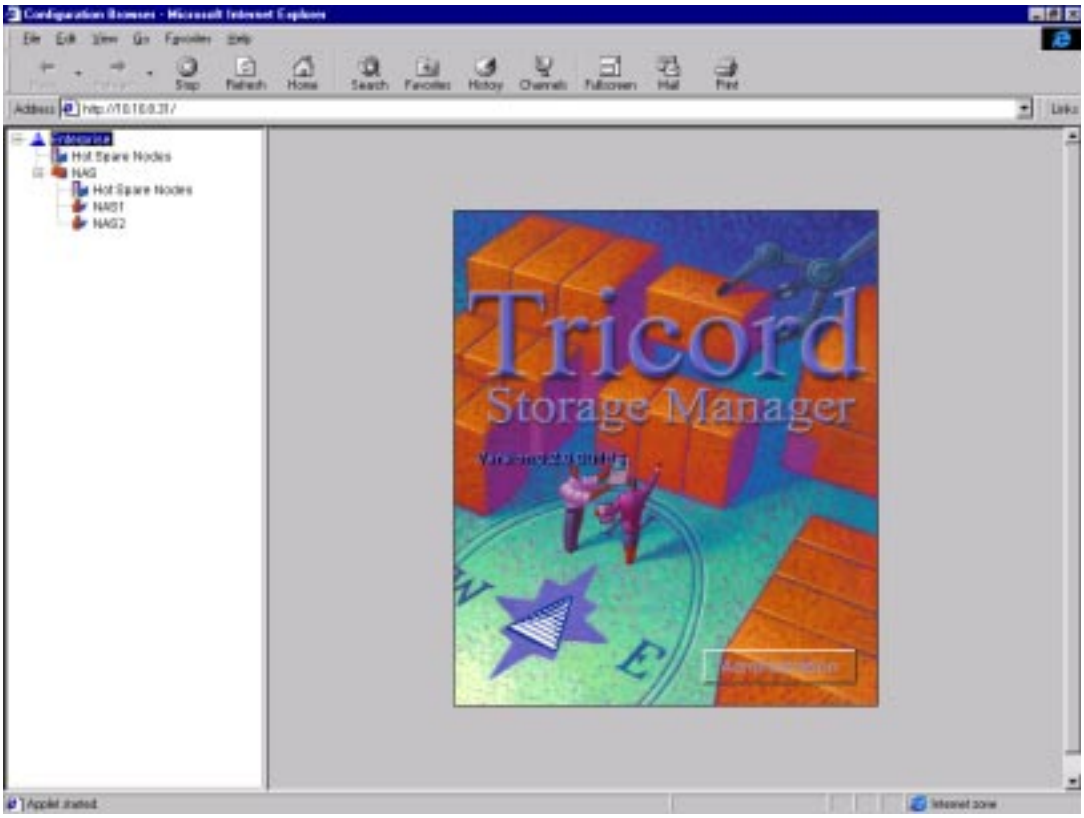
Tricord TBD Storage Manager

The Tricord Storage Manager screens are divided into two sections; Administration and Enterprise Tree.

This section of the manual describes the Administration screens.

The administration screens guide you through the set up procedures that apply globally to all of your nodes (global properties), such as alerts, network, date time and upgrades.

Hint: **See page 21 for a description of Nodes, Clusters, Shares and Hot Spare Nodes.**



Note: **The factory default name for a Cluster is "NAS".**
The names that are used for the nodes in this example are NAS 1, NAS2.
The name that you assigned to your nodes will appear on the Enterprise Tree in place of the default names. It may take a minute or two for the tree to update after you have added new nodes.

Tricord TBD Storage Manager (continued...)

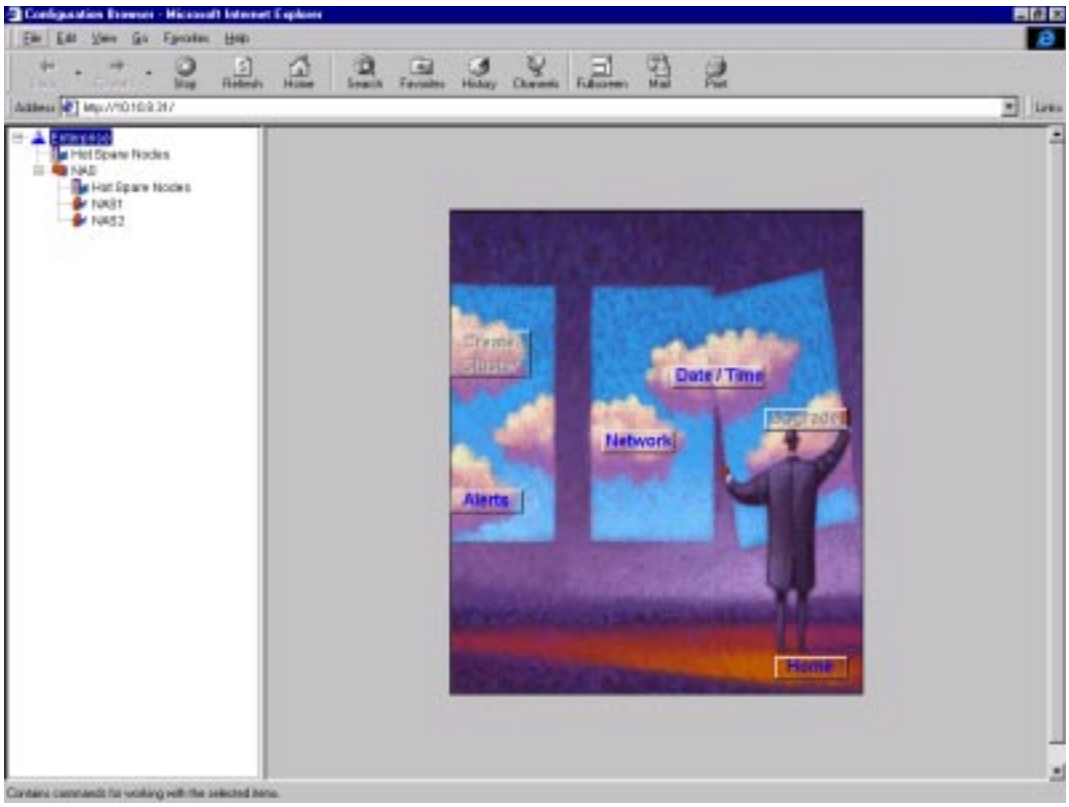
If you clicked on the Administration button in the Tricord Storage Manager screen, the xxxxx screen appeared.

The administration section takes you through the set up procedures that apply globally to all of your nodes (global properties). These procedures are:

Create a Cluster (not available beta 2)
Alerts Setup
Network Setup
Date/Time setup
Upgrades Setup (not available beta 2)

You may have already completed the alerts, network and date/time set up in the “Storage Manager Setup”. You can use this section to make changes. The administration section also guides you through the procedure to create a Cluster (or Clusters) as well as the procedure for upgrading your Tricord TBD.

Hint: **See page 21 for a description of Nodes, Clusters, Shares and Hot Spare Nodes.**



Note: Muted buttons indicate functions that are not available in Beta 2.

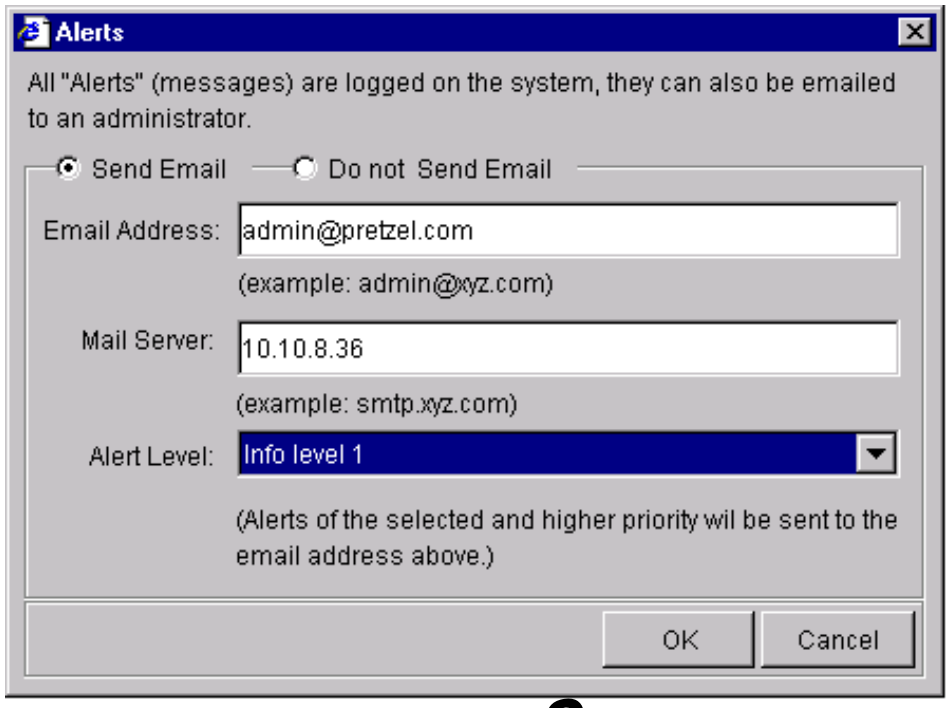
Tricord TBD Storage Manager (continued...)

Administration/Create Cluster.

Use the Create a Cluster screen.....

NOT AVAILABLE IN BETA 2

THIS screen will belongs on page 49



NOT available beta 2
BETA 2 GO TO NEXT PAGE

Tricord TBD Storage Manager (continued...)

Administration/Alerts.

Use the Alerts screen if you did not set up alerts in the Storage Manager Setup or if you want to change the current settings or add an alert level.

Choose “Send Email if the designated email address is to receive an email alert.
Choose “Do not Send Email” if the designated email address is NOT to receive an email alert.

Type an email address (e.g., admin_group@corp.com) in the “email address” box.

Tab to the “Mail Server” box and type in either the name or IP address of the mail server (smtp.corp.com or 198.100.1.4).

Tab to the “Alert Level” and use the pull down menu to pick your alert priority level. The email recipient will receive alerts at or above the level indicated in “Alert Level”.
In decreasing level of severity, Alerts Levels are:

Error	=	Critical- may or may not be operational. Immediate administrative action suggested. Errors only will generate Email.
Warning	=	Problems but still operational. Administrative action suggested at earliest convenience. Errors and warnings will generate Email.
Info level 2	=	Less detailed information. Important advisory information. Errors and warning and Info Level 2 will generate Email.
Info Level 1	=	Most detailed information. Most inclusive. Errors and warnings and Info Level 1 and 2 will generate Email.

Humble Suggestion/
In decreasing severity, the alert levels are:

Error	=	There is a critical error which may or may not render the Node(s) inoperable. Immediate administration is required. If you choose this classification then only the “Error” alert will generate Email.
Warning	=	There are problems but of the Node(s) are still operational. Administration is suggested at your earliest convenience. If you choose this classification then both the “Error” and the “Warnings” alerts will generate Email.
Info level 2	=	General, advisory information. If you choose this classification then the “Error”, the “Warnings” and the “Level 1” alerts will generate Email.
Info Level 1	=	Specific, detailed information. If you choose this classification, then Email is generated by all of the alert levels: “Errors”, “Warnings”; “Level 1” and “Level 2”

- Click on “OK” to save your settings and continue.
- Click on "Cancel" to cancel your settings and return to the “xxxx” screen.

