VERITAS™

VERITAS NetBackup™ 6.0

System Administrator's Guide, Volume II

for UNIX and Linux

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Contents

Preface

This guide describes how to configure and manage the operation of VERITAS NetBackup™ Server and VERITAS NetBackup Enterprise Server for UNIX and Linux platforms. See the *NetBackup Release Notes* for a list of the hardware and operating system levels that NetBackup supports.

To determine the version and release date of installed software, see the `version` file located here in `/usr/openv/netbackup`

Getting Help

You can find answers to questions and get help from the NetBackup documentation and from the VERITAS technical support web site.

Finding NetBackup Documentation

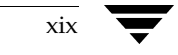
A list of the entire NetBackup documentation set appears as an appendix in the *NetBackup Release Notes*. All NetBackup documents are included in PDF format on the NetBackup Documentation CD.

For definitions of NetBackup terms, consult the online glossary.

▼ **To access the NetBackup online glossary**

1. In the NetBackup Administration Console, click **Help** > **Help Topics**.
2. Click the **Contents** tab.
3. Click **Glossary of NetBackup Terms**.

Use the scroll function to navigate through the glossary.



Accessing the VERITAS Technical Support Web Site

The address for the VERITAS Technical Support Web site is http://support.veritas.com.

The VERITAS Support Web site lets you do any of the following:

- Obtain updated information about NetBackup, including system requirements, supported platforms, and supported peripherals
- Contact the VERITAS Technical Support staff and post questions to them
- Get the latest patches, upgrades, and utilities
- View the NetBackup Frequently Asked Questions (FAQ) page
- Search the knowledge base for answers to technical support questions
- Receive automatic notice of product updates
- Find out about NetBackup training
- Read current white papers related to NetBackup

From http://support.veritas.com, you can complete various tasks to obtain specific types of support for NetBackup:

1. Subscribe to the VERITAS Email notification service to be informed of software alerts, newly published documentation, Beta programs, and other services.

   a. From the main http://support.veritas.com page, select a product family and a product.

   b. Under Support Resources, click **Email Notifications**.

      Your customer profile ensures you receive the latest VERITAS technical information pertaining to your specific interests.

2. Locate the telephone support directory at http://support.veritas.com by clicking the **Phone Support** icon. A page appears that contains VERITAS support numbers from around the world.

   Note Telephone support for NetBackup is only available with a valid support contract. To contact VERITAS for technical support, dial the appropriate phone number listed on the Technical Support Guide included in the product box and have your product license information ready for quick navigation to the proper support group.

3. Contact technical support using e-mail.

a. From the main http://support.veritas.com page, click the **E-mail Support** icon.

A wizard guides you to do the following:

- Select a language of your preference
- Select a product and a platform
- Provide additional contact and product information, and your message
- Associate your message with an existing technical support case

b. After providing the required information, click **Send Message**.

Contacting VERITAS Licensing

For license information, you can contact us as follows:

- Call 1-800-634-4747 and select option 3
- Fax questions to 1-650-527-0952
- In the Americas, send e-mail to amercustomercare@veritas.com.

  In the Asia and Pacific areas, send email to apaccustomercare@veritas.com.

  In all other areas, send email to internationallicense@veritas.com.

Accessibility Features

NetBackup contains features that make the user interface easier to use by people who are visually impaired and by people who have limited dexterity. Accessibility features include:

- Support for assistive technologies such as screen readers and voice input (Windows servers only)
- Support for keyboard (mouseless) navigation using accelerator keys and mnemonic keys

For more information, see the *NetBackup Installation Guide*.

Comment on the Documentation

Let us know what you like and dislike about the documentation. Were you able to find the information you needed quickly? Was the information clearly presented? You can report errors and omissions or tell us what you would find useful in future versions of our manuals and online help.

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- Your comment
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Email your comment to NBDocs@veritas.com.

Please only use this address to comment on product documentation. See "Getting Help" in this preface for information on how to contact Technical Support about our software.

We appreciate your feedback.

Access Management 1

Access to NetBackup can be controlled by defining user groups and granting explicit permissions to these groups. Configuring user groups and assigning permissions is done using **Access Management** in the NetBackup Administration Console.

This chapter discusses how to set up and manage access to NetBackup. It contains the following sections:

Note *Access Management* and *Enhanced Authorization and Authentication* (see Chapter 2) are independent methods of Access Control. Access Management is the newest and will be the preferred method in future NetBackup releases. If both Access Management and Enhanced Authorization and Authentication are configured, Access Management takes precedence.

Note If some media servers are not configured with access control, non-root/non-administrator users will not be able to manage those servers.

NetBackup Access Management Components

NetBackup uses the VERITAS Security Services (VxSS) to help implement core security. VxSS is a set of shared VERITAS infrastructure services, installed from one of the infrastructure common services CDs containing VxSS for your platform. The CDs are packaged as part of NetBackup.

Note NetBackup Access Management relies on the use of home directories. Please see the documentation for your operating system for more information on home directories.

Note In order for members of the *NBU_Operator* user group to continue viewing media and device information, run the following command:

```
bpnbaz -UpGrade60
```

Running this command brings the NetBackup 5.x permissions for the *NBU_Operator* user group up to the expected configuration for 6.0.

VxSS Components

When you install VxSS, you're installing and configuring the following services and client software:

- Authentication (At Server, At Client)

  Authentication is the process of proving your identity to the VxSS system. Authentication is accomplished by communicating with the daemon which, in turn, validates your identity with the operating system.

  For more information on authentication or the authentication daemon (`vxatd`), see the *VERITAS Security Services Administrator's Guide* found on one of the infrastructure common services CDs containing VxSS for your platform.

- Authorization (Az Server, Az Client)

  Authorization is the process of verifying that an identity has permission to perform the desired action. NetBackup verifies permissions with the authorization daemon for most actions. In many cases, NetBackup alters what information is accessible from the command line and Administration Console.

  For more information on authorization or the authorization daemon (`vxazd`), see the *VERITAS Security Services Administrator's Guide* found on one of the infrastructure common services CDs containing VxSS for your platform.

Root Broker

A Root Broker is a NetBackup server that has VxSS Authentication Server installed and is configured to be a Root Broker. There is always one Root Broker in every NetBackup Access Management configuration.

The Root Broker acts as the most trusted certificate authority, implementing a registration authority for Authentication Brokers, as well as itself.

While a Root Broker can authenticate an Authentication Broker, an Authentication Broker cannot authenticate a Root Broker.

In many cases, the Root Broker will also be an Authentication Broker. This chapter describes installing VxSS services, then it describes configuring the NetBackup server to be a Root Broker and an Authentication Broker (Root Broker + AB). For more information on the authentication Root Broker, see the *VERITAS Security Services Administrator's Guide* found on one of the infrastructure common services CDs containing VxSS for your platform.

Authentication Brokers

An Authentication Broker is a server that has VxSS Authentication Server installed. This machine is part of the Root Broker's private Access Management domain. An Authentication Broker can authenticate clients, but not other brokers.

The member of the NetBackup Security Administrator user group can choose which Authentication Broker a client should contact for authentication. (See "Example Configuration Containing Windows Systems Only" on page 29 or "Example Configuration Containing UNIX Systems Only" on page 35 for a depiction of this configuration.)

For example:

- A Windows 2000 client uses a Windows Authentication Broker for authentication.
- A UNIX client uses a UNIX Authentication Broker for authentication.
- For more information on authentication brokers, see the *VERITAS Security Services Administrator's Guide* found on one of the infrastructure common services CDs containing VxSS for your platform.

Security Administrator

The user who installs and configures VxSS software for use with NetBackup Access Management is, by default, a member of the *NBU_Security Admin* user group. This chapter will refer to a member of the *NBU_Security Admin* group as a Security Administrator. Users can be added to the group, but there are usually few members.

Members of the *NBU_Security Admin* user group are the only users who can view the contents of **Access Management** > **Users** and **Access Management** > **NBU User Groups** in the NetBackup Administration Console. Security Administrators are the only users allowed to create user groups, assign users to the groups, and define permissions for the groups. However, Security Administrators, by default, do not have permission to perform any other NetBackup administration activities. (See "Security Administrator (NBU_Security Admin)" on page 58.)

Installation Overview

For a detailed installation description, see "Installing and Configuring Access Control for Master Servers" on page 8.

Order for Installation

1. Complete all NetBackup master server installations:
   a. Complete Root + AB installation of VxSS Authentication server.
   b. Complete VxSS Authorization server installation.
   c. Configure master servers for NetBackup Access Control. See "Installing and Configuring Access Control for Master Servers" on page 8.
2. Complete all NetBackup media server installations, then configure media servers for NetBackup Access Control. See "Installing and Configuring Access Control for Media Servers" on page 12.
3. Complete all NetBackup client installations, then configure clients for NetBackup Access Control. See "Installing and Configuring Access Control for Clients" on page 15.

Order for Upgrade

Use the following order for upgrading any NetBackup machine that uses NetBackup Access Control.

1. Stop NetBackup.
2. Upgrade VxSS.
3. Configure Access Control on the NetBackup machines. See:
   - "Installing and Configuring Access Control for Master Servers" on page 8.
   - "Installing and Configuring Access Control for Media Servers" on page 12.
   - "Installing and Configuring Access Control for Clients" on page 15.

Including VxSS Databases in the NetBackup Catalog Backup

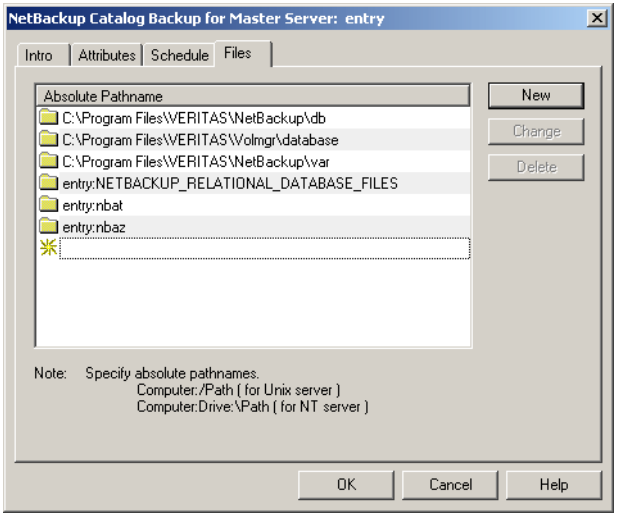
In NetBackup environments which use the online, hot catalog backup method, no additional configuration is needed in order to include the VxSS Authorization and Authentication databases in the catalog backup.

In environments which use the offline, cold catalog backup method, one additional step is required:

Within the NetBackup Catalog Wizard or on the Files tab of the offline catalog configuration dialog, add the following directives for each host in the NBAC domain:

```
[host:]nbat

[host:]nbaz
```



Note If the master server using NBAC is a UNIX machine, VERITAS recommends that you do not include the NetBackup master server configuration file (`/usr/openv/netbackup/bp.conf`) in the offline catalog backup file list. If `bp.conf` is included in the list, it must not be recovered until all other catalog recovery is completed.

VxSS Component Distribution

The VxSS components can be distributed throughout a configuration, just as NetBackup can distribute master servers, media servers and clients.

Note Although the Authentication broker and Authorization broker can technically be placed on any machine, VERITAS currently recommends that the root Authentication broker and Authorization broker be placed on the NetBackup master server. At a minimum, the root Authentication broker must reside on the master server.

For specific VxSS installation information, refer to the *VERITAS Security Services Installation Guide*, found on the VxSS installation CD.

NetBackup Installation	Required Authentication Component	Required Authorization Component
Master server	At server	Az server
Media server	At client	Az client
Client	At client	None
Windows Remote Administration Console (only)	At client	Az client
Java Windows Display Console (only)*	At client	None
Java Display Console	At client	None

*The At client is required for all Java consoles. Concerning the Java Windows Display Console, the At client must be installed on the Windows host before installing the Java Windows Display Console. This ensures that the Windows Display Console is configured correctly to use the VxSS component successfully.

Note While it is possible to share the Enterprise Media Manager server between multiple master servers, this configuration is not supported when using Access Control. The EMM server must be bound to one master server.

The following sections describe some actions you can take to verify that the components are correctly installed in a mixed environment:

- "Windows Verification Points" on page 28
- "UNIX Verification Points" on page 35
- "Verification Points in a Mixed Environment with a UNIX Master Server" on page 41
- "Verification Points in a Mixed Environment with a Windows Master Server" on page 46
- "UNIX Verification Points" on page 35

Installing and Configuring Access Control for Master Servers

The following steps describe configuring NetBackup Access Control for the master server in a NetBackup configuration. A master server requires Authentication Server and Client software and Authorization Server and Client software.

Throughout this chapter, in the configuration examples we'll refer to the following host names:

	Windows	UNIX
Master Servers	win_master	unix_master
Media Servers	win_media	unix_media
Clients	win_client	unix_client

1. If this is an upgrade installation, stop NetBackup.

2. Using one of the infrastructure common services CDs containing VxSS for your platform, install both the VxSS Authentication Server and Client software on the master server. This master server will be a Root + AB (Authentication Broker).

   See "Installing the Authentication Service Root Broker (Root + AB)" on page 18 and the *VERITAS Security Services Installation Guide* on the VxSS installation CD.

3. Using one of the infrastructure common services CDs containing VxSS for your platform, install the VxSS Authorization Server and Client software on the master server. To do this, you must perform a custom installation.

   See "Installing the Authorization Server" on page 21 and the *VERITAS Security Services Installation Guide* on one of the infrastructure common services CDs containing VxSS for your platform.

4. Complete all NetBackup master server installations or upgrades.

5. Create a machine account for the master server. Make sure that the Authentication and the Authorization services are running. See "UNIX Verification Points" on page 35 or "Windows Verification Points" on page 28.

   The command in this step must be run as either `root` (UNIX) or as a member of the local Administrator group (Windows) on the Root+AB Authentication broker. For more information about this step, see "Configuring Authentication on the Root Broker for Use with NetBackup" on page 19.

To add the master server locally to the private domain, run the following command on the master server:

bpnbat is located in directory /usr/openv/netbackup/bin/

```
bpnbat -addmachine
Does this machine use Dynamic Host Configuration Protocol (DHCP)?
(y/n) n
Authentication Broker: win_master
Authentication port[ Enter = default]:
Machine Name: win_master
Password: *******
Password: *******
Operation completed successfully.
```

Note The default Authentication port is 2821.

6. Log in to the machine account for the master server.

   To create a credential for the master server, run the following command on the master server:

```
bpnbat -LoginMachine
Does this machine use Dynamic Host Configuration Protocol (DHCP)?
(y/n) n
Authentication Broker: win_master
Authentication port[ Enter = default]:
Machine Name: win_master
Password: *******
Operation completed successfully.
```

   Note Repeat this step for each alias used by NetBackup.

   For more information about this step, see "Configuring Authentication on the Root Broker for Use with NetBackup" on page 19.

7. Create the first Security Administrator (bootstrapping security).

   bpnbaz is located in directory /usr/openv/netbackup/bin/admincmd

```
bpnbaz -setupsecurity win_master
Please enter the login information for the first Security
Administrator other than root/Administrator. This identity
will be added to the security administrators group
(NBU_Security Admin), and to the netbackup administrators
group (NBU_Admin). It will also be used to build the initial
security information.
Authentication Broker: win_master
```


```
Authentication port[ Enter = default]:
Authentication type (NIS, NIS+, WINDOWS, vx, unixpwd: WINDOWS
Domain: domain1
Login Name: admin1
Password: ******
Processing - please be patient
Operation completed successfully.
```

For more information about this step, see "Configuring the Authorization Server" on page 21.

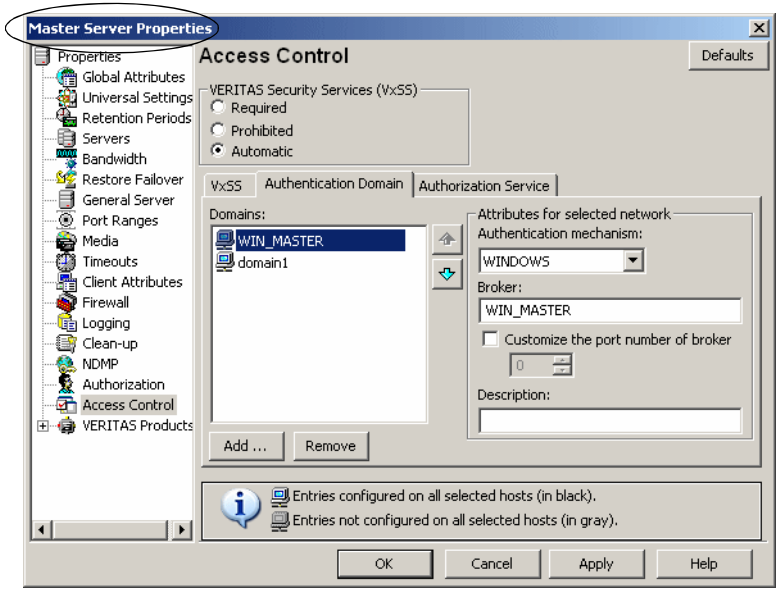
8. Add the master server as a host that is authorized to perform Authorization checks.

```
bpnbaz -AllowAuthorization win_master
Operation completed successfully.
```

For more information about this step, see "Configuring the Authorization Server" on page 21.

9. Configure the Access Control host properties of the master server.
   - Set VERITAS Security Services to **Automatic** or **Required**. (If some clients or media servers will not use NetBackup Access Control, set to **Automatic**.)
   - On the Authentication Domain tab, add authentication domain(s) and the host that will act as the broker for the domain (*domain1)*.

     The broker is a machine using an operating system supporting the domain type and the specific domain that has the VxSS Authentication service installed on it.



- On the Authorization Service tab, specify the master server on which you installed the VxSS Authorization service (*win_master*).

For more information about this step, see "Configuring Access Control Host Properties" on page 23.

10. After changing the host properties, recycle the server daemons for the changes to take effect.

Installing and Configuring Access Control for Media Servers

The following steps describe configuring NetBackup Access Control for a media server in a NetBackup configuration. A media server requires Authentication Client software and Authorization Client software.

1. If this is an upgrade installation, stop NetBackup.

2. Using one of the infrastructure common services CDs containing VxSS for your platform, install Authentication Client software on the system.

3. Using one of the infrastructure common services CDs containing VxSS for your platform,install the Authorization Client software on the media server.

4. Complete all NetBackup media server installations or upgrades.

5. On the master server, create a machine account for the media server. Make sure that the Authentication and the Authorization services are running. See "UNIX Verification Points" on page 35 or "Windows Verification Points" on page 28.

   The command in this step must be run as either `root` (UNIX) or as a member of the local Administrator group (Windows) on the Root+AB Authentication broker.

   To add the media server locally to the private domain, run the following command on the master server:

   `bpnbat` is located in directory `/usr/openv/netbackup/bin`

   ```
   bpnbat -addmachine
   Does this machine use Dynamic Host Configuration Protocol (DHCP)?
   (y/n) n
   Authentication Broker: win_master
   Authentication port[ Enter = default]:
   Machine Name: win_media
   Password: *******
   Password: *******
   Operation completed successfully.
   ```

   For more information about this step, see "Configuring Authentication on the Root Broker for Use with NetBackup" on page 19.

6. Log in to the machine account for the media server.

   To create a credential for the media server, run the following command on the media server:

   ```
   bpnbat -LoginMachine
   ```

```
Does this machine use Dynamic Host Configuration Protocol (DHCP)?
(y/n) n
Authentication Broker: win_master
Authentication port[ Enter = default]:
Machine Name: win_media
Password: *******
Operation completed successfully.
```

Note Repeat this step for each alias used by NetBackup.

For more information about this step, see "Configuring Authentication on the Root Broker for Use with NetBackup" on page 19.

7. Add the media server as a host authorized to perform Authorization checks.

   `bpnbaz` is located in directory `/usr/openv/netbackup/bin/admincmd`

   On the master server, run:

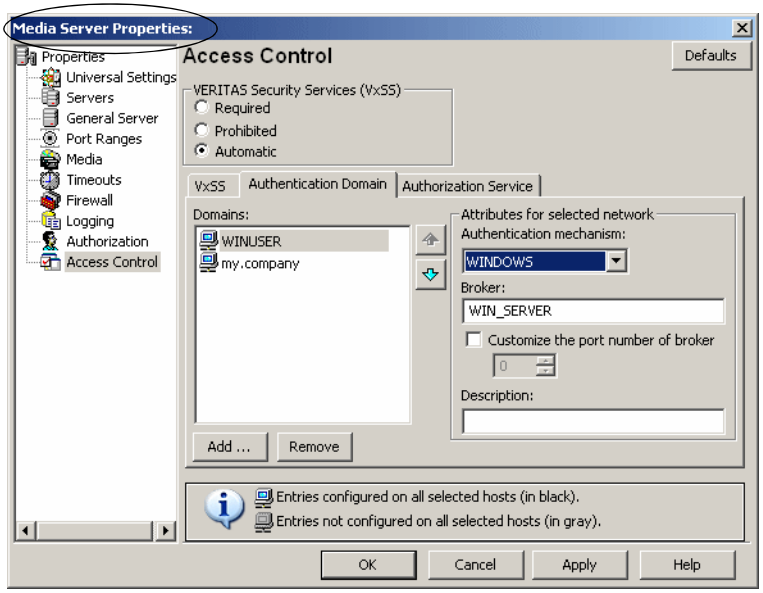
   ```
   bpnbaz -AllowAuthorization win_media
   Operation completed successfully.
   ```

   For more information about this step, see "Configuring the Authorization Server" on page 21.

8. Set up the proper Access Control host properties for the media server. The properties are described in "Configuring Access Control Host Properties" on page 23.

   Open Access Control host properties for the media server *(win_media)* through the master server. In the NetBackup Administration Console, select **NetBackup Management** > **Host Properties** > **Media Server** > *Select media server win_media* > **Access Control**.

   - Set VxSS mode to **Required**. If some clients or media servers will not use NetBackup Access Control, set to **Automatic**.
   - Add authentication domains based on the systems where you have installed Authentication servers and the Authentication methods supported.
     For example, given a Windows system configured for Authentication using domain `WINUSER`, and a UNIX system configured for Authentication using the NIS domain `my.company`, the tab would look like the following:



- On the Authorization Services tab, indicate the host that will perform authorization for this media server.

9. After changing the host properties, recycle the server daemons for the changes to take effect.

Installing and Configuring Access Control for Clients

The following steps describe configuring NetBackup Access Control for a client in a NetBackup configuration. A client requires Authentication Client software.

1. If this is an upgrade installation, stop NetBackup.

2. Using one of the infrastructure common services CDs containing VxSS for your platform, install Authentication Client software on the system.