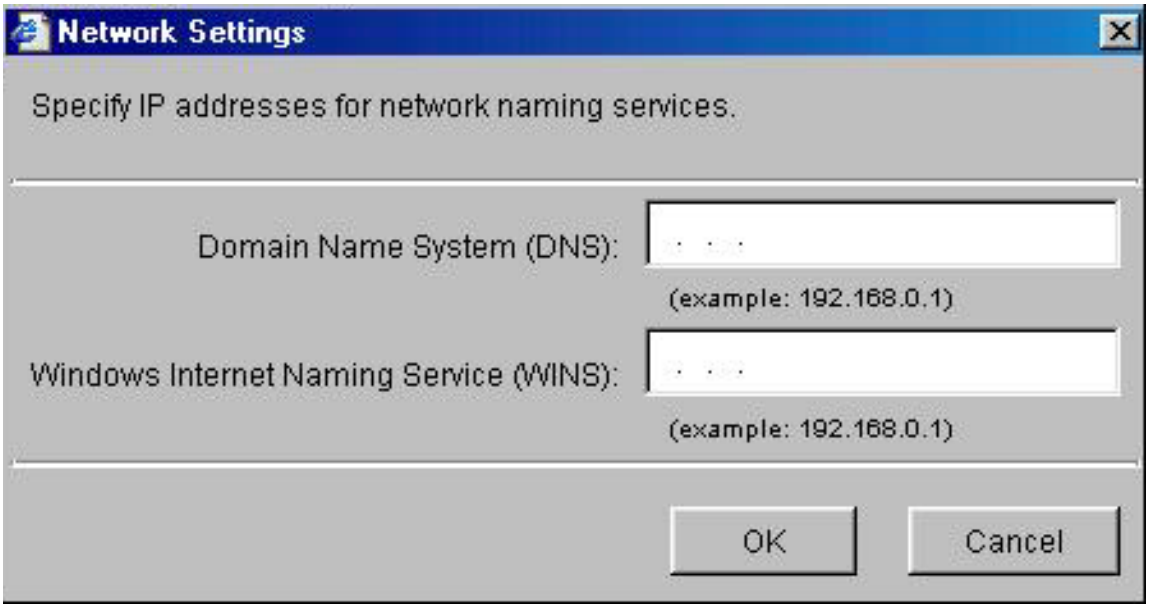
Tricord TBD Storage Manager (continued...)

Administration/Network. Use the network screen if you did not set up DNS (Domain Name Server) or WINS (Windows Internet Naming Service) in the Setup Wizard or if you want to change the current settings.

Type the IP Address of your DNS in the “Domain Name System (DNS)” box.

Tab to the “Windows Internet Naming Service (WINS)” box and type in your WINS server address.

HINT: If you do not use these services, leave these boxes blank and continue.



- Click on “OK” to save your settings and continue.
- Click on "Cancel" to cancel your settings and return to the “xxxxx” screen

Tricord TBD Storage Manager (continued...)

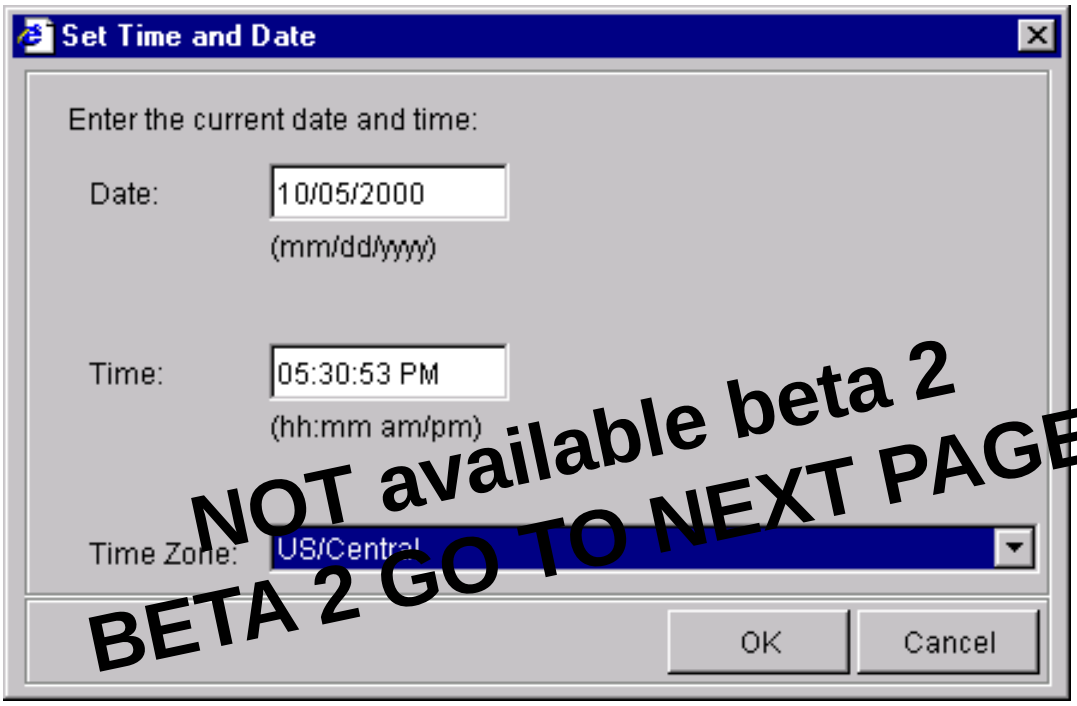
Administration/Time/Date. Use the Time/Date screen make the current time, date and time zone available to the Storage Management logs.

Type the month, day, year in the "Date" box (mm/dd/yy).

Type the hour, minutes, AM or PM in the "Time" box (hh:mm/AM or PM).

Use the pull down menu in the "Time Zone" box to select your time zone.

HINT: **If you do not want to use the date/time stamp, you can leave these boxes blank and continue, however Tricord recommends that you use this feature.**



- Click on "OK" to save your settings and continue.
- Click on "Cancel" to cancel your settings and return to the "xxxx" screen

Tricord TBD Storage Manager (continued...)

The upgrade screen is not available in beta 2

Administration/Upgrade. Use the Upgrade screen to xxxxxxxxxxxxx

Type the xxxxxx in the "xxxxx" box.

Type the xxxxxxxxxin the "Time" box.

Use the pull down menu in the "xxxxxxxx"box to select your xxxxxxxx,

HINT: If you do not want to upgrade, leave these boxes blank and continue with the Enterprise Tree screens.

NOT available beta 2
BETA 2 GO TO NEXT PAGE

Tricord TBD Storage Manager (continued...)

The Tricord Storage Manager screens are divided into two sections; administration and Enterprise Tree.

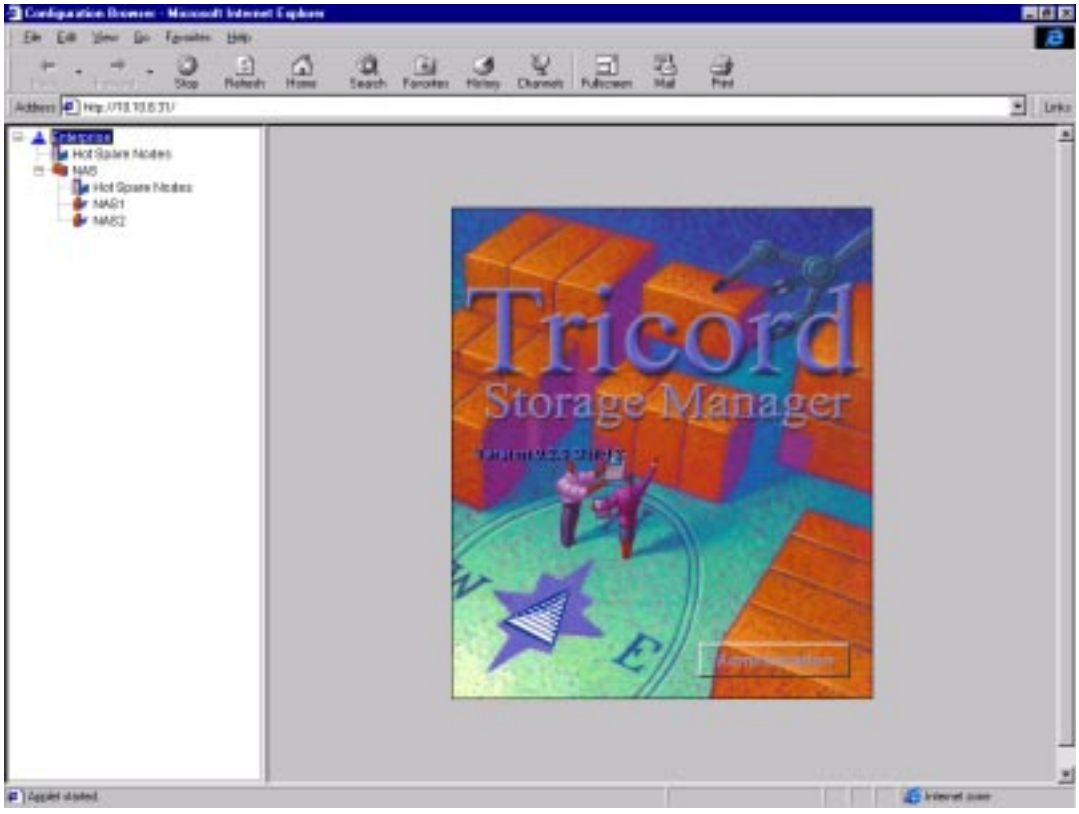
This section of the manual guides you through the Enterprise Tree screens.

Use the Enterprise Tree to access the screen hierarchy for:

Cluster Administration
Hot Spare Nodes
Access to individual nodes and their status.

Begin your Cluster administration by clicking on the cluster named "NAS" on the Enterprise Tree

Hint: **See page 21 for a description of Nodes, Clusters, Shares and Hot Spare Nodes**
See page 22 for a description of the Enterprise Tree.



Note: **The factory default name for a Cluster is "NAS".**
The names that are used for the nodes in this example are NAS1, NAS2.
The name that you assigned to your nodes will appear on the Enterprise Tree in place of the default names. It may take a minute or two for the tree to update after you have added new nodes.

Tricord TBD Storage Manager (continued...)

NAS/Capacity.

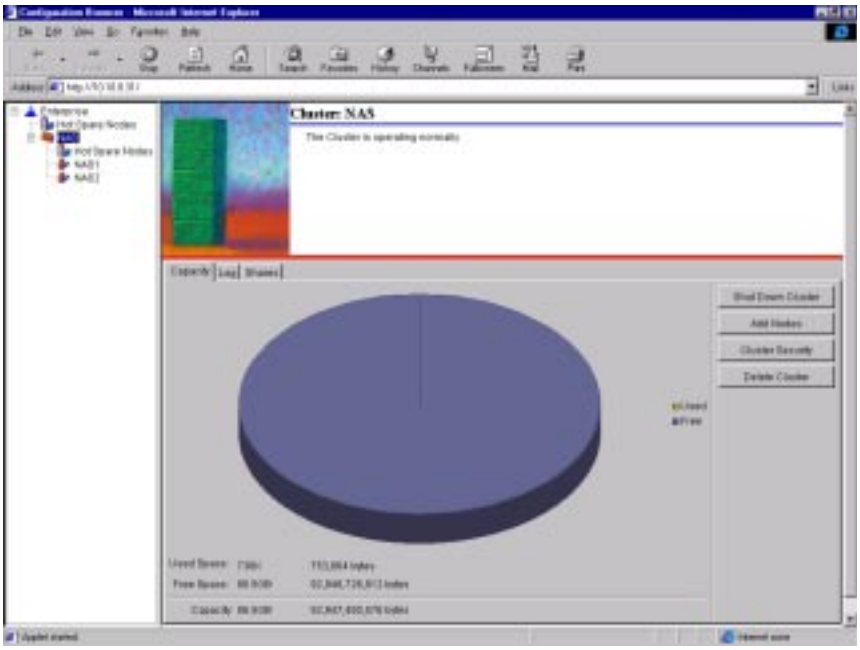
Click on “NAS” on the Enterprise Tree to access the screen for the Cluster administration.

The “Cluster:NAS” capacity screen appears by default and displays:

The current operating status of the Cluster.
The space that the Cluster is using.
The amount of free space that is still available to the Cluster.
The Cluster’s total net usable capacity.

X **NOTE: The free space and Capacity are both expressed in terms of “net usable” not raw physical space. That is, appropriate adjustments have been factored in to account for RAID parity data and other file system formatting overhead.**

Humble suggestion/NOTE: The “Free Space” and the “Capacity” refer to the “net usable” space rather than the gross storage space. RAID parity data and other file system formatting require a portion of the gross storage space.



- Click on the “Log” tab to view a log of events relative to this Cluster (page 56)
- Click on the “Shares” tab to manage the Shares on the Cluster (page 57).

- Click on the “Shut Down Clusters” button to power down this Cluster (**Not available beta 2**)
- Click on the “Add Nodes” button to add unassigned nodes to this Cluster (page 62).
- Click on the “Cluster Security” button to assign security protocols to this Cluster (page 57).
- Click on the “Delete Cluster” button to erase all data from the Cluster reset the node (page 61).

(Not available beta 2).

HINT: If you have not set up the security protocols for your Cluster then do that first by clicking on the “Cluster Security” button.

NAS/Capacity/Cluster Security.

To access NAS Security:

Click on “NAS” on the Enterprise Tree,
Click on the “Capacity” tab.
Click on the “Cluster Security” button.

The default setting for the “Set Primary Domain Control” dialog box is “Unrestricted.” If you are not setting security restrictions then leave this dialog in the default setting of ”Unrestricted”.

If you are using the “Restricted” setting and running in a NT environment with a PDC:

Click on the “Restricted” radial button.

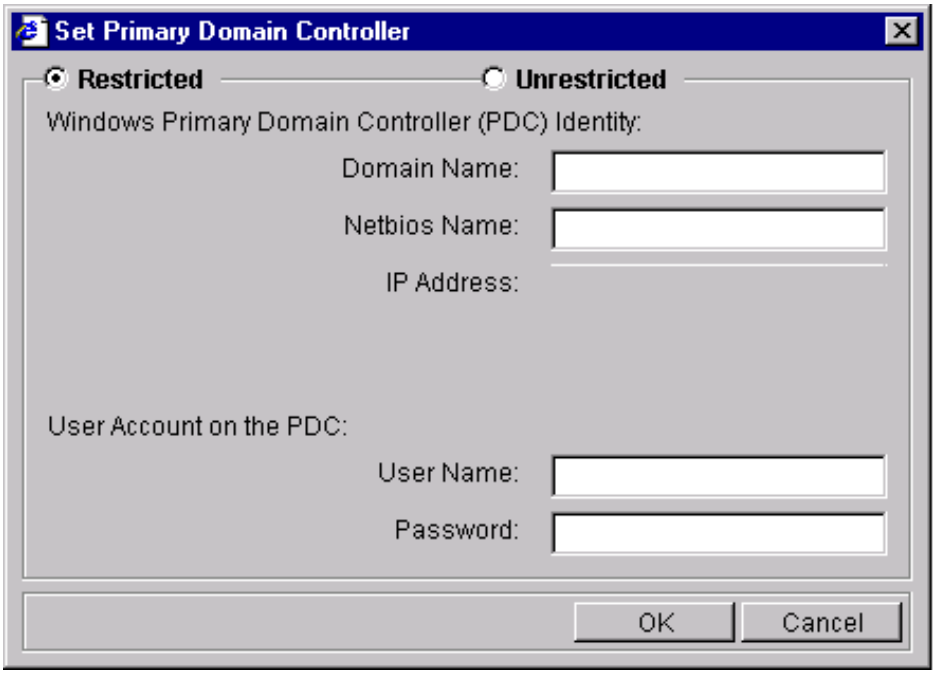
Enter the name of the domain in the “Domain Name” box.

Enter the Netbios name of the PDC in the “Netbios” box.

Enter the IP address of the PDC in the “IP Address” box.

Enter the name and password of any user in the “”Password” boxes.

HINT: **The user name that you use is arbitrary, as the Tricord TBD will use this information to establish a link to the PDC and then automatically download all of the user/group information and make it available for your use when you set up the users/groups and permissions. If you do not have any users or groups on the PDC, then set up a “dummy” account so that the Tricord TBD can establish the link.**

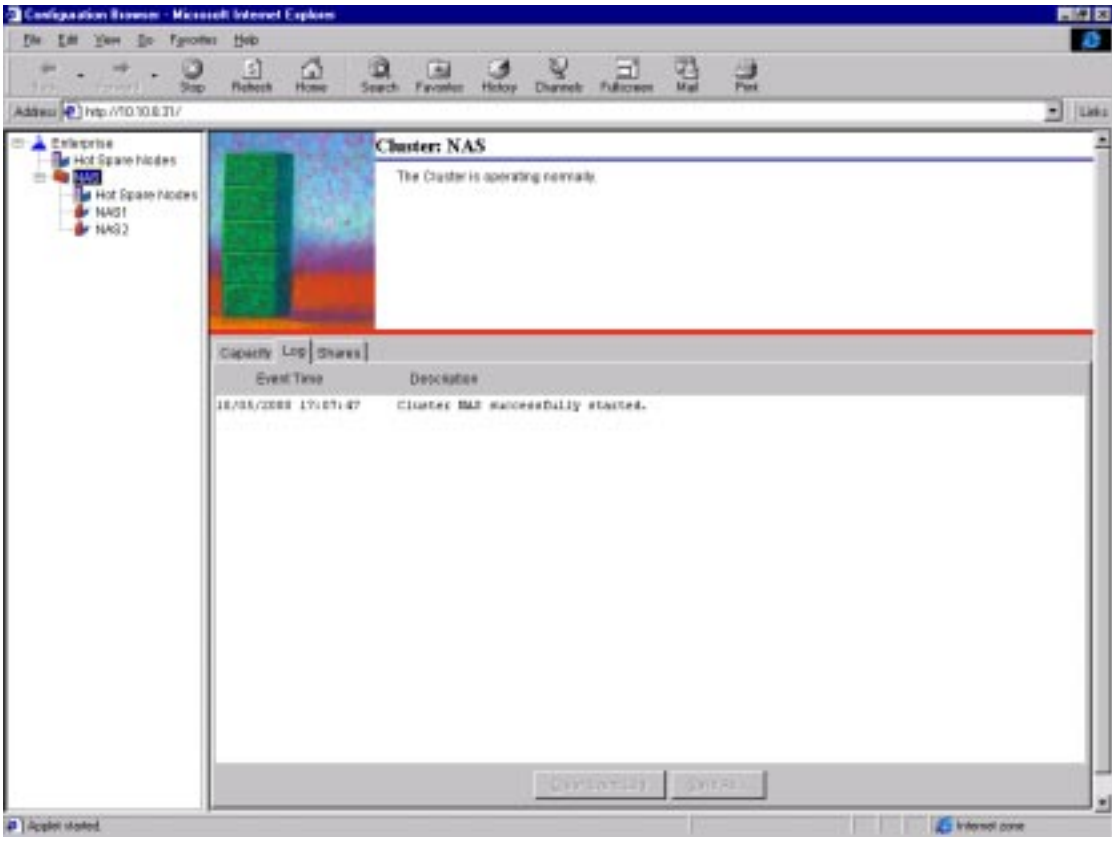


- Click on the “OK” button to accept these settings and return to Cluster:NAS.
- Click on the “Cancel” button to cancel your settings and return to Cluster:NAS.

NAS/Log.

To access the log on the “Cluster: NAS” screen:
Click on “NAS” on the Enterprise Tree.
Click on the “Log” tab.

The “Log” screen displays:
The current operating status of the Cluster.
The log of events relative to this Cluster by date, time and a brief description.

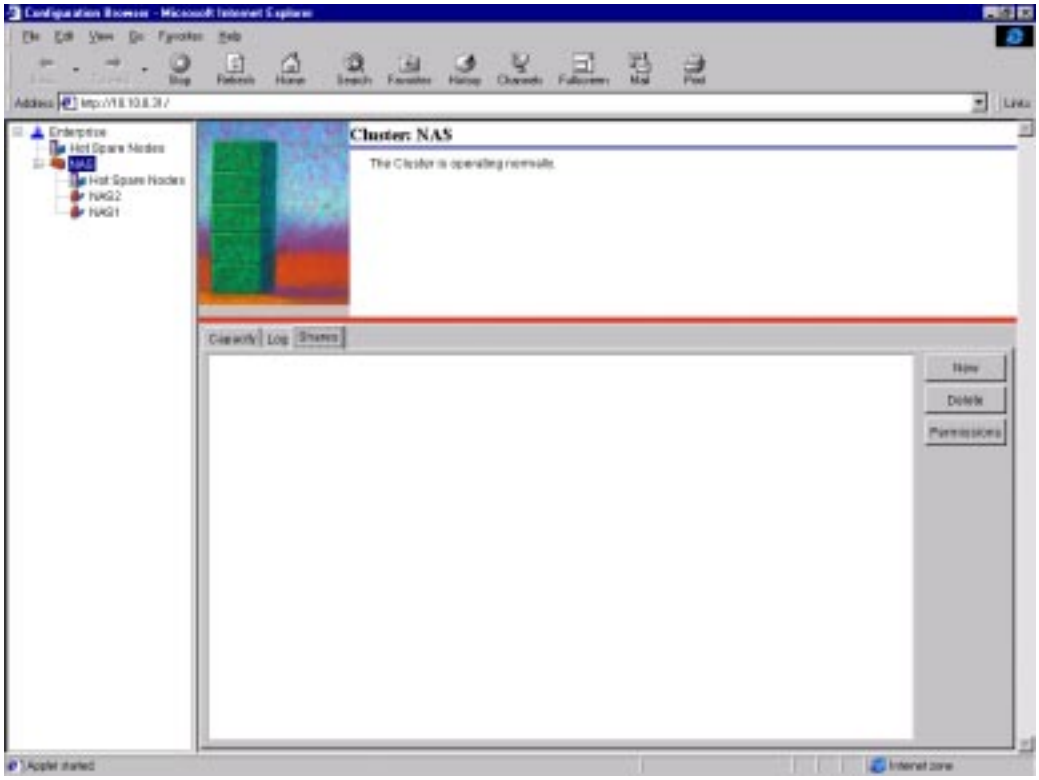


- Click on the “Shares” tab to view a list of allocated Shares on the Cluster (page 57).
- Click on the “Capacity” tab to view the current net capacity of the Cluster (page 54).

NAS/Shares.

To access the Shares on the “Cluster: NAS” screen:
Click on “NAS” on the Enterprise Tree.
Click on the “Shares” tab.

The Shares screen displays:
The current operating status of the Cluster.
A list of allocated Shares on the Cluster.
(If you have not created Shares on the Cluster, the Shares area will be blank).



- Click on the “New” button to create a new Share (page 58).
- Click on the “Delete” button to permanently delete the Share and its data (page 60).
- Click on the “Permissions” button to assign user/group security to Share(s) when the Cluster is using a PDC for authentication and security (page 59).

- Click on the “Log” tab to view a log of events relative to this Cluster (page 56).
- Click on the “Capacity” tab to view the current net capacity of the Cluster (page 54).

HINT: If you have not created new Shares on your Cluster then do that first by clicking on the “New” button.

I will split all of this into two pages (which will mean that most of the page reference will change again)

Tricord TBD Storage Manager (continued...)

Unlike other typical servers, there is no need to manually create an internal directory structure and mount point for this share. The operations are automatically handled by the Storage Manager Software.

Humble Suggestion:
NOTE :Unlike the typical server, you are not required to manually create an internal directory structure and mount point for shares on the Tricord TBD. These operations are performed for you automatically by the TBD's Storage Manager.

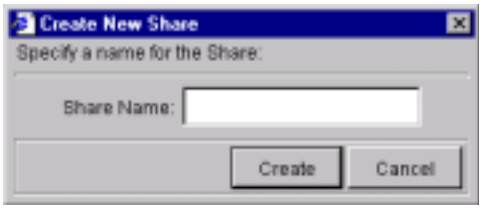
NAS/Shares/New

To create new Share(s):

Click on "NAS" on the Enterprise Tree,
Click on the "Shares" tab.
Click on the "New" button.

Unrestricted Security

If you set your security as unrestricted, you will see the following "Create New Share" dialog box:



Enter a name for a Share on the Cluster. Because the security on this Share is unrestricted, it will be accessible to everyone connected to the network, without restriction.

Click on "Create" to accept the new share name.
Click on "Cancel" to cancel your settings and return to the NAS:Cluster screen.

Restricted Security

If you set your security to restricted, you will see the following "Create New Share" dialog box:

Enter a name for the Share. To give users and groups access to a new Share:

Click on the user or group to highlight it.
Click on the ">" button to move the user/group into the active column.
Double-click the pull down menu to select the type of access (read only, read/write, deny)

Click on "Create" to accept the new share name.
Click on "Cancel" to cancel your settings and return to the NAS:Cluster screen.