3. Using one of the infrastructure common services CDs containing VxSS for your platform, install Authentication client software on the system.

4. Using `bpnbat`, register the client with the Authentication Broker, as described in step 2 on page 19.

   For example, if registering a machine *(win_client)* with the Authentication Broker *(win_master)*, run the following command on the At server *(win_master)*.

   To add the client locally to the private domain, run the following command on the master server:

   ```
   bpnbat -AddMachine
   Does the machine use Dynamic Host Configuration Protocol (DHCP)?
   (y/n) n
   Authentication Broker: win_master.min.com
   Authentication Port: [Enter = Default]:
   Name: win_client.min.com
   Password:  [any password]
   Password:  [enter password again]
   Operation completed successfully.
   ```

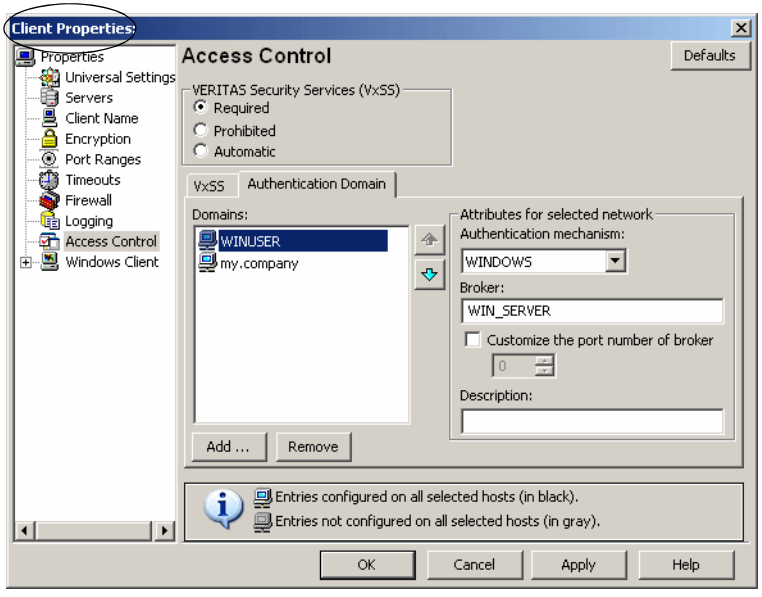
5. To create a credential for the client, run the following command on the client *(win_client)*:

   ```
   bpnbat -loginmachine
   Does this machine use Dynamic Host Configuration Protocol (DHCP)?
   (y/n) n
   Authentication Broker: win_master.min.com
   Authentication port[ Enter = default]:
   Name: win_client.min.com
   Password: [same password as in step a]
   Operation completed successfully.
   ```

6. Set up the proper Access Control host properties for the client. The properties are described in "Configuring Access Control Host Properties" on page 23.

a. Open Access Control host properties for the client *(win_client)* through the master server. In the NetBackup Administration Console, select **NetBackup Management** > **Host Properties** > **Clients** > *Select client win_master* > **Access Control**.

- Set VxSS mode to **Required**.
- Add authentication domains based on the systems where you have installed Authentication servers and the Authentication methods supported.
  For example, given a Windows system configured for Authentication using domain `WINUSER`, and a UNIX system configured for Authentication using the NIS domain `my.company`, the tab would look like the following:



b. Set up Access Control on the master server *(win_master)* for the client:

On the VxSS tab, add win_client.min.com to the **VxSS Network** list as **Required**.

Establishing a Trust Relationship Between the Broker and the Windows Remote Console

To establish a trust relationship between the master server (broker) and the administration client:

1. From the master server, run the following command:

   ```
   Install_path\VERITAS\NetBackup\bin\
   admincmd>bpgetconfig USE_VXSS AUTHENTICATION_DOMAIN
   >VXSS_SETTINGS.txt
   ```

   Sample output of `VXSS_SETTINGS.txt`:

   ```
   USE_VXSS = AUTOMATIC
   AUTHENTICATION_DOMAIN = <domain_name> "" WINDOWS <broker_host> 0
   ```

   Note The actual output identifies the specific domain name and broker host name.

2. Copy `VXSS_SETTINGS.txt` to the Administration Client.

3. Run the following command from the Administration Client:

   ```
   C:\Program Files\VERITAS\NetBackup\bin\
   admincmd>bpsetconfig "<absolute_path>\VXSS_SETTINGS.txt"
   ```

   Running this command matches the VXSS settings on the administration client with those on the broker and sets the administration client to log in automatically to the broker.

4. Launch the Administration Console from the administration client, a request to establish a trust with the broker should be requested. Once the trust is agreed to, the administration console should be available.

Installing the Authentication Service Root Broker (Root + AB)

Before installing the VxSS services which will create a Root Broker that is also an Authentication Broker, check that the following conditions are true:

- Make sure that you are root on the system where you plan to install the VxSS Root Broker software. To become root, enter the following command:

  ```
  su -
  ```

- After becoming `root`, verify that root's home directory is correctly specified. Use the following command:

  ```
  echo $HOME
  ```

- If NetBackup is currently installed, shut down all NetBackup services before installing VxSS software.

Install the VxSS Root Broker software using one of the infrastructure common services CDs containing VxSS for your platform, according to the instructions in the *VERITAS Security Services Installation Guide*. The manual is found on the installation CD.

NetBackup recommends placing the Root + AB broker on the NetBackup master server. This allows for more centralized administration of the NetBackup server and can facilitate upgrading to NetBackup Access Management.

After installing the Authentication Server software, configure the VxSS Root Broker as described in "Configuring Authentication on the Root Broker for Use with NetBackup" on page 19.

Configuring Authentication on the Root Broker for Use with NetBackup

Configure the Root Broker using the NetBackup command, `bpnbat` located in directory `/usr/openv/netbackup/bin/`

1. **Shut down NetBackup on the master server and start the At daemon, then the Az daemon:**

   To shut down NetBackup daemons, use

   ```
   NetBackup stop
   ```

   located in the `goodies` directory.

   To start the At daemon, enter `/opt/VRTSat/bin/vxatd`
   To start the Az daemon, enter `/opt/VRTSaz/bin/vrtsaz`

2. **Allow the machines to communicate with one another:**

Note The steps below require a password that should not be a user or `root` password. The password must be at least five characters long, and match one another in both steps. However, it is not necessary to use the same password each time the two steps are run for a new machine in the domain.

   a. **To add a machine locally to the private domain:**

   In order for the NetBackup master servers, media servers, and clients to communicate, this machine needs to be added to the private database of the Authentication Broker by running the following command on the At server:

   ```
   bpnbat -AddMachine
   Does this machine use Dynamic Host Configuration Protocol (DHCP)?
   (y/n) n
   Authentication Broker: broker
   Authentication port[ Enter = default]: broker_port
   Name: machine_name
   Password: any_password
   Password: Re-enter password
   Operation completed successfully.
   ```

   Where:

   broker is the name of the machine that will act as the Authentication Broker for this machine. In this case, since this machine is Root Broker + AB, enter the name of this machine.

   broker_port is a specified port number. To use the default Authentication port number (2821), press **Enter**.

machine_name is the name of this machine.

any_password may be a unique password (at least five characters long) used only for the purpose of registering this machine. However, the same password *must* be used in both this step, when registering the machine locally in the private domain, *and* the next step, when registering the machine, but not in the private domain.

b. To create a credential for a machine:

In order to log the machine into the specified Authentication Broker, enter the following command on the machine that needs to be logged in:

```
bpnbat -loginmachine
Does this machine use Dynamic Host Configuration Protocol (DHCP)?
(y/n) n
Authentication Broker: broker
Authentication port[ Enter = default]: broker_port
Name: machine_name
Password: same password as in step a
You do not currently trust the server: broker
Do you wish to trust it? (y/n) y
Operation completed successfully.
```

Continue to the next section for instructions on configuring authorization on the Root Broker.

Installing the Authorization Server

Install the VxSS Authorization software from one of the infrastructure common services CDs containing VxSS for your platform, according to the instructions in the *VERITAS Security Services Installation Guide*. The manual is found on the installation CD.

NetBackup recommends installing the Authorization server on the master server. This ensures that the master and media servers are able to communicate with the Authentication server at all times.

Configuring the Authorization Server

The `bpnbaz` command is used during Authorization setup to perform two functions necessary for Access Management:

- Create the object hierarchy that appears in the NetBackup Administration Console under **Access Management**.
- Set up user groups and add the first identity to the security administration group (*NBU_Security Admin*).

`bpnbaz` is located in the directory `/usr/openv/netbackup/bin/admincmd`

Before running `bpnbaz` commands, check that both the Authentication daemon (`vxatd`) and the Authorization daemon (`vxazd`) are running. If necessary, start the At daemon first, then the Az daemon.

Note The user named in the following command will be set up as the first NetBackup security administrator.

1. On the machine where the VxSS Authorization server software is installed and contains the Authorization server, run:

   `bpnbaz -SetupSecurity` *`master_server`* `[-server` *`AZ_server`*`]`

   Where:

   `master_server` is the fully qualified name of the NetBackup master server.

   `AZ_server` is the fully qualified name of the machine where Authorization server software is installed.

Note `bpnbaz -SetupSecurity` must be run by `root` (UNIX) or Administrator (Windows).

   This process may take a number of minutes.

   See step 7 on page 9 for an example of this command.

2. **Allow authorization:**

   Run the following command on the Authorization server:

   `bpnbaz -AllowAuthorization` *`server`*

   This command must be run on the Az server for each master or media server that will utilize NetBackup Access Control.

Note `bpnbaz -AllowAuthorization` *`server`* must be run by `root` (UNIX) or Administrator (Windows).

Where:

server is the fully qualified name of the machine where the Authorization client software is installed. (Typically a media or master server.)

3. **Start NetBackup daemons on the machine(s).**

4. Continue with "Configuring Access Control Host Properties" on page 23 for instructions on configuring NetBackup Access Control host properties for the master server (Root Broker).

Configuring Access Control Host Properties

Until host properties configuration on the master server is complete, NetBackup Access Control is not enforced. As such, UNIX users must temporarily load the Java NetBackup Administration Console (`jnbSA`) as `root` and Windows users must load the NetBackup Administration Console as Administrator.

Note VERITAS recommends setting master server VxSS property to **Automatic** until the clients are configured for Access Control. Then, if desired, change the VxSS property on the master server to **Required**.

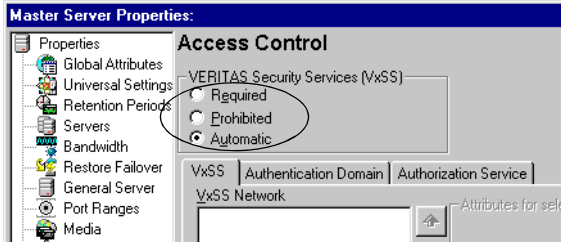
Master Server and Media Server Host Properties

The Access Control host properties are described fully in Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*, but the following sections describe some points to double-check.

To get to the master and media server host properties in the NetBackup Administration Console, open **NetBackup Management** > **Host Properties** > **Master Server** *or* **Media Server** > *Select server* > **Access Control**.

Access Control Host Properties Dialog

Set the **VERITAS Security Services** to either **Required** or **Automatic**. A setting of **Automatic** takes into account that there may be hosts within the configuration that are not upgraded to NetBackup version 5.0 or higher. The server will attempt to negotiate the most secure connection possible when talking to other NetBackup systems.



Note VERITAS recommends setting the master server VxSS property to **Automatic** until the clients are configured for Access Control. Then, if desired, change the VxSS on the master server to **Required**.