NOTE: For more information on "Restricted" and "Unrestricted" Clusters, see page 57.

Tricord TBD Storage Manager (continued...)

NAS/Shares/Permissions.

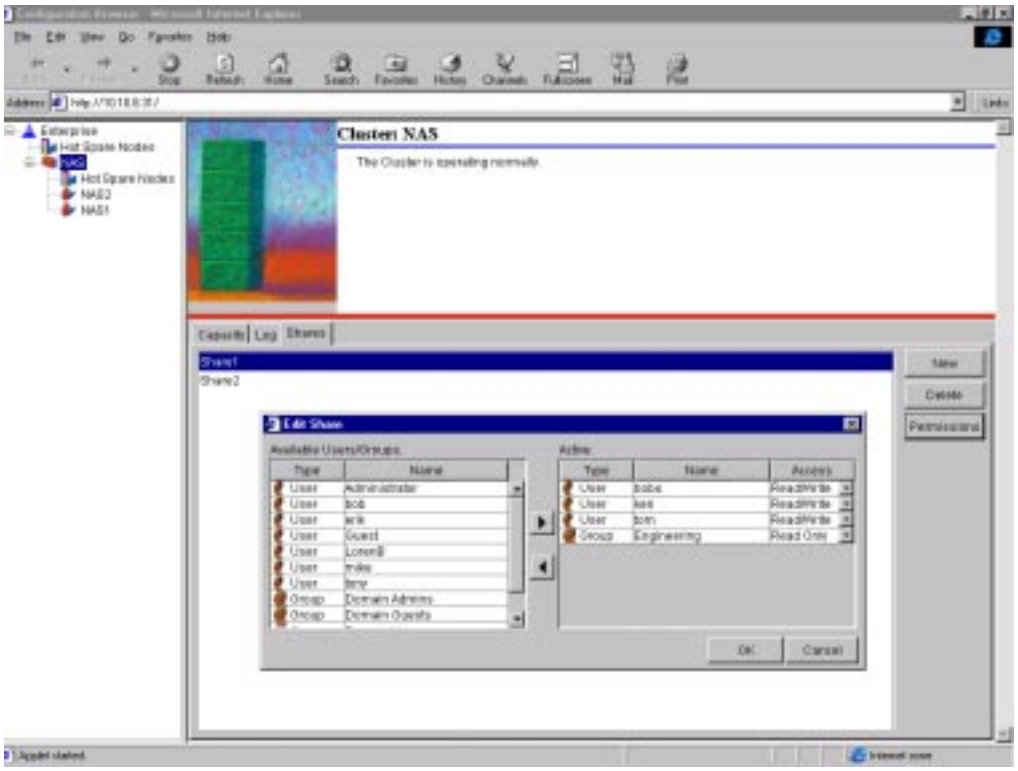
Use this screen for "Restricted" Clusters (Does not apply to Unrestricted Clusters).

To edit the user/group security of the Share(s):
Click on "NAS" on the Enterprise Tree,
Click on the "Shares" tab.

The Shares screen displays a list of allocated Shares on the Cluster.
Click on a Share to highlight it
Click on the "Permissions" button.

The "Edit Shares" pop-up screen will appear. The "Edit Shares" pop-up screen displays a list of all users and groups in "Available Users/Groups".
Click on a user/group then click on the ">" button to add a user/group to the active list.
Click on a user/group then click on the "<" button to remove them from the active list.
Double-Click the pull down menu to select the type of access (read only, read/write, deny)

NOTE: For more information on "Restricted" and "Unrestricted" Clusters, see page 57.



- Click on the "OK" tab to save your settings and return to the "Cluster:NAS/Share" screen.
- Click on the "Cancel" screen to cancel your settings and return to the "Cluster:NAS/Share" screen

Tricord TBD Storage Manager (continued...)

NAS/Shares/Delete.

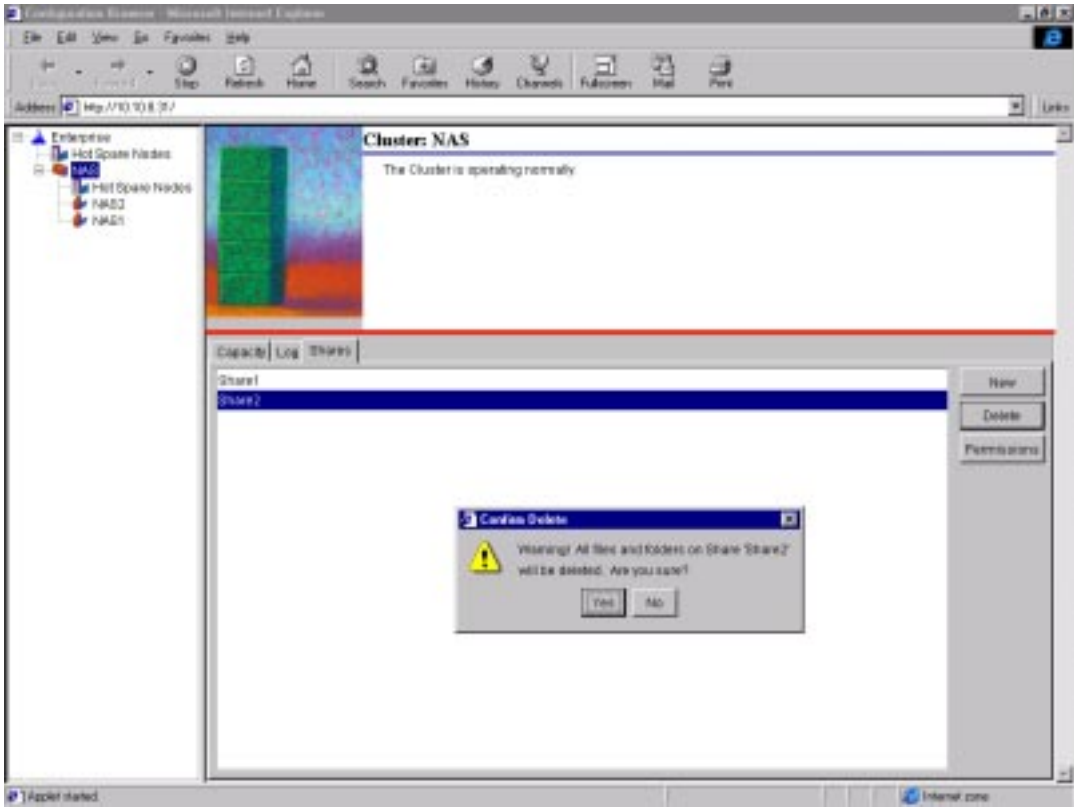
To delete Shares:
Click on “NAS” on the Enterprise Tree,
Click on the “Shares” tab.

The Shares screen displays a list of allocated Shares on the Cluster.
Click on a Share to highlight it .
Click on the “Delete” button.

The “Confirm Delete” pop-up screen will appear.
If you want to permanently delete a Share and all of the data on that Share:
Click on the “Yes” button.

WARNING:
If you delete a Share, you will lose all of the Share’s data.
This is permanent and is not reversible.

If you do NOT want to permanently delete a Share and all of the data on that Share:
Click on the “No” button.



Tricord TBD Storage Manager (continued...)

NAS/Capacity/Shutdown Cluster.

To shut down a Cluster:

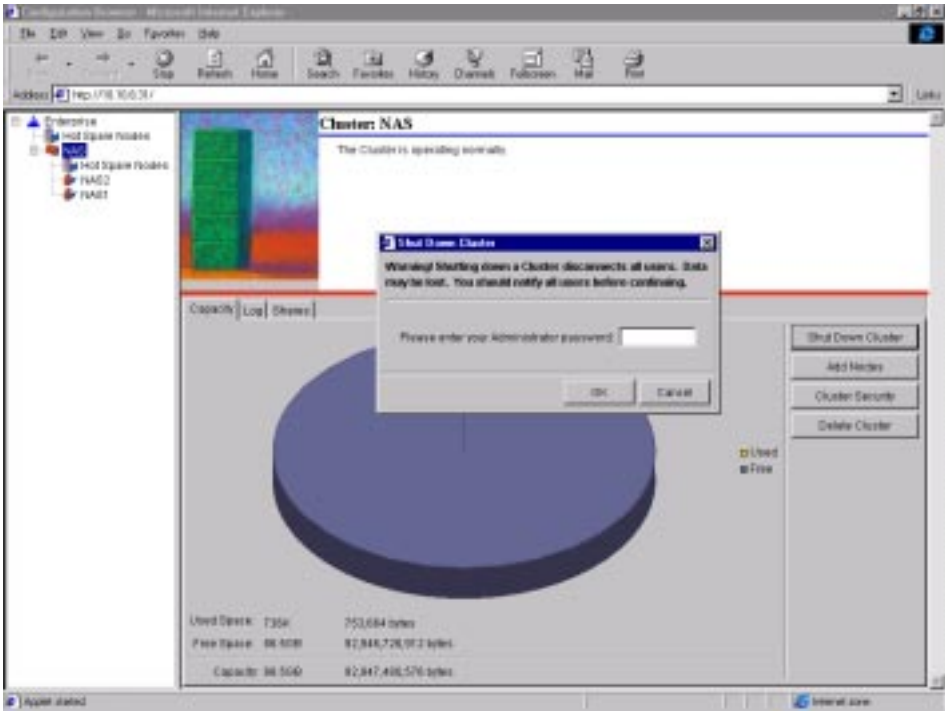
Click on “NAS” on the Enterprise Tree,
Click on the “Capacity” tab.
Click on the “ShutDown Cluster” button.

The “Shut Down Cluster” dialog box will appear.

Enter your administrator password.
Click on the “OK” button to shut down the Cluster.
Click on the “Cancel” button to cancel the cluster shut down.

WARNING:

If you shut down a Cluster, you will disconnect all users.
You could lose Data. Notify users before you delete a Cluster.



Tricord TBD Storage Manager (continued...)

NAS/Capacity/Delete Cluster.

To delete a Cluster:
Click on “NAS” on the Enterprise Tree,
Click on the “Capacity” tab.
Click on the “Delete Clusters” button.

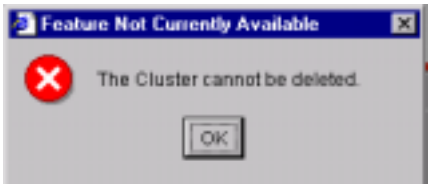
The “Delete Cluster” pop-up screen will appear.
If you want to permanently delete the Cluster.
Click on the “Yes” button.

WARNING:
If you delete a Cluster, you will lose all data on the Cluster
This is permanent and is not reversible.
You will disconnect all users.
Back up data before you delete a Cluster
Notify users before you delete a Cluster.

If you do NOT want to permanently delete a Cluster:
Click on the “Cancel” button.

NOT available beta 2
BETA 2 GO TO NEXT PAGE

NOTE: **Delete Cluster is NOT AVAILABLE in beta 2.**
You will get the following pop up if you try to delete a Cluster:



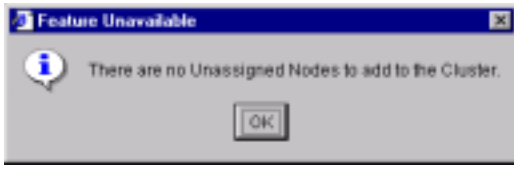
Tricord TBD Storage Manager (continued...)

NAS/Capacity/Add Nodes.

To add nodes to a Cluster:

Click on “NAS” on the Enterprise Tree,
Click on the “Capacity” tab.
Click on the “Add Nodes” button.