When using **Automatic**, you may specify machines or domains requiring VxSS or **Prohibited** from using VxSS.

VxSS Tab

Within the **Access Control** host properties, on the **VxSS** tab, add the master server to the VxSS Network list and set **VERITAS Security Services** to **Required**.

Each new NetBackup client or media server (version 5.0 or higher), added to the NetBackup master, needs to have the Access Control properties configured on both itself and the master. This can be done through the host properties on the master server.

Note VERITAS recommends setting the master server VxSS property to **Automatic** until the clients are configured for Access Control. Then, if desired, change the VxSS on the master server to **Required**.

Authentication Domain Tab

The Authentication Domain tab is used to define the following:

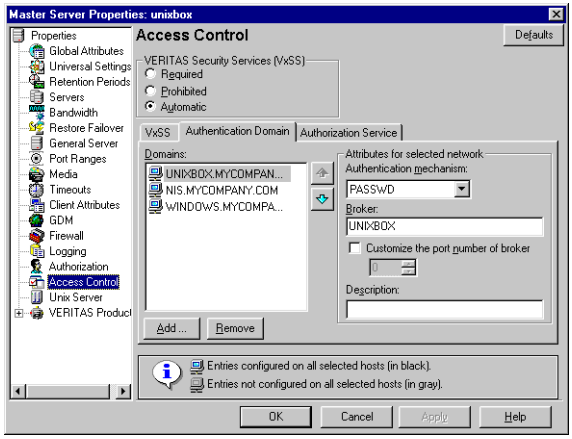
- which Authentication servers support which authentication mechanisms, and
- what domains each supports.

Add the domain you wish users to authenticate against. Be sure to select the proper authentication mechanism.

The following examples contain three authentication domains and three authentication types, two hosted on the authentication server *UNIXBOX*, and a Windows AD/PDC (Active Directory/Primary Domain Controller) hosted on *WINMACHINE.*

A UNIX domain `UNIXBOX.MYCOMPANY.COM` on the Authentication server *UNIXBOX*.

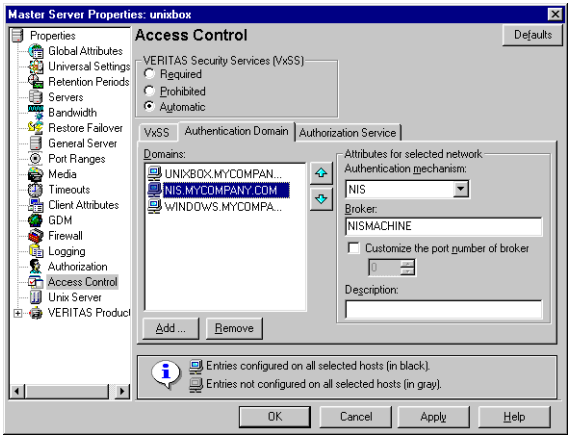
Notice that the authentication mechanism for this domain is PASSWD.



Note If using a UNIX authentication domain, enter the fully qualified domain name of the host performing the authentication.

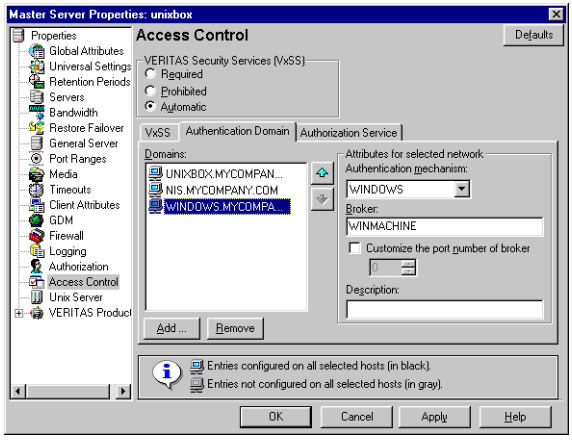
A NIS domain `NIS.MYCOMPANY.COM` on the Authentication server *NISMACHINE*.

Notice that the authentication mechanism for this domain is NIS.



A Windows AD/PDC domain `WINDOWS.MYCOMPANY.COM` on the Authentication server *WINMACHINE*:

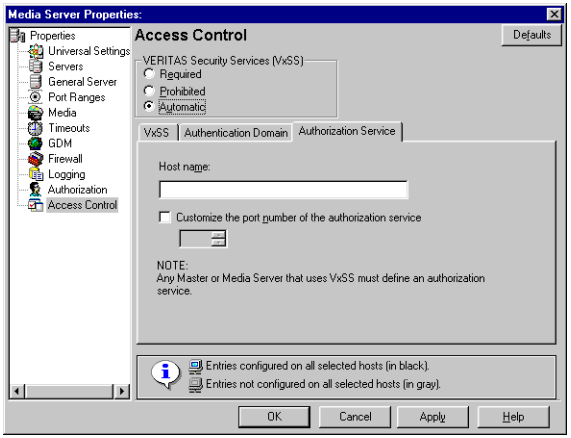
Notice that the authentication mechanism for this domain is WINDOWS.



Authorization Service Tab

Within the **Access Control** host properties, on the **Authorization Service** tab, complete the properties for the Authorization server. Specify the fully qualified domain name for the system running the Authorization daemon (typically the master). If needed, specify the alternate port for which this daemon has been configured. The default listening port for the Authorization daemon is 4032.

After making any changes to the host properties, restart the daemons.



Note If configuring this tab for a media server using Access Control, you must define the host that will perform authorization.

Verifying Master Server Settings

Running `bpnbat -whoami` tells in what domain a host is registered and the name of the machine the certificate represents (*master.min.com*).

```
bpnbat -whoami -cf
"c:\program
Files\veritas\netbackup\var\vxss\credentials\master.min.com"
Name: master.min.com
Domain: NBU_Machines@master.min.com
Issued by: /CN=broker/OU=root@master.min.com/O=vx
Expiry Date: Nov  5 20:17:51 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```

If the domain listed is not NBU_Machines@master.min.com, consider running `bpnbat -addmachine` for the name in question *(master)* on the machine that is serving the NBU_Machines domain *(master)*.

Then, on the machine where we want to place the certificate, run:
`bpnbat -loginmachine`

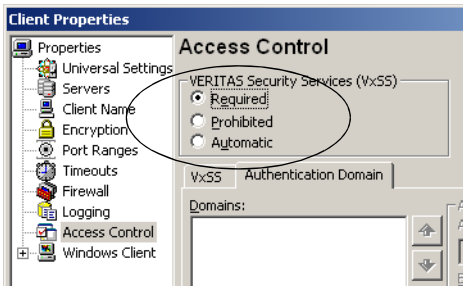
Client Host Properties

To get to the client host properties in the NetBackup Administration Console, open **NetBackup Management** > **Host Properties** > **Master Server** *or* **Media Server** > *Select client(s)* > **Access Control**.

Access Control Host Properties Dialog

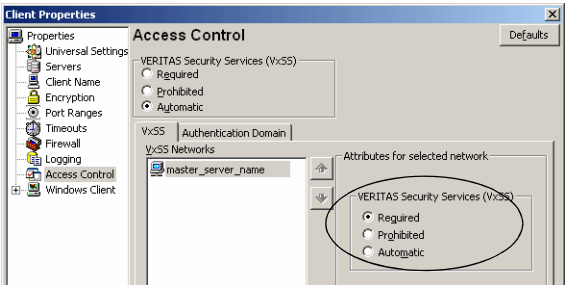
Select the NetBackup client in the host properties. (On the master server, in the NetBackup Administration Console, open **NetBackup Management** > **Host Properties** > **Clients** > *Selected clients* > **Access Control**.)

Set the **VERITAS Security Services** to **Required** or **Automatic**.



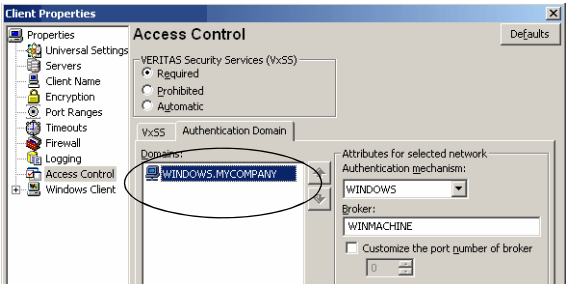
VxSS Tab

Select the NetBackup client in the host properties. This tab is only enabled in **Automatic** mode and can be used to control which systems require or prohibit the use of VxSS on a per-machine basis. Note that both systems must have matching settings in order to have communicate.



Authentication Domain Tab

Within the **Access Control** host properties, on the **Authentication Domain** tab, add the domain in which the NetBackup client resides and select the proper authentication mechanism.



Access Management Troubleshooting Guidelines

In the configuration examples we'll refer to the following host names:

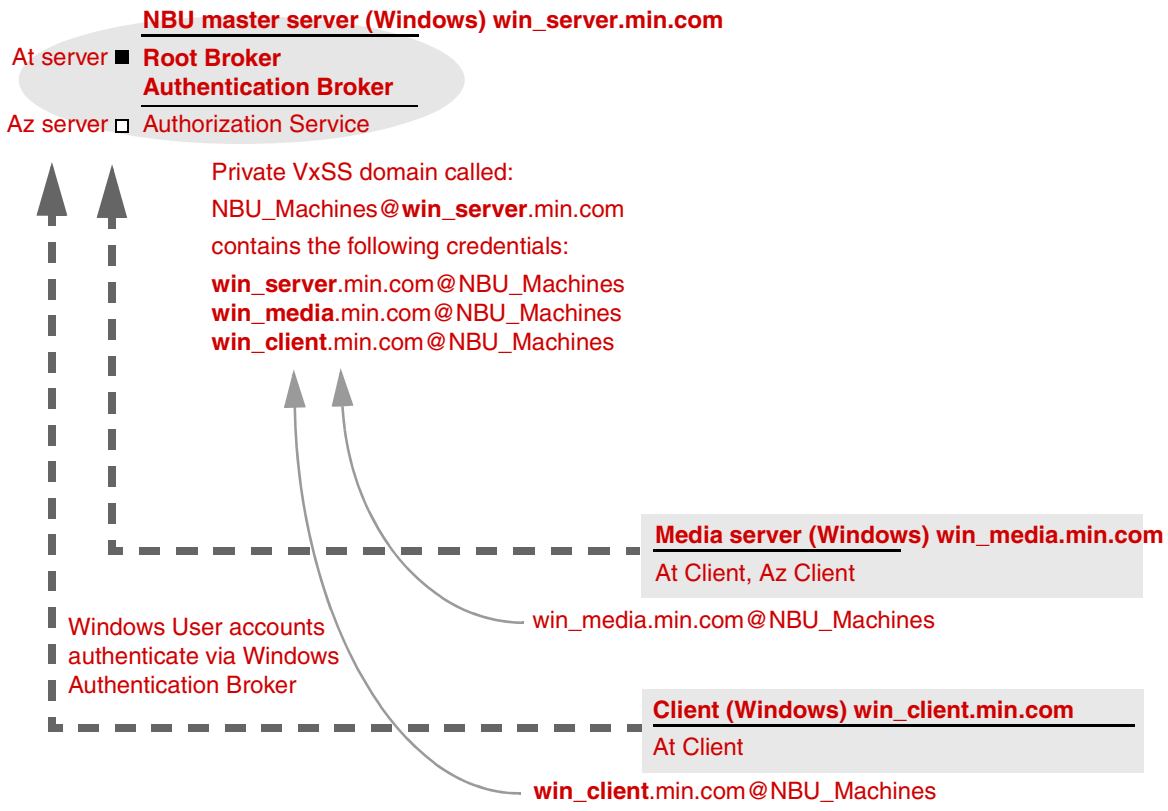
	Windows	UNIX
Master Servers	win_master	unix_master
Media Servers	win_media	unix_media
Clients	*win_client*	unix_client

Note While it is possible to share the Enterprise Media Manager server between multiple master servers, this configuration is not supported when using Access Control. The EMM server must be bound to one master server.

Windows Verification Points

There are procedures that help you verify that the master server, media server and client are configured correctly for Access Control.

Example Configuration Containing Windows Systems Only



Note:
Each machine has a private domain account created for it. Using these accounts allows NetBackup to more reliably identify machines as they communicate with each other.

Master Server Verification Points

The following sections describe procedures for Windows master server verification.

Verify Windows Master Server Settings

To determine in what domain a host is registered (where the primary Authentication broker resides), and the name of the machine the certificate represents, run `bpnbat` with `-whoami`. For example:

```
bpnbat -whoami -cf
"c:\program
Files\veritas\netbackup\var\vxss\credentials\win_master"
Name: win_master.min.com
Domain: NBU_Machines@win_master.min.com
Issued by: /CN=broker/OU=root@win_master.min.com/O=vx
Expiry Date: Nov  5 20:17:51 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```

If the domain listed is not NBU_Machines@win_master.min.com, consider running `bpnbat -addmachine` for the name in question *(win_master)* on the machine that is serving the NBU_Machines domain *(win_master)*.

Then, on the machine where we want to place the certificate, run:
`bpnbat -loginmachine`

Note When determining if a user's credentials have expired, keep in mind that the output displays the expiration time in GMT, not local time.

Note For the remaining procedures in this verification section, we assume that the commands are performed from an operating system window in which the user identity in question has run `bpnbat -login` using an identity that is a member of *NBU_Security Admin*. This is usually the first identity with which the security was set up.

Verify which Machines are Permitted to Perform Authorization Lookups

Logged in as a member of the Administrators group run the following command:

`bpnbaz -ShowAuthorizers`

This command shows that *win_master* and *win_media* (media server) are permitted to perform Authorization lookups. Note that both servers are authenticated against the same vx (VERITAS Private Domain) Domain, NBU_Machines@win_master.min.com.

Note This command must be run by a local administrator or by `root`. The local administrator must be a member of the *NBU_Security Admin* user group.

```
bpnbaz -ShowAuthorizers
==========
Type: User
Domain Type: vx
Domain:NBU_Machines@win_master.min.com
Name: win_master.min.com
==========
Type: User
Domain Type: vx
Domain:NBU_Machines@win_master.min.com
Name: win_media.min.com
Operation completed successfully.
```

If a master or media server is missing from the list of Authorized machines, run `bpnbaz -allowauthorization` to add the missing machine.

Verify that the Database is Configured Correctly

To make sure that the database is configured correctly, run `bpnbaz -listgroups`:

```
bpnbaz -listgroups
NBU_User
NBU_Operator
NBU_Security Admin
Vault_Operator
NBU_Admin
Operation completed successfully.
```

If the groups do not appear, or if `bpnbaz -listmainobjects` does not return data, run `bpnbaz -SetupSecurity`.

Verify that the vxatd and vxazd Processes are Running

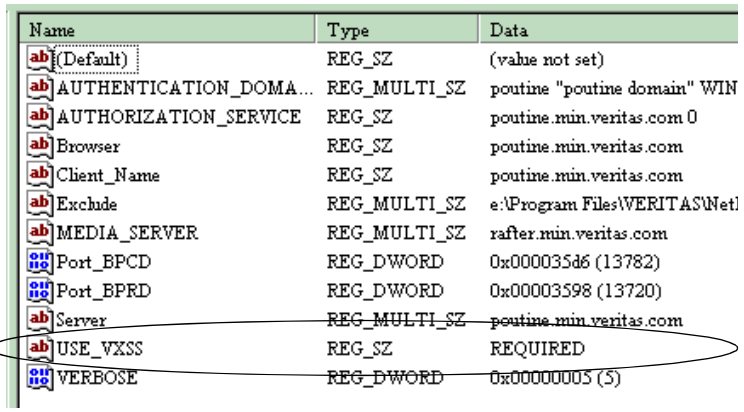
Use the Windows Task Manager to make sure that vxatd.exe and vxazd.exe are running on the designated host. If necessary, start them.

Verify that the Host Properties are Configured Correctly

In the Access Control host properties, verify that the **VERITAS Security Services** property is set correctly. (The setting should be either **Automatic** or **Required**, depending on whether all machines are using VxSS or not. If all machines are not using VxSS, set it to **Automatic**.

This can also be verified by viewing USE_VXSS in the registry at:

```
HKEY_LOCAL_MACHINE\Software\VERITAS\NetBackup\CurrentVersion\config
```



Name	Type	Data
(Default)	REG_SZ	(value not set)
AUTHENTICATION_DOMA...	REG_MULTI_SZ	poutine "poutine domain" WIN
AUTHORIZATION_SERVICE	REG_SZ	poutine.min.veritas.com 0
Browser	REG_SZ	poutine.min.veritas.com
Client_Name	REG_SZ	poutine.min.veritas.com
Exclude	REG_MULTI_SZ	e:\Program Files\VERITAS\Net
MEDIA_SERVER	REG_MULTI_SZ	rafter.min.veritas.com
Port_BPCD	REG_DWORD	0x000035d6 (13782)
Port_BPRD	REG_DWORD	0x00003598 (13720)
Server	REG_MULTI_SZ	poutine.min.veritas.com
USE_VXSS	REG_SZ	REQUIRED
VERBOSE	REG_DWORD	0x00000005 (5)

In the Access Control host properties, verify that the authentication domains listed are spelled correctly and point to the proper servers (valid Authentication brokers). If all domains are Windows-based, they should point to a Windows machine running the At broker.

Media Server Verification Points

The following sections describe procedures for Windows media server verification.

Verify the Media Server

To determine which Authentication broker the media server is authenticated against, run `bpnbat -whoami`. For example:

```
bpnbat -whoami -cf "c:\program
files\veritas\netbackup\var\vxss\credentials\win_media.min.com"
Name: win_media.min.com
Domain: NBU_Machines@win_master.min.com
Issued by: /CN=broker/OU=root@win_master.min.com/O=vx
Expiry Date: Nov  5 20:11:40 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```

Verify that the Server has Access to the Authorization Database

To make sure that the media server is able to access the Authorization database as it needs, run `bpnbaz -ListGroups -CredFile "`*`directory_containing_credential_file`*`"`

For example:

```
bpnbaz -ListGroups -CredFile "C:\Program
Files\VERITAS\NetBackup\var\vxss\credentials\win_media.min.com"
NBU_User
NBU_Operator
NBU_Security Admin
Vault_Operator
NBU_Admin
Operation completed successfully.
```

If this command fails, run `bpnbaz -AllowAuthorization` on the master server that is the Authorization broker *(win_master.min.com).*

Unable to Load Library Message

Verifying the media server and verifying that the media server has access to the proper database indirectly informs us that the VxSS client libraries for both At and Az are properly installed. If either of these procedures fail with messages pertaining to "unable to load libraries," check to make certain the Authentication and Authorization client libraries are installed. See the *VERITAS Security Services Installation Guide* on the VxSS installation CD for proper installation procedures.

You may also verify that the Authentication domains are correct by viewing the Access Control host properties for this media server, or by using `regedit` directly on the media server.

Client Verification Points

The following sections describe procedures for Windows client verification.

Verify the Credential for the Client

To check that the credential for the client is indeed for the correct client and comes from the correct domain, run `bpnbat -whoami`. For example:

```
bpnbat -whoami -cf "c:\program
files\veritas\netbackup\var\vxss\credentials\win_client.min.com"
Name: win_client.min.com
Domain: NBU_Machines@win_master.min.com
Issued by: /CN=broker/OU=root@win_master.min.com/O=vx
Expiry Date: Nov  5 20:11:45 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```


Verify that the VxSS Authentication Client Libraries are Installed

Run `bpnbat -login` on the client to verify that the VxSS authentication client libraries are installed.

```
bpnbat -login
Authentication Broker: win_master
Authentication port[ Enter = default]:
Authentication type (NIS, NIS+, WINDOWS, vx, unixpwd): WINDOWS
Domain: ENTERPRISE
Name: Smith
Password:
Operation completed successfully.
```

This can also be done by looking at the Windows Add/Remove Programs.

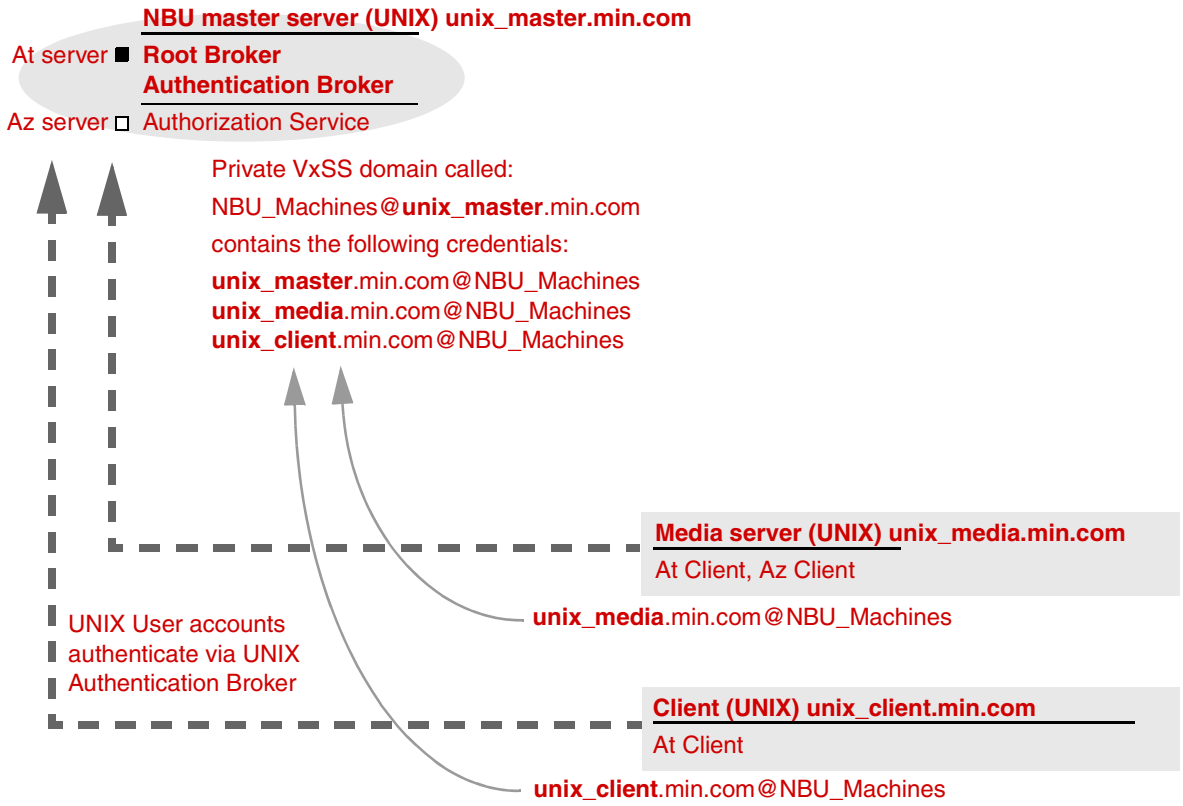
Verify Correct Authentication Domains

In the Access Control host properties or by using `regedit`, check that any defined authentication domains for the client are correct. Make certain the domains are spelled correctly, and that the authentication brokers listed for each of the domains is valid for that domain type.