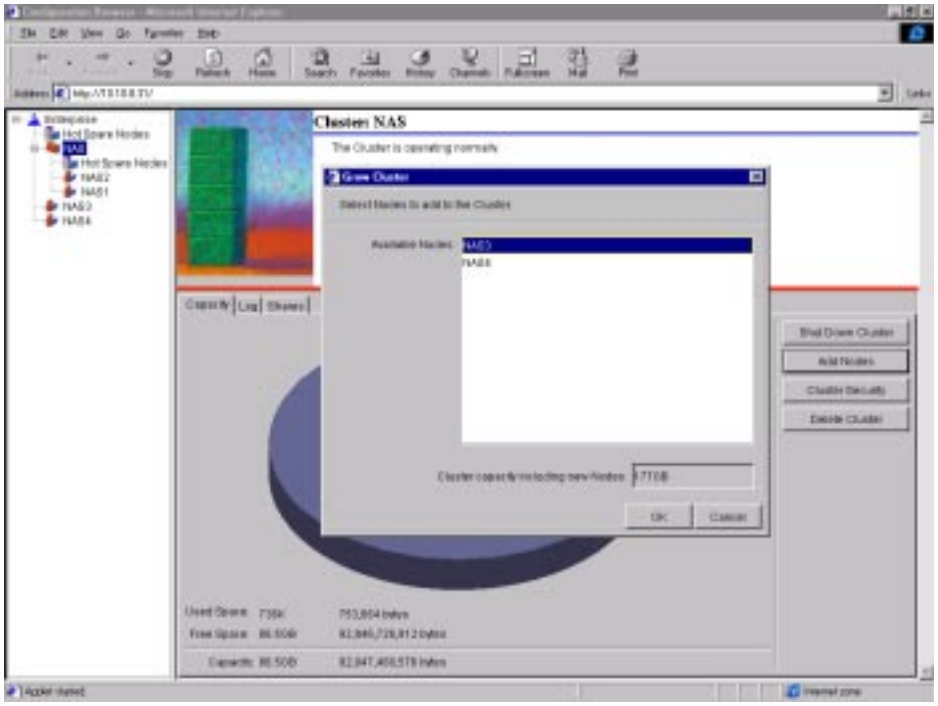
If you see the “Feature Unavailable ” dialog box, then you do not have any available nodes. If you were not expecting this response, refer to the troubleshooting section.



If you have nodes available, the “Grow Cluster” pop-up screen will appear. The screen displays all of the nodes which have not yet been assigned to a Cluster or as a hot spare. To assign a node to the Cluster:

Click on the node and it will highlight (NAS3 in this example).

If you want to assign more than one node to the Cluster, press the “Control” key and click on all of the nodes that you want to assign to the Cluster. The Cluster capacity will change with each node addition.



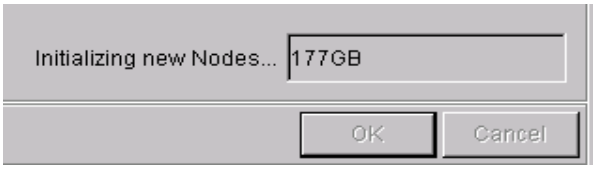
Click on the “OK” button to accept these settings and return to the NAS screen
Click “Cancel” button to delete these settings and return to the NAS screen

(Continued...)

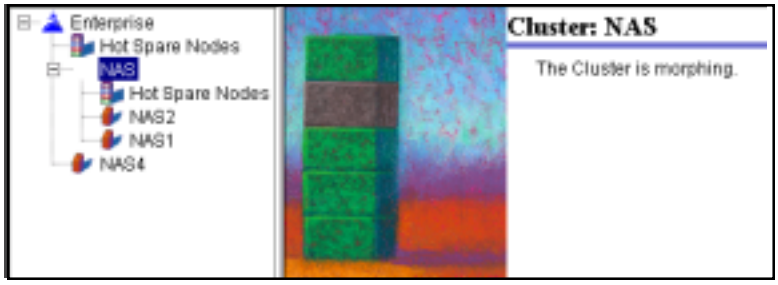
Tricord TBD Storage Manager (continued...)

NAS/Capacity/Add Nodes (continued).

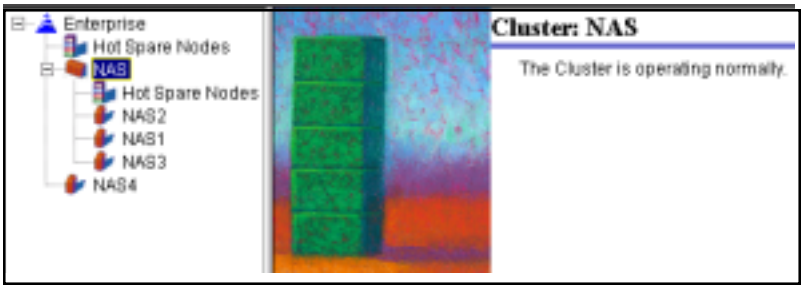
As the node(s) are added to the Cluster, the morphing process will be visible in both the “Grow Cluster” dialog box and the Cluster:NAS screen. The Cluster capacity in the “Grow Cluster” dialog box will indicate that a new node is being initialized:



The “Grow Cluster” dialog box will close and the Cluster:NAS screen will be fully visible. The text immediately below Cluster:NAS will indicate that the Cluster is morphing. The node(s) that you added to the Cluster will temporarily disappear from the Enterprise Tree (NAS3 in this example).



When the morphing is complete, the text immediately below Cluster:NAS will indicate that the Cluster is operating normally. The node(s) that you added to the Cluster will appear under the Cluster in the Enterprise Tree (NAS3 in this example)



The capacity in the Cluster:NAS screen will also increase to reflect the addition of the node(s).

Used Space:	6.56MB	6,881,280 bytes
Free Space:	162GB	174,269,661,184 bytes
Capacity:	162GB	174,276,542,464 bytes

Tricord TBD Storage Manager (continued...)

Enterprise/Hot Spare Nodes.

To set the parameters for the Enterprise Hot Spare Nodes:

Click on “Hot Spare Nodes” located immediately below “Enterprise”.

The “Enterprise Hot Spare” screen indicates if there are nodes in the Enterprise’s Hot Spare Nodes and gives you two options for using a Hot Spare Node to replace a failed node.

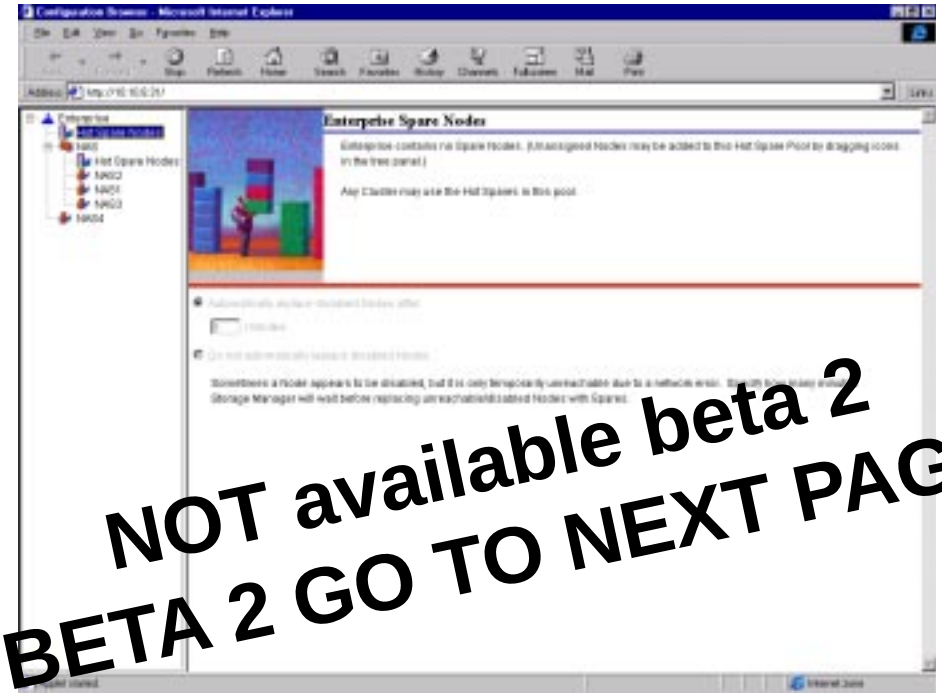
Option 1. You can automatically replace a failed node within a time frame which you specify. Tricord recommends allowing at least 5 minutes before the node is automatically replaced.

Option 2. You can set the TBD to replace the failed node by manually dragging and dropping a Enterprise Hot Spare Node.

Click on “Automatically replace disabled Nodes after ___ minutes” to automatically replace the failed node with a Hot Spare Node in the time specified.

Click on the “Do not automatically replace disabled Nodes” to manually replace the failed node by dragging and dropping.

HINT: You can add an unassigned node to the Enterprise Hot Spare Nodes by dragging and dropping the available node on the Enterprise Hot Spare Node icon.



NOTE: The “Enterprise” Hot Spare Nodes are not the same as the “NAS” Hot Spare Nodes (located beneath “NAS”). The Enterprise Hot Spare Nodes are available to any Cluster that has a node fail. The “NAS” Hot Spare Nodes are only available to the NAS Cluster.

Tricord TBD Storage Manager (continued...)

NAS/Hot Spare Nodes.

To set the parameters for the NAS Hot Spare Nodes:

Click on “Hot Spare Nodes” located mediately below “NAS”.

The “NAS Hot Spare” screen indicates if there are nodes in the NAS’s Hot Spare Nodes and gives you two options for using a hot spare to replace a failed node.

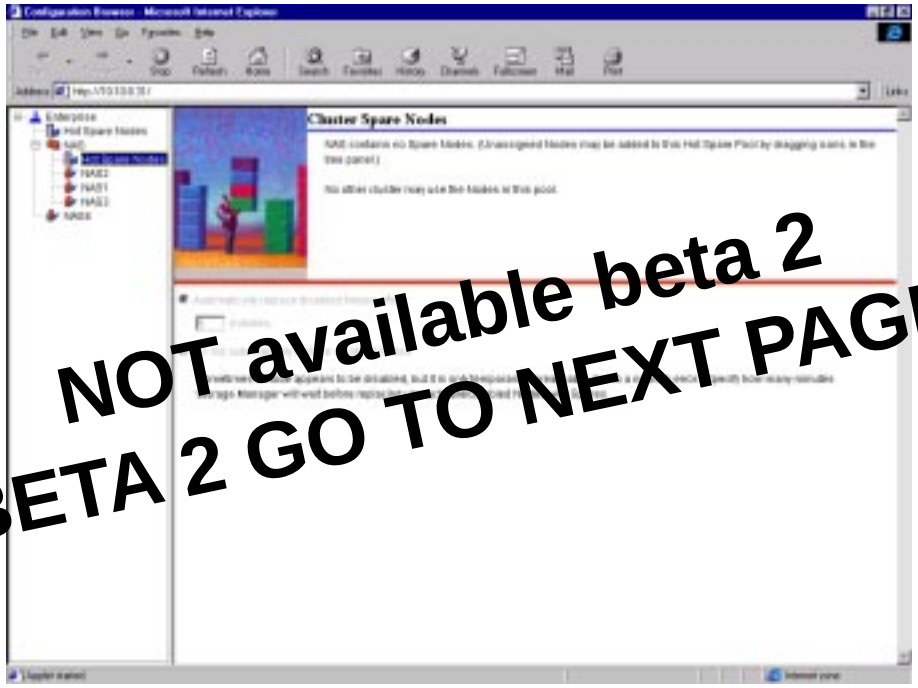
Option 1. You can automatically replace a failed node within a time frame which you specify. Tricord recommends allowing at least 5 minutes before the node is automatically replaced.

Option 2. You can set the TBD to replace the failed node by manually dragging and dropping a Enterprise Hot Spare Node.

Click on “Automatically replace disabled Nodes after ___ minutes” to automatically replace the failed node with a Hot Spare Node in the time specified.

Click on the “Do not automatically replace disabled Nodes” to manually replace the failed node by dragging and dropping.

HINT: You can add an unassigned node to the NAS Hot Spare Nodes by dragging and dropping the available node on the NAS Hot Spare Node icon.



NOTE: The “NAS” Hot Spare Nodes are not the same as the “Enterprise” Hot Spare Nodes (located beneath “Enterprise”). The Enterprise Hot Spare Nodes are available to any Cluster that has a node fail. The “NAS” Hot Spare Nodes are only available to the NAS Cluster.

Tricord TBD Storage Manager (continued...)

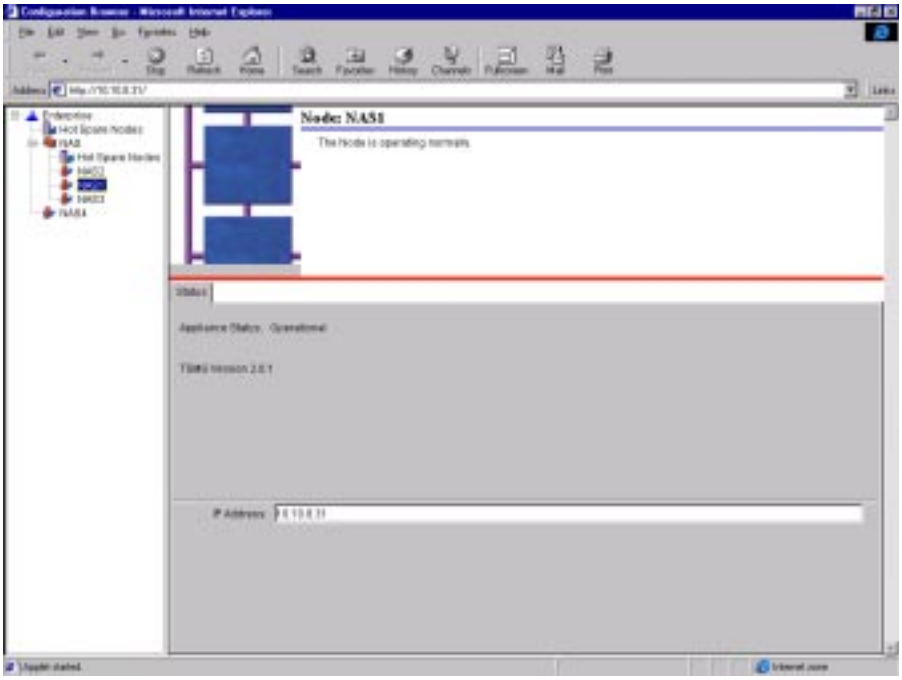
Node<name>/Status.

Click on “Node:<name>” on the Enterprise Tree to access the screen for node administration.

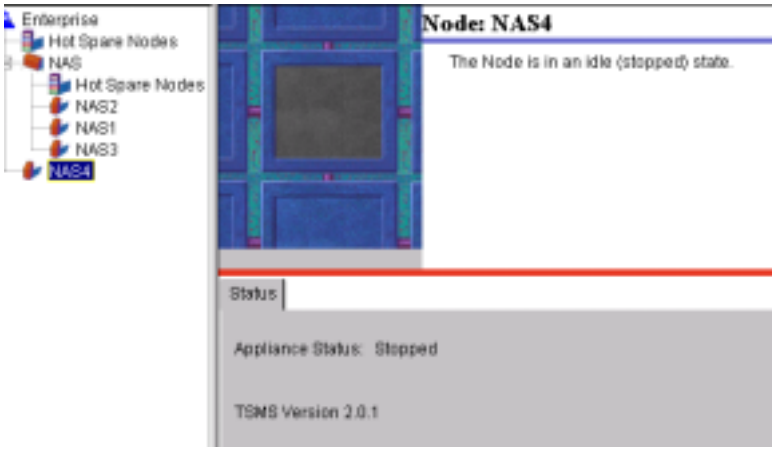
The “Node:<name>” status screen appears by default and displays:

- The current operating status of the node
- The Node’s driver status
- The Node’s IP address.

A node that is operating as part of a Cluster will indicate a status of “operating normally” and “Operational”



A node that is unassigned will indicate a status of “Idle” and “Stopped”

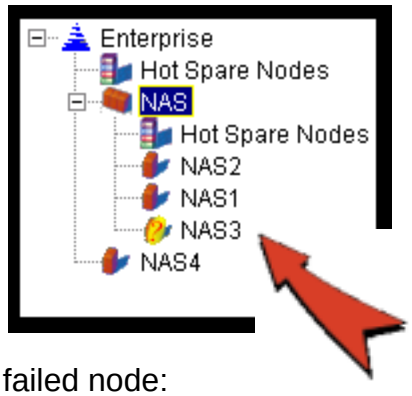


When a Node Fails

When a Node Fails

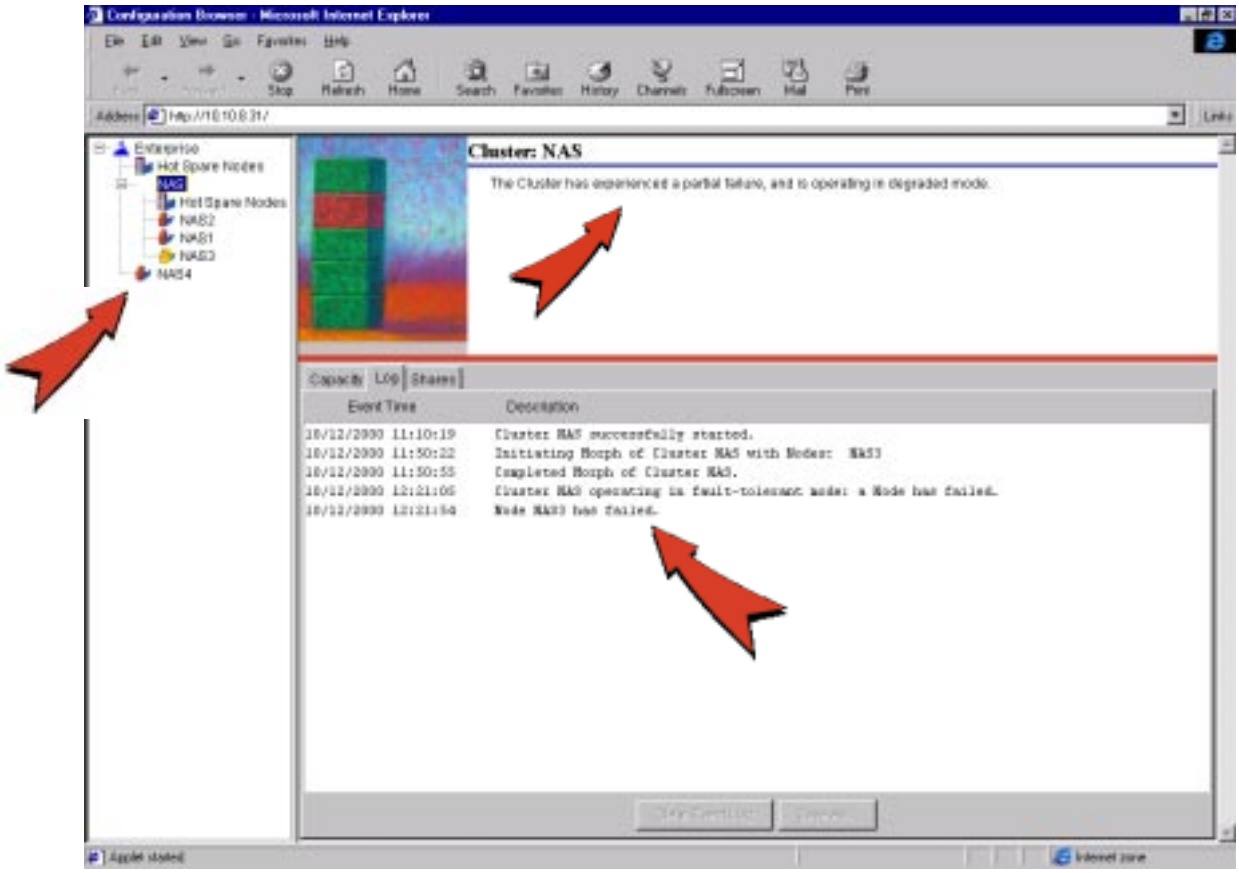
The first indication that you will have of a node failure will be in the Enterprise Tree. The failed node will change from red to yellow with a red question mark.

For beta 2: Test this function by momentarily removing power from the node to invoke a node failure



To access the Cluster and log for failed node:

Click on the Cluster's name. (e.g., NAS)
Click on the "Log" tab.

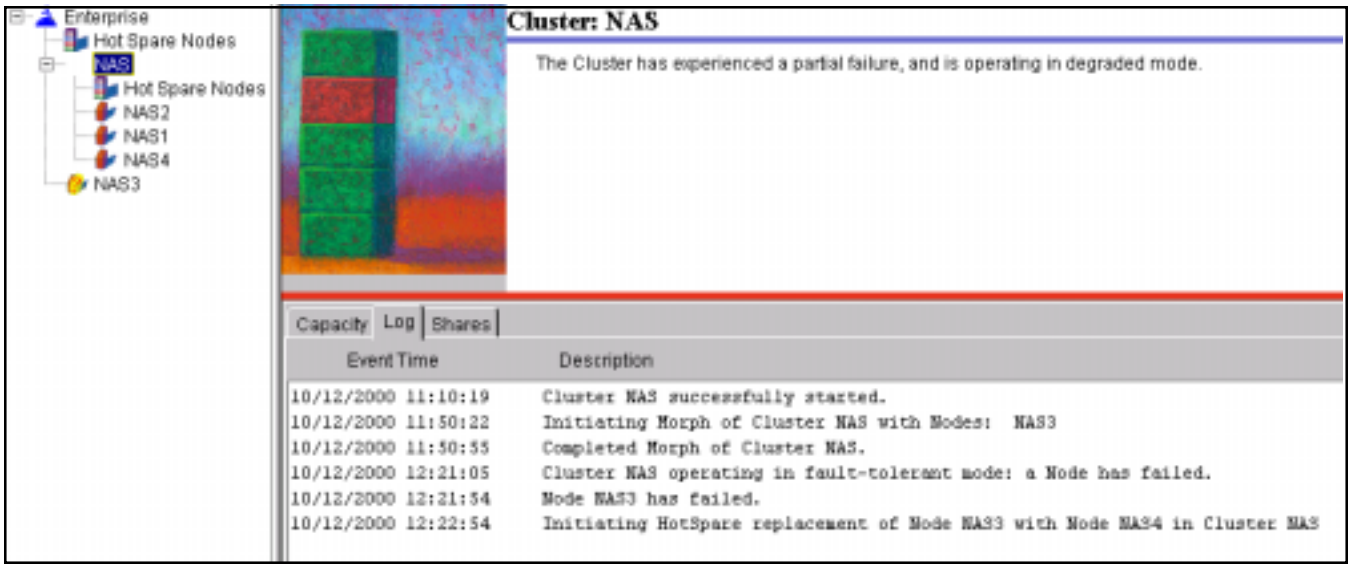


The log will indicate which node has failed along with the time and date. The log will continue to track the node's failure. Dynamically updated Messages will also appear below "Cluster:NAS ". (Beta 2 will not dynamically update. To refresh the screen, choose one of the other tabs, then choose the "Log" tab again.)

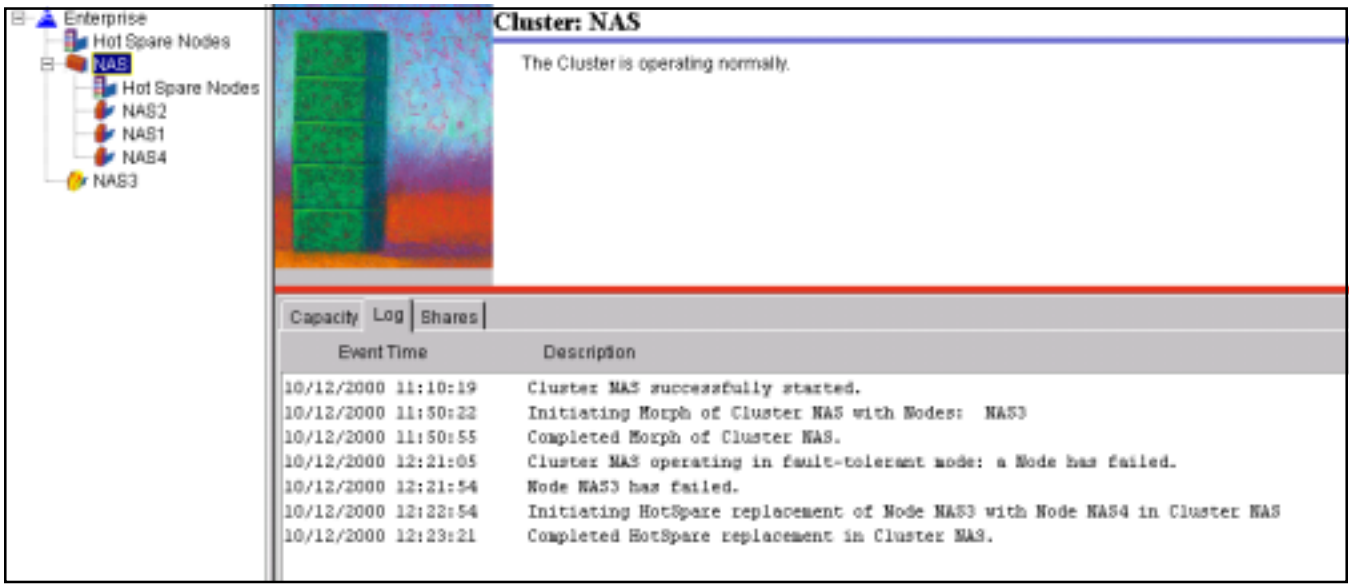
When a Node Fails (continued...)