UNIX Verification Points

These are the procedures that help you verify that the UNIX master server, media server and client are configured correctly for Access Control.

Example Configuration Containing UNIX Systems Only



Note:
Each machine has a private domain account created for it. Using these accounts allows NetBackup to more reliably identify machines as they communicate with each other.

Master Server Verification Points

The following sections describe procedures for UNIX master server verification.

Verify UNIX Master Server Settings

To determine in what domain a host is registered (where the primary Authentication broker resides), and the name of the machine the certificate represents, run `bpnbat` with `-whoami`. For example:

```
bpnbat -whoami -cf
/usr/openv/var/vxss/credentials/unix_master.min.com
Name: unix_master.min.com
Domain: NBU_Machines@win_master
Issued by: /CN=broker/OU=root@win_master/O=vx
Expiry Date: Nov 13 15:44:30 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```

If the domain listed is not NBU_Machines@unix_master.min.com, consider running `bpnbat -addmachine` for the name in question *(unix_master)* on the machine that is serving the NBU_Machines domain *(unix_master)*.

Then, on the machine where we want to place the certificate, run:
`bpnbat -loginmachine`

Note When determining if a user's credentials have expired, keep in mind that the output displays the expiration time in GMT, not local time.

Note For the remaining procedures in this verification section, we assume that the commands are performed from an operating system window in which the user identity in question has run `bpnbat -login` using an identity that is a member of *NBU_Security Admin*. This is usually the first identity with which the security was set up.

Verify which Machines are Permitted to Perform Authorization Lookups

Logged in as root on the Authorization broker, run the following command:

`bpnbaz -ShowAuthorizers`

This command shows that *unix_master* and *unix_media* are permitted to perform Authorization lookups. Note that both servers are authenticated against the same vx (VERITAS Private Domain) Domain, NBU_Machines@unix_master.min.com.

```
bpnbaz -ShowAuthorizers
==========
```

```
Type: User
Domain Type: vx
Domain:NBU_Machines@unix_master.min.com
Name: unix_master.min.com

==========
Type: User
Domain Type: vx
Domain:NBU_Machines@unix_master.min.com
Name: unix_media.min.com

Operation completed successfully.
```

If a master or media server is missing from the list of Authorized machines, run `bpnbaz -allowauthorization` to add the missing machine.

Verify that the Database is Configured Correctly

To make sure that the database is configured correctly, run `bpnbaz -listgroups`:

```
bpnbaz -listgroups
NBU_User
NBU_Operator
NBU_Admin
NBU_Security Admin
Vault_Operator
Operation completed successfully.
```

If the groups do not appear, or if `bpnbaz -listmainobjects` does not return data, run `bpnbaz -SetupSecurity`.

Verify that the vxatd and vxazd Processes are Running

Run the `ps` command to ensure that `vxatd` and `vxazd` are running on the designated host. If necessary, start them. For example:

```
ps -fed |grep vx
root 10716     1  0   Nov 11 ?        0:02 /opt/VRTSat/bin/vxatd
root 10721     1  0   Nov 11 ?        4:17 /opt/VRTSaz/bin/vxazd
```

See the *VERITAS Security Services Administrator's Guide* for more details on how to start `vxatd` and `vxazd`.

Verify that the Host Properties are Configured Correctly

In the Access Control host properties, verify that the **VERITAS Security Services** property is set correctly. (The setting should be either **Automatic** or **Required**, depending on whether all machines are using VxSS or not. If all machines are not using VxSS, set it to **Automatic**.

In the Access Control host properties, verify that the authentication domains listed are spelled correctly and point to the proper servers (valid Authentication brokers). If all domains are UNIX-based, they should point to a UNIX machine running the At broker.

This can also be verified in `bp.conf` using `vi`.

```
cat bp.conf
SERVER = unix_master
SERVER = unix_media
CLIENT_NAME = unix_master
AUTHENTICATION_DOMAIN = min.com "default company NIS namespace" NIS
unix_master 0
AUTHENTICATION_DOMAIN = unix_master "unix_master password file"
PASSWD unix_master 0
AUTHORIZATION_SERVICE = unix_master.min.com 0
USE_VXSS = REQUIRED
#
```

Media Server Verification Points

The following sections describe procedures for UNIX media server verification.

Verify the Media Server

To determine which Authentication broker the media server is authenticated against, run `bpnbat -whoami`. For example:

```
bpnbat -whoami -cf
/usr/openv/var/vxss/credentials/unix_media.min.com
Name: unix_media.min.com
Domain: NBU_Machines@unix_master.min.com
Issued by: /CN=broker/OU=root@unix_master.min.com/O=vx
Expiry Date: Nov  9 14:48:08 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```

Verify that the Server has Access to the Authorization Database

To make sure that the media server is able to access the Authorization database as it needs, run `bpnbaz -ListGroups -CredFile "`*`directory_containing_AZ_db`*`"`

For example:

```
bpnbaz -ListGroups -CredFile
/usr/openv/var/vxss/credentials/unix_media.min.com
NBU_User
NBU_Operator
NBU_Admin
NBU_Security Admin
Vault_Operator
Operation completed successfully.
```

If this command fails, run `bpnbaz -AllowAuthorization` on the master server that is the Authorization broker *(unix_master)*.

Unable to Load Library Message

Verifying the media server and verifying that the media server has access to the proper database indirectly informs us that the VxSS client libraries for both At and Az are properly installed. If either of these procedures fail with messages pertaining to "unable to load libraries," check to make certain the Authentication and Authorization client libraries are installed. See the *VERITAS Security Services Installation Guide* on the VxSS installation CD.

You may also verify that the Authentication domains are correct by viewing the Access Control host properties for this media server, or by using `cat(1)ing` the `bp.conf` file.

Client Verification Points

The following sections describe procedures for UNIX client verification.

Verify the Credential for the Client

To check that the credential for the client is indeed for the correct client and comes from the correct domain, run `bpnbat -whoami`. For example:

```
bpnbat -whoami -cf
/usr/openv/var/vxss/credentials/unix_client.min.com
Name: unix_client.min.com
Domain: NBU_Machines@unix_master.min.com
Issued by: /CN=broker/OU=root@unix_master.min.com/O=vx
Expiry Date: Nov  9 14:49:00 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```


Verify that the VxSS Authentication Client Libraries are Installed

Run `bpnbat -login` on the client to verify that the VxSS authentication client libraries are installed.

```
bpnbat -login
Authentication Broker: unix_master.min.com
Authentication port[ Enter = default]:
Authentication type (NIS, NIS+, WINDOWS, vx, unixpwd): NIS
Domain: min.com
Name: Smith
Password:
Operation completed successfully.
```

This can also be done by looking at `/etc/vx/vss/*.loc` to see where the libraries are installed, and verify they are in the location indicated:

```
cat /etc/vx/vss/*.loc
ProductInstallDir=/opt/VRTSat
ProductInstallDir=/opt/VRTSaz
ls -l /opt/VRTSat/*/opt/VRTSaz/*
```

Verify Correct Authentication Domains

In the Access Control host properties or by using `vi`, check that any defined authentication domains for the client are correct. Make certain the domains are spelled correctly, and that the authentication brokers listed for each of the domains is valid for that domain type.

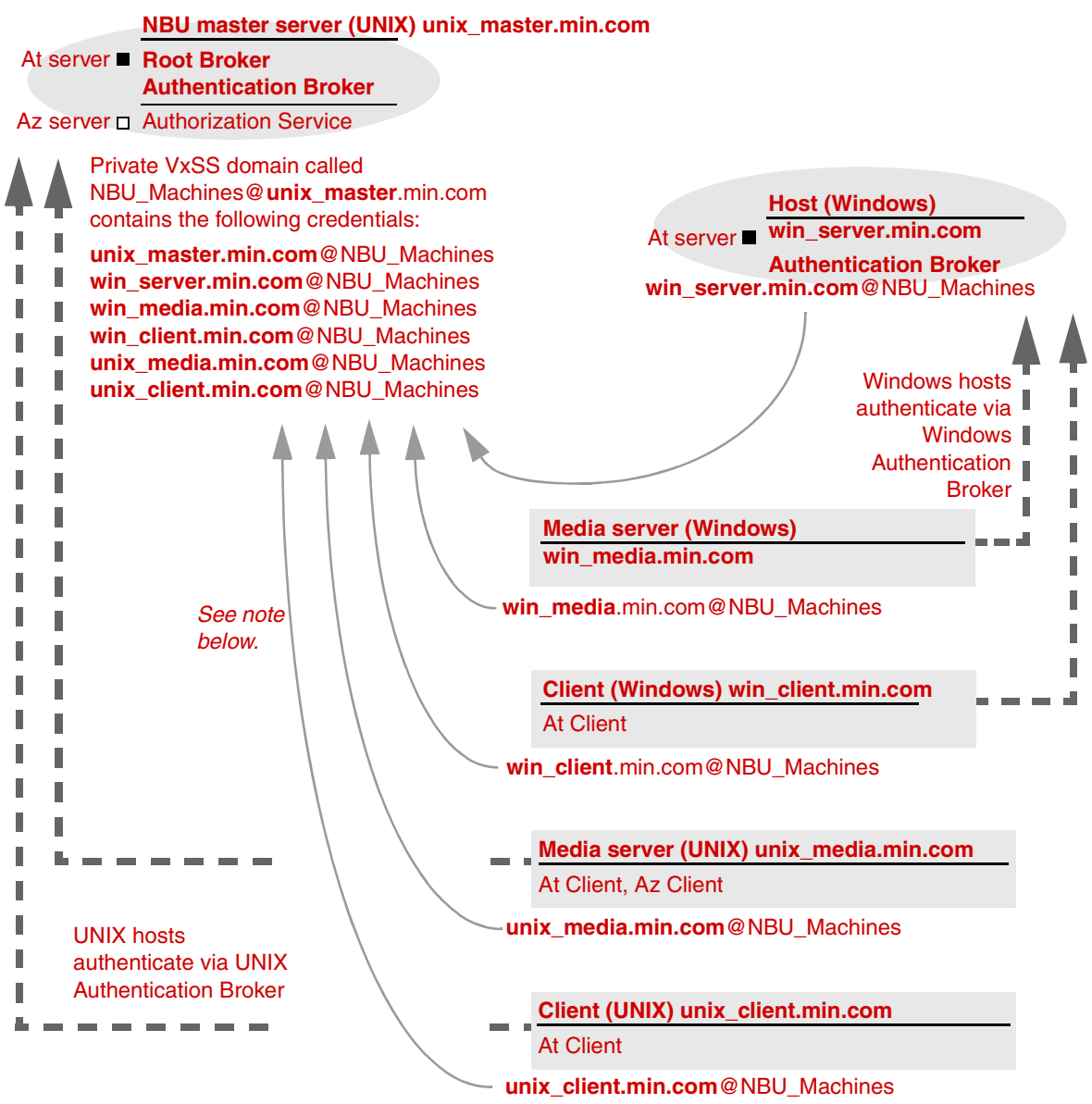
This can also be verified in `bp.conf` using `vi`.

```
cat bp.conf
SERVER = unix_master
SERVER = unix_media
CLIENT_NAME = unix_master
AUTHENTICATION_DOMAIN = min.com "default company NIS namespace" NIS
unix_master 0
AUTHENTICATION_DOMAIN = unix_master "unix_master password file"
PASSWD unix_master 0
AUTHORIZATION_SERVICE = unix_master.min.com 0
USE_VXSS = REQUIRED
```

Verification Points in a Mixed Environment with a UNIX Master Server

The following procedures can help you verify that the master server, media server and client are configured correctly for a heterogeneous NetBackup Access Control environment, where the master server is a UNIX machine.

Example Mixed Configuration Containing a UNIX Master



Note:
Each machine has a private domain account created for it. Using these accounts allows NetBackup to more reliably identify machines as they communicate with each other.

Master Server Verification Points

Follow the same procedures as those listed in "Master Server Verification Points" on page 36.

Media Server Verification Points

Verify the UNIX Media Server

For UNIX media servers, follow the same procedures as those listed in "Media Server Verification Points" on page 38.

Verify the Windows Media Server

Check the machine certificate comes from the root Authentication broker, which is found on the UNIX master server *(unix_master)*.

If the certificate is missing, run the following commands to correct the problem:

- `bpnbat -addmachine` on the root Authentication broker (in this example, *unix_master*)
- `bpnbat -loginmachine` (in this example, *win_media*)

For example:

```
bpnbat -whoami -cf "C:\program
files\veritas\netbackup\var\vxss\credentials\win_media.min.com"
Name: win_media.min.com
Domain: NBU_Machines@unix_master.min.com
Issued by: /CN=broker/OU=root@unix_master.min.com/O=vx
Expiry Date: Nov 13 20:11:04 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```

Verify that a Media Server is Permitted to Perform Authorization Lookups

Make sure the media server is allowed to perform authorization checks by running `bpnbaz -listgroups -CredFile`. For example:

```
bpnbaz -listgroups -CredFile "C:\program
files\veritas\netbackup\var\vxss\credentials\win_media.min.com"
NBU_User
NBU_Operator
NBU_Admin
NBU_Security Admin
Vault_Operator
Operation completed successfully.
```


If the media server is not allowed to perform authorization checks, run `bpnbaz -allowauthorization` on the master server for the media server name in question.

Unable to Load Library Message

Verifying the Windows media server and verifying that the media server is permitted to perform authorization checks indirectly informs us that the VxSS client libraries for both At and Az are properly installed. If either of these procedures fail with messages pertaining to "unable to load libraries," check to make certain the Authentication and Authorization client libraries are installed. See the *VERITAS Security Services Installation Guide* on the VxSS installation CD.

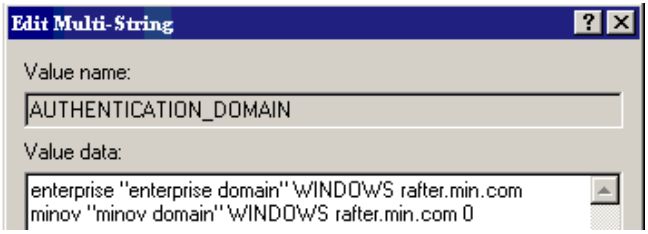
Verify Authentication Domains

You may also verify that the Authentication domains are correct by viewing the Access Control host properties for this media server, or by using `regedit` directly on the media server in the following location:

```
HKEY_LOCAL_MACHINE\Software\VERITAS\NetBackup\CurrentVersion\config\
AUTHENTICATION_DOMAIN
```

Cross Platform Authentication Domains

Take extra care in mixed environments to ensure that the appropriate domain types point to the correct authentication brokers. In the example below, note that the WINDOWS domains point to win_media.min.com.



Client Verification Points

For UNIX client machines, follow the same procedures as those listed in "Client Verification Points" on page 39.

For Windows clients:

Verify the Credential for the Windows Client

To check that the credential for the client is indeed for the correct client and comes from the correct domain, run `bpnbat -whoami`. For example:

```
bpnbat -whoami -cf "c:\program
files\veritas\netbackup\var\vxss\credentials\win_master.min.com"
Name: win_master.min.com
Domain: NBU_Machines@unix_master.min.com
Issued by: /CN=broker/OU=root@unix_master.min.com/O=vx
Expiry Date: Nov 13 19:50:50 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```

Verify that the VxSS Authentication Client Libraries are Installed

Run `bpnbat -login` on the client to verify that the VxSS authentication client libraries are installed. For example:

```
bpnbat -login
Authentication Broker: unix_master.min.com
Authentication port[ Enter = default]:
Authentication type (NIS, NIS+, WINDOWS, vx, unixpwd): NIS
Domain: min.com
Name: Smith
Password:
Operation completed successfully.
```

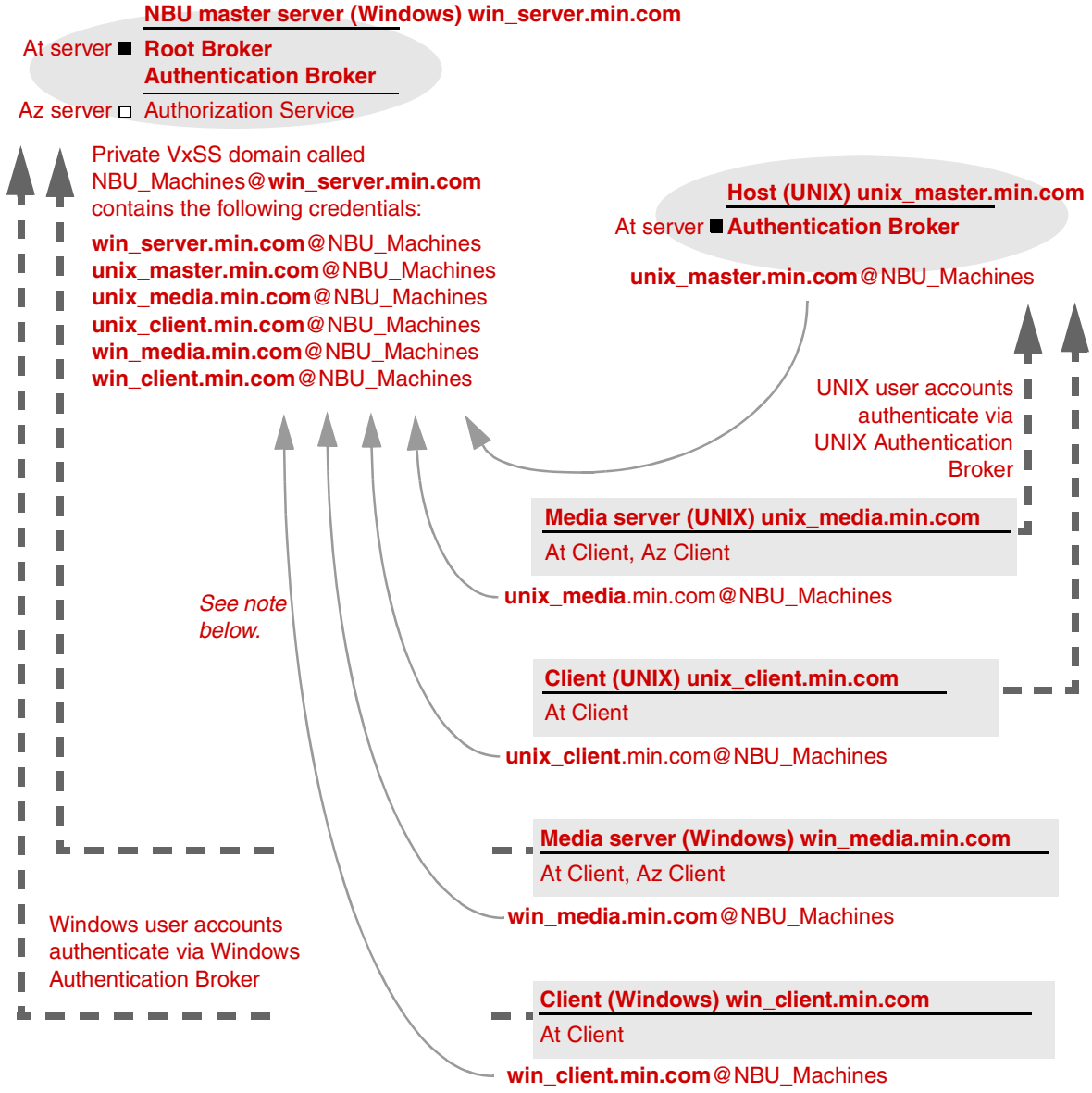
Verifying the Windows Authentication Broker

Make sure that the Windows Authentication broker either has mutual trust with the main UNIX Authentication broker, or is using the UNIX broker as its root broker. See the *VERITAS Security Services Installation Guide* on the VxSS installation CD for more information regarding these scenarios.

Verification Points in a Mixed Environment with a Windows Master Server

The following procedures can help you verify that the master server, media server and client are configured correctly for a heterogeneous NetBackup Access Control environment, where the master server is a Windows machine.

Example Mixed Configuration Containing a Windows Master



Note:
Each machine has a private domain account created for it. Using these accounts allows NetBackup to more reliably identify machines as they communicate with each other.

Master Server Verification Points

Follow the same procedures as those listed in "Master Server and Media Server Host Properties" on page 23.

Media Server Verification Points

Verify the Windows Media Server

For Windows media servers, follow the same procedures as those listed in "Media Server Verification Points" on page 32.

Verify the UNIX Media Server

Check that the machine certificate is issued from the root Authentication broker, found on the Windows master server *(win_master)*. To determine which Authentication broker the media server is authenticated against, run `bpnbat -whoami`. For example:

```
bpnbat -whoami -cf
/usr/openv/var/vxss/credentials/unix_media.min.com
Name: unix_media.min.com
Domain: NBU_Machines@win_master.min.com
Issued by: /CN=broker/OU=root@win_master.min.com/O=vx
Expiry Date: Nov  9 14:48:08 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```

Verify that the Server has Access to the Authorization Database

To make sure that the media server is able to access the Authorization database as it needs to perform authorization checks, run `bpnbaz -ListGroups -CredFile "/usr/openv/var/vxss/credentials/<hostname>"`

For example:

```
bpnbaz -ListGroups -CredFile\
/usr/openv/var/vxss/credentials/unix_media.min.com
NBU_User
NBU_Operator
NBU_Admin
NBU_Security Admin
Vault_Operator
Operation completed successfully.
```

If the media server is not allowed to perform authorization checks, run `bpnbaz -allowauthorization` on the master server for the media server name in question.

Unable to Load Library Message

Verifying the media server and verifying that the media server has access to the proper database indirectly informs us that the VxSS client libraries for both At and Az are properly installed. If either of these procedures fail with messages pertaining to "unable to load libraries," check to make certain the Authentication and Authorization client libraries are installed. See the *VERITAS Security Services Installation Guide* on the VxSS installation CD.

Cross Platform Authentication Domains

You may also verify that the Authentication domains are correct by viewing the Access Control host properties for this media server, or by using `cat(1)ing` the `bp.conf` file.