The Hot Spare Node will automatically replace the failed node.

NOTE: In beta 2, the unassigned node will automatically function as a global Hot Spare Node.



The “Log” will indicate when the Hot Spare Node named NAS4 has joined the Cluster and is operating normally. (Resistance is futile, you will be absorbed). The failed Hot Spare Node named NAS4 has left the Cluster is an unassigned failed node that is no longer operative.

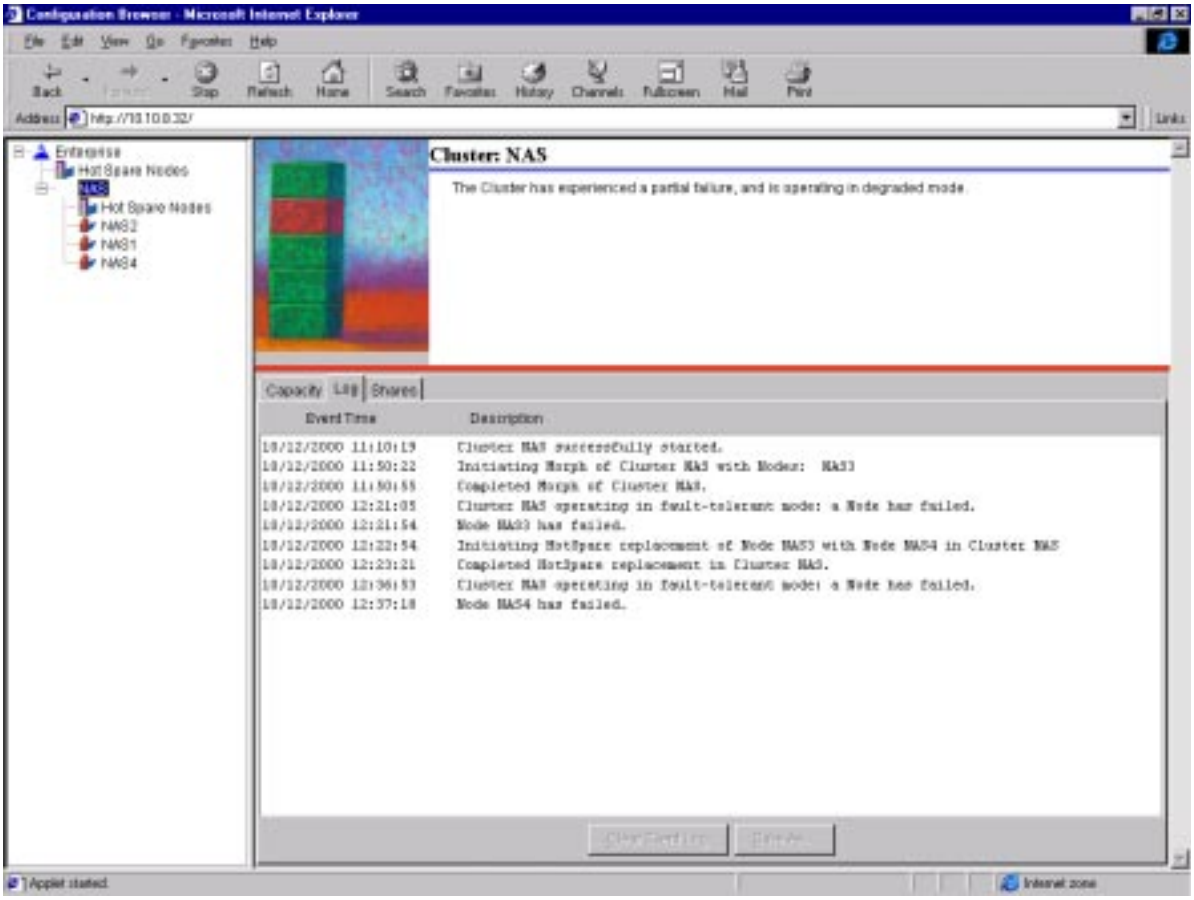


Healing a Node

Healing a Node

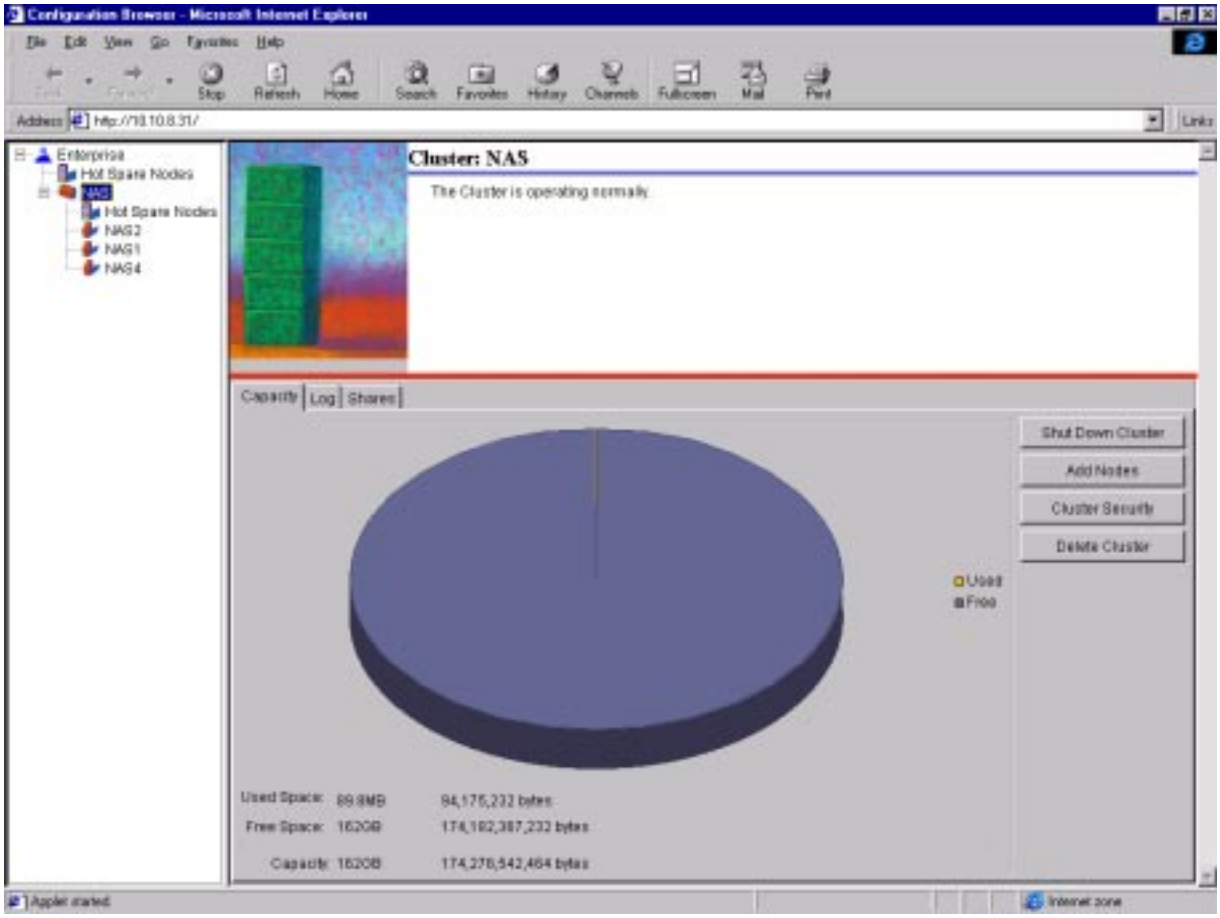
The Tricord TBD offers a unique self-healing feature that increases your protection against data loss. If a node fails (e.g., power loss) and the Cluster enters a temporary degraded mode but the reason for the failure is remedied (e.g., power reinstated), then the node will automatically self-heal and begin operating normally without any loss of data. There is no time limit on how long the node can be in failure; the data will remain safe. However, although there is no data loss, the data can not be accessed until the node is operating normally.

In the example below, the NAS4 Node has lost power and the Cluster has entered a degraded mode. The Clister:NAS and the Cluster:NAS "Log" indicate the NAS4 node failure and the Cluster's degraded condition. The NAS4 Node icon changes from its normal red color to yellow with a red question mark.



Healing a Node (continued...)

Once the reason for the failure has been removed and the node has self-healed, the Cluster will begin operating normally. The Cluster's normal operating status will be indicated in Cluster:NAS/Capacity. The NAS4 Node icon on the Enterprise Tree will change from yellow back to its normal red color.



Mapping a Drive

Mapping a Drive

To allow users and groups to access the Shares to which you have given them permission, you will need to map a drive on their computer. The following instructions will walk you through mapping a drive for windows 2000, 98, 95 and NT.

NOTE: You will need the host computer's IP address and the Share's name (e.g., \\10.11.17.175\accounting)

Windows 2000:

- Go to Start/Programs/Windows Explorer.
- In the pull down menu, select Tool/Map network Drive.
  The dialog box "Map Network Drive" appears.
- In the "Drive" pull down menu box, either choose the drive that appears by default or choose a drive to which you want to map.

HINT: Do not map a drive that is already in use.

- In the "Folder" box, type the path to the Share to which the user has access. Use the host computer's IP address and the Share's name (e.g.,\\10.11.17.175\accounting).
- Choose "Reconnect at Login" if you want this drive to remain accessible to the Share. If you do not choose "Reconnect at Login", then the connection is only temporary.
- Click on "OK" to save these settings and exit.

Mapping a Drive (continued...)

Windows 98:

- Go to Start/Programs/Windows Explorer.
- In the pull down menu, select Tool/Map network Drive.
  The dialog box “Map Network Drive” appears.
- In the “Drive” pull down menu box, either choose the drive that appears by default or choose a drive to which you want to map.

HINT: Do not map a drive that is already in use.

- In the “Path” pull down menu box, type the path to the Share to which the user has access. Use the host computer’s IP address and the Share’s name (e.g.,\\10.11.17.175\accounting).

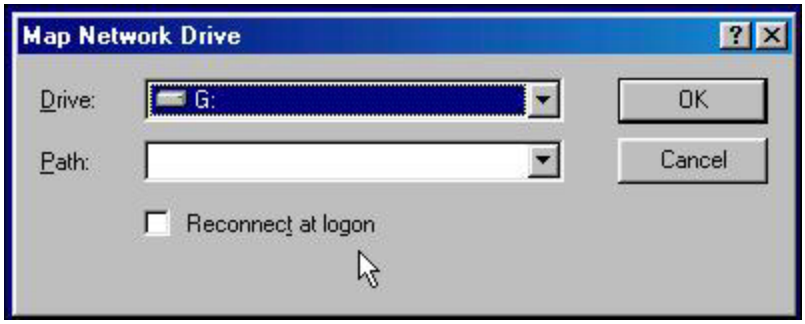
Mapping a Drive (continued...)

Windows 95:

- Go to Start/Programs/Windows Explorer.
- In the pull down menu, select Tool/Map network Drive.
  The dialog box “Map Network Drive” appears.
- In the “Drive” pull down menu box, either choose the drive that appears by default or choose a drive to which you want to map.

HINT: Do not map a drive that is already in use.

- In the “Path” pull down menu box, type the path to the Share to which the user has access. Use the host computer’s IP address and the Share’s name (e.g.,\\10.11.17.175\accounting).



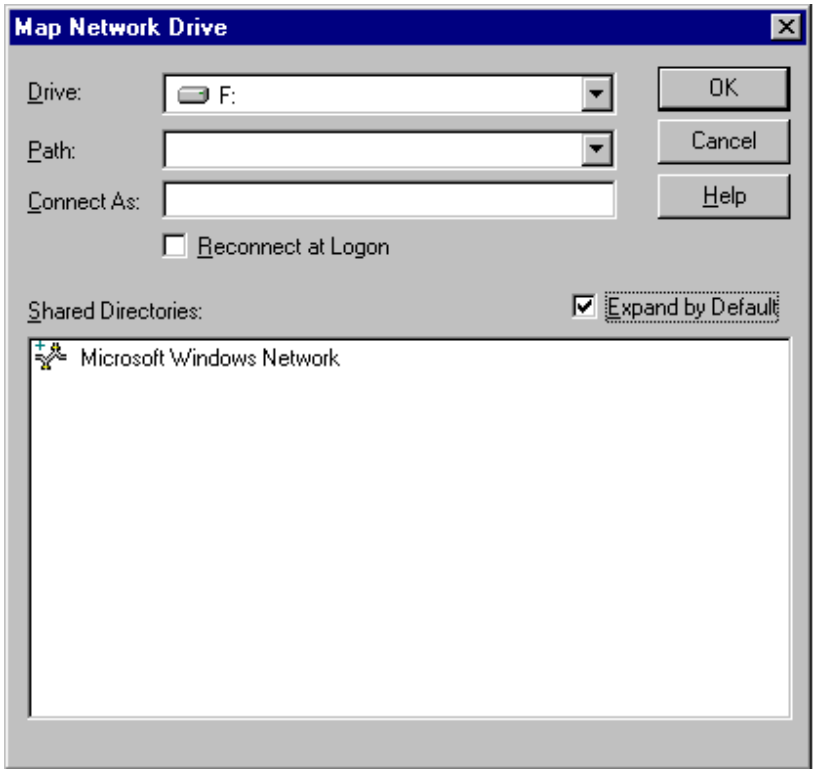
Mapping a Drive

Windows NT:

- Go to Start/Programs/Windows NT Explorer.
- In the pull down menu, select Tool/Map Network Drive.
  The dialog box “Map Network Drive” appears.
- In the “Drive” pull down menu box, either choose the drive that appears by default or choose a drive to which you want to map.

HINT: Do not map a drive that is already in use.

- In the “Path” pull down menu box, type the path to the Share to which the user has access. Use the host computer’s IP address and the Share’s name (e.g.,\\10.11.17.175\accounting).
- “Connect as” can be left blank.
- Choose “Reconnect at Login” if you want this drive to remain accessible to the Share. If you do nt choose “Reconnect at Login”, then the connection is only temporary.
- Choose “Expand by Default” to see a list of the Shared directories.
- Click on “OK” to save these setting and exit.



Acronyms

ARP ..... Address Resolution Protocol

BDCs ..... Backup Domain Controllers
BPS ..... bit per second

CAD ..... Computer-Aided Design
CGI ..... Common Gateway Interface
**CIFS ..... Common Internet File System
**CPU ..... Central Processing Units
CSMA/CA ..... Carrier Sence Multipul Access with Collision Avoidance
CSMA/CD ..... Carrier Sence Multipul Access with Collision Detection

**DHCP ..... Domain Host Control Protocol
DDCMP ..... Digital Data Communications Message Protocol
DNS ..... Domain Service Name
DRAM ..... Dynamic RAM

EIDE ..... Enhanced Integrated Device (or Drive) Electronics
EMI ..... Electromagnetic Interference
EEPROM ..... Electrically Erasable Programmable ROM
ESD ..... Electrostatic Discharge

**FSCK ..... File System Check
FTP ..... File Transfer Protocol

HTTP ..... Hypertext Transfer Protocol

I/O (address)
ICMP ..... Internet Control Message Board
IDE ..... Integrated Device (or Drive) Electronics
**IP (Address) ..... Internet Protocol
IPX ..... Internetwork Packet Exchange
IRQs ..... Interrupt Requests

LAN ..... Local Area Network

MAC ..... Media Access Control
MANs ..... Metrpolitan Area Network
MAPI ..... Message Application Programming Interface

MAUs ..... Mulitistation Access Units
Mbps ..... Megabits per Second
MHz ..... Megahertz

**NAS ..... Network Attached Storage
**NFS ..... Network File System
NIC ..... Network Interface Card
NLSP ..... Network Link Services Protocol
NOSs ..... Network Operating Systems

OSPF ..... Open Shortest path First
OSI ..... Open System Interconnection

**PCI ..... Peripheral Component Interconnect
**PDC ..... Primary Domain Controller
POP ..... Post Office Protocol

RAM ..... Random Access Menory
RAID ..... Redundent Array of Inexpensive Disks
ROM ..... Read-Only Memory
RIP ..... Routing Information Protocol
RPC ..... Remote Procedure Call
RTMP ..... Routing Table Maintenance Protocol
RZ ..... Return-to-Zero

SCSI ..... Small Computer Systems Interface
**SAN ..... Storage Area Network
SMTP ..... Simple Mail Transfer Protocol
SNMP ..... Simple Network Management Protocol
SRAM ..... Static Ramdom Access Memory

TCP ..... Transmission Control Protocol
TCP/IP ..... Transmission Control Protocol/Internet P rotocol
TDR ..... Time-Domain Reflectometer
TechNet ..... Technical Information Network (Microsoft)
**TFS ..... Tricord File System
TCO ..... Total Cost of Ownership
**TSMS ..... Tricord Storage Management Software

UDP ..... User Datagram Protocol

WAN ..... Wide Area Network
WINS ..... Windows Internet Naming Service
WWW ..... World Wide Web

Glossary

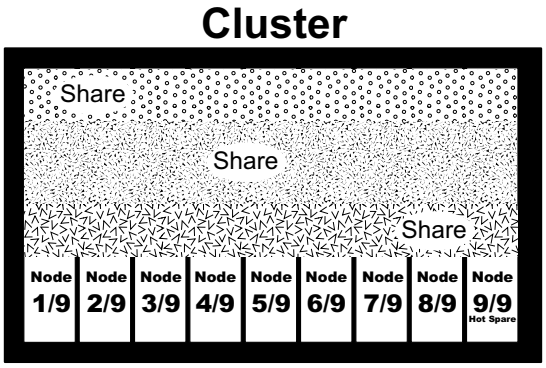
Glossary

NOT IN ALPHA ORDER

----------**THIS IS A WORK IN PROGRESS**----------

Cluster

A cluster consists of one or more shares disributed across one or more nodes. See figure below.



Local Area Network (LAN)

The Local Area Network is a network that operates over a small area, such as a single building. It uses a network software to link a number of computers together on a network. The LAN uses a privately owned cables hookup.

Network Interface Card (NIC)

The NIC is a circuit board that contains the name and address that is unique to each individual computer on a network. Through the NIC, each unit can be individually identified across the network. There are four main types of NIC: ATM, Ethernet, Token-Ring, and ARCnet, Each individual Tricord node has its own unique Ethernet NIC.

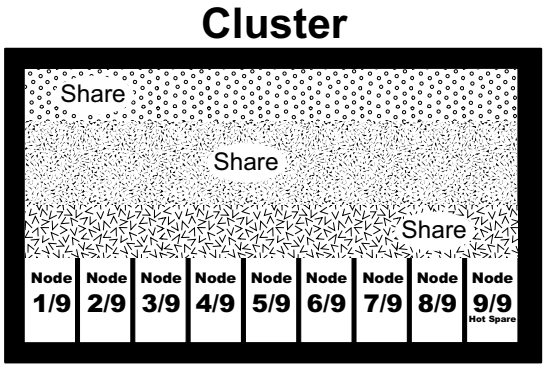
Node

A node is a network device that communicates across a network. Examples of nodes are; a personal computer, a server, a workstation or a storage unit. Tricord refers to each individual storage unit as a node. Tricord nodes have the unique capability of sharing data across nodes. Tricord nodes can be grouped together in a cluster.

Network

A network links computers together using network software as well as cables, the telephone line or a satellite. A network link allows computers to exchange information and share equipment. Examples of networks are: LAN, WAN and MAN.

Metropolitan Area Network (MAN)	The Metropolitan Area Network is a network that usually operates over a single city to link a number of computers It is generally larger than a LAN but smaller than a WAN. It is connected by telephone line or satellite hookup.
Wide Area Network (WAN)	The Wide Area Network is a network that operates over a large area, spanning cities and office branches. It uses a network software to link a number of computers across office branches together on a network. It is connected by telephone line or satellite hookup.
IP Address	The IP Address transmitts data between hosts that are identified by a fixed-length address. The address is a code or string of numbers that identifies a computer and are usually shown in groups that are separated by periods (e.g.,197.143.34.5.) Every computer requires an IP address.
IP	The Internet Protocol is transport and application protocol that routes data packets between a source and a destination . Combined with TCP/IP, it becomes a protocol suite that is widely used on Ethernets. Sometimes IP used to refer to the IP Address, however it is not the same. See IP Address
Share	A share is a block of data that is stored in a cluster. There can be one or more shares in a cluster. Shares are distributed across one or more nodes. See figure below.



Appendix

Appendix A: Tricord TBD Specifications

Hardware Dimensions	1U Rack style container (19.00 x 21.00 x 1.75) Weight: 45 lbs.
Power Requirements	100-240V, 50/60Hz
Maximum Power Rating	200W
Hardware Architecture -T Ethernet interfaces	Dual 10/100Base LED indicators, Power-On, Node Healthy, Node and Network Activity, and Cluster Alert.
Software Features	CIFS/SMB Client Support Node Fault Tolerance Network Based Backup services Email Alerts Supports 16 node Cluster Hot Spare Node Seal Healing
User Interface	Browser Based Management
Network Requirements:	For a Storage Network: Recommend 100 Base Tx Hub or Switch For a Private Network: 100 Base Tx Switch
Operating Temperature	5 – 40° C
Maximum Ambiant Teperature	40°C
Environment	(Example = must be installed in pollution degree 2 macro environment
Humidity	(example 0-95%, non-condensing
Physical Dimensions	
Weight	32 pounds

Appendix A: Tricord TBD Specifications (continued...)

Agency Certifications	UL CE TUV VCCI-B FCC Class B
Warranty	1 year hardware parts and labor

Appendix B: Quick Reference Table

To Do This:	Go Here:

Appendix C: Functions and Features

Appendix D: Troubleshooting

Key Words	Problem	Reason	Solution
Feature Unavailable.	The " Feature Unavailable " dialog box indicates that you do not have any available nodes.	You really don' t have any Nodes.	Add nodes.
		You did not configure the Node(s)that you have.	Configure he Nodes in IP Setup (CD-ROM)
		The Node(s) have failed.	Replace the Nodes
		There is no power to the Nodes	Power up the Nodes

Appendix J:

Appendix K: Tricord TBD Revision Log

Revision Date	ECO Number	Manual Revision	Corresponding Software Version/ Revision
00/00/00	12345	10756-A	1000-7675 Rev 1.0

Appendix L: Tricord TBD User Manual(Beta) Evaluation

You opinion is valuable to us at Tricord.

As a participant in our beta product evaluation, please take a moment to record your feedback on the manual. While we recognize that a beta manual is a work in progress and far from the finished product, your feedback can help us determine if we are heading in the right direction.

Please consider and comment on items such as:

are the directions clear,
do the graphics help,
does the organization fit with your pattern of use,
is there enough, too little, too much information,
are all subjects that need to be discussed included
kudos graciously accepted as well.

Please use the following chart to make comments on the manual on a page by page basics. Make as many copies of this document as you need to comment on individual pages.

Please return beta 2 evaluations by:

Beta Manual Number:	Date:
Page Number:	Subject:
Comments (optional-attach manual page):	