Take extra care in mixed environments to ensure that the appropriate domain types point to the correct authentication brokers. In the example below, note that the PASSWD and NIS domains point to unix_media.min.com, which, in this example, is the UNIX Authentication broker:

```
cat bp.conf
SERVER = win_master.min.com
MEDIA_SERVER = unix_media.min.com
CLIENT_NAME = unix_media
AUTHENTICATION_DOMAIN = win_master "win_master domain" WINDOWS
win_master.min.com
 0
AUTHENTICATION_DOMAIN = enterprise "enterprise domain" WINDOWS
win_master.min.com 0
AUTHENTICATION_DOMAIN = unix_media.min.com "local unix_media
domain" PASSWD unix_media.min.com 0
AUTHENTICATION_DOMAIN = min.com "NIS domain" NIS
unix_media.min.com 0
AUTHORIZATION_SERVICE = win_master.min.com 0
USE_VXSS = REQUIRED
```

Client Verification Points

Verify the Credential for the Windows Client

For Windows clients, follow the same procedures as those listed in "Client Verification Points" on page 33.

Verify the Credential for the UNIX Client

To check that the credential for the client is indeed for the correct client and comes from the correct domain, run `bpnbat -whoami`. For example:

```
bpnbat -whoami -cf \
"/usr/openv/var/vxss/credentials/unix_client.min.com"
Name: unix_client.min.com
Domain: NBU_Machines@win_master.min.com
Issued by: /CN=broker/OU=root@win_master.min.com/O=vx
Expiry Date: Nov  6 21:16:01 2004 GMT
Authentication method: VERITAS Private Security
Operation completed successfully.
```

Verify that the VxSS Authentication Client Libraries are Installed

Run `bpnbat -login` on the client to verify that the VxSS authentication client libraries are installed.

```
bpnbat -login
Authentication Broker: unix_media.min.com
Authentication port[ Enter = default]:
Authentication type (NIS, NIS+, WINDOWS, vx, unixpwd): NIS
Domain: min.com
Name: Smith
Password:
You do not currently trust the server: unix_media.min.com, do you
wish to tr
ust it? (y/n):
y
Operation completed successfully.
```

Verify the UNIX Authentication Broker

Make sure that the UNIX Authentication broker either has mutual trust with the main Windows Authentication broker, or is using the Windows broker as its root broker. See the *VERITAS Security Services Installation Guide* on the VxSS installation CD for more information regarding this scenario.

Other Troubleshooting Topics

The following sections describe topics that may be helpful when configuring VxSS with NetBackup.

Expired Credentials Message

If your credential has expired or is incorrect, you may receive the following message while running a `bpnbaz` or `bpnbat` command:

```
Supplied credential is expired or incorrect. Please reauthenticate and
try again.
```

Run `bpnbat -Login` to update an expired credential.

Useful Debug Logs

The following logs are useful when debugging NetBackup Access Control:

On the master: `admin`, `bpcd`, `bprd`, `bpdbm`, `bpjobd`

On the client: `admin`, `bpcd`, `bprd`, `bpdbjobs`

See the *NetBackup Troubleshooting Guide* for instructions on implementing proper logging.

If Uninstalling VxSS

On UNIX:

Using `installvss`, select the option for uninstalling Authentication and Authorization. The following directories should be empty after uninstalling:

```
/opt
/etc/vx/vss
/var/
```

On Windows:

Use the Windows **Add/Remove Programs** panel from the Control Menu to uninstall Authentication and Authorization. The `\Veritas\Security` directory should be empty after uninstalling.

Where Credentials Are Stored

NetBackup VxSS credentials are stored in the following UNIX directories:

User credentials: `$HOME/.vxss`

Machine credentials: `/usr/openv/var/vxss/credentials/`

How System Time Affects Access Control

Credentials have a birth and death time. Machines with large discrepancies in time may see credentials as being created in the future or may prematurely consider a credential to be expired. Consider synchronizing system time if you have trouble communicating between systems.

VxSS Ports

VxSS daemons listen at the following ports:

Authentication:

```
netstat -an | grep 2821
```

Authorization:

```
netstat -an | grep 4032
```

Stopping VxSS Daemons

When stopping the VxSS daemons, stop Az first, then stop At.

When stopping the VxSS services, stop Authorization first, then stop Authentication.

UNIX: Use the following commands.

To stop Az: `/opt/VRTSaz/bin/vrtsaz -stop`

To stop At: Use the term signal as shown in the example below:

```
# ps -fed |grep vxatd
    root 16018     1  4 08:47:35 ?        0:01 ./vxatd
    root 16019 16011  0 08:47:39 pts/2    0:00 grep vxatd
# kill 16018
# ps -fed |grep vxard
    root 16021 16011  0 08:47:48 pts/2    0:00 grep vxard
```

Windows:

Use the Services utility that Windows provides, since these services do not appear in the NetBackup Activity Monitor.

If You Lock Yourself Out of NetBackup

It is possible to lock yourself out of the NetBackup Administration Console if Access Control is incorrectly configured.

If this occurs, use `vi` to read the bp.conf entries (UNIX) or `regedit` (Windows) to view the Windows registry in the following location:

`HKEY_LOCAL_MACHINE\Software\VERITAS\NetBackup\CurrentVersion\config`

You'll look to see if he following entries are set correctly: AUTHORIZATION_SERVICE, AUTHENTICATION_DOMAIN, and USE_VXSS.

If the administrator does not wish to use NetBackup Access Control or does not have the VxSS libraries installed, make certain that the USE_VXSS entry is set to **Prohibited**, or is deleted entirely.

nbac_cron Utility

Use the `nbac_cron` utility to create identities under which to run *cron* or *at* jobs.

`nbac_cron` is found in the following location:

UNIX: `/opt/openv/netbackup/bin/goodies/nbac_cron`

Windows: *`Install_path`*`\netbackup\bin\goodies\nbac_cron.exe`

nbac_cron options:

- `-SetupAt [-Port #]`
  `-SetupCron [-Port #]`

  Either option sets up an Authentication account. Optionally, specify a port number to use for authentication.

- `-AddAt`

  Create an *at* account for a user.

- `-AddCron`

  Create a *cron* account for a user.

Using the Access Management Utility

Users assigned to the NetBackup Security Administrator user group have access to **Access Management**. Users assigned to any other user group, including NetBackup Administrator, can see the Access Management node in the NetBackup Administration Console, but cannot expand it.

If a user other than a Security Administrator tries to select **Access Management**, an error message displays. Toolbar buttons and menu items specific to **Access Management** are not displayed.

Upon successful completion, the default NetBackup user groups should display in the NetBackup Administration Console under **Access Management** > **NBU User Groups**.

To list the groups on the command line, run `bpnbaz -ListGroups` on the machine where the VxSS Authorization server software is installed.

`bpnbaz` is located in directory `/usr/openv/netbackup/bin/admincmd`

(You must be logged in as the Security Administrator by using `bpnbat -login`)

```
bpnbaz -ListGroups
NBU_User
NBU_Operator
NBU_Admin
NBU_Security Admin
Vault_Operator
Operation completed successfully.
```

The NetBackup user groups are listed. This verifies that the Security Administrator can access the user groups.

Access Management Menus

The Menu bar consists of the following menu items:

Option	Description
File	Options **Change Server**, **New Window from Here**, **Adjust Application Time Zone**, **Export**, **Page Setup**, **Print Preview**, **Print**, **Close Window**, and **Exit** are described in Chapter 1 of the *NetBackup System Administrator's Guide for UNIX, Volume I*.
Edit	Options **New**, **Change**, **Delete**, and **Find** are described in Chapter 1 of the *NetBackup System Administrator's Guide for UNIX, Volume I*. The **Change** option is available when a NBU user group is selected in the details pane.

Option	Description
View	Options **Show Toolbar**, **Show Tree**, **Back**, **Forward**, **Up One Level**, **Options**, **Refresh**, **Column Layout**, **Sort**, and **Filter** are described in Chapter 1 of the *NetBackup System Administrator's Guide for UNIX, Volume I*.
Actions	The Actions menu contains the following options when **Access Management** is selected: ◆ **New User Group:** Click to create a new NetBackup user group. ◆ **Copy to New User Group:** Use to create a new user group based on an existing user group. Users and permissions can be changed as needed for the new user group.
Help	Options **Help Topics**, **Troubleshooter**, **License Keys**, **Current NBAC User**, and **About NetBackup Administration Console** are described in Chapter 1 of the *NetBackup System Administrator's Guide for UNIX, Volume I*.

Determining Who Can Access NetBackup

Access Management allows only one user group, by default, the *NBU_Security Admin* user group, to define the following aspects of NetBackup Access Management:

- The permissions of individual users.
- The creation of user groups.

First, determine which NetBackup resources your users will need to access. (See "Permissions for Default NetBackup User Groups" on page 65 for resources and associated permissions.)

The Security Administrator may want to first consider what different users have in common, then create user groups with the permissions that these users require. User groups generally correspond to a role, such as administrators, operators, or end-users.

Consider basing user groups on one or more of the following criteria:

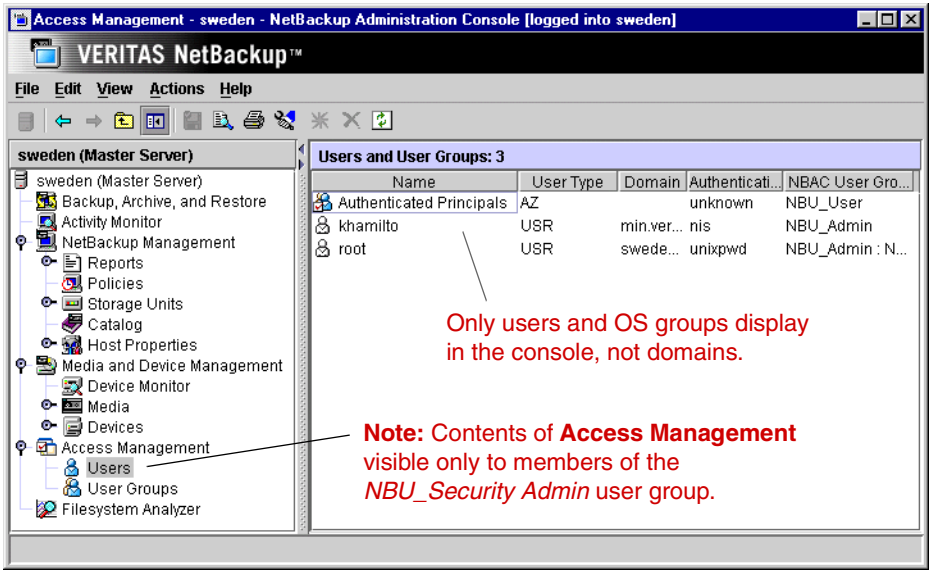
- Functional units in your organization (UNIX administration, for example)
- NetBackup resources (drives, policies, for example)
- Location (East Coast or West coast, for example)
- Individual responsibilities (tape operator, for example)

Note Permissions are granted to individuals in user groups, not to individuals on a per-host basis. If a machine is authenticated within the configuration, any individual in the user group can operate NetBackup to the extent that they are authorized to do so. There are no restrictions based on a machine name.

Individual Users

NetBackup Access Management uses your existing OS-defined users, groups, and domains. As such, Access Management maintains no list of users and passwords. When defining members of groups, the Security Administrator is specifying existing OS level users as members of user groups.

Every authenticated user belongs to at least one authorization user group. By default, every user belongs to the user group *NBU_Users*, which contains all authenticated users.



There are two types of users that are implicit members of groups:

- On the server hosting the Authorization daemons, `root` is an implicit member of the *NBU_Security Admin* user group
- All authenticated users are implicit members of the *NBU_Users* user group

All other groups must have members defined explicitly. The NetBackup Security Administrator can delete members added manually to other groups; however, the Security Administrator may not delete the predefined implicit members of the *NBU_Users* and *NBU_Security Admin* groups. OS groups and OS users may be added to an authorization group.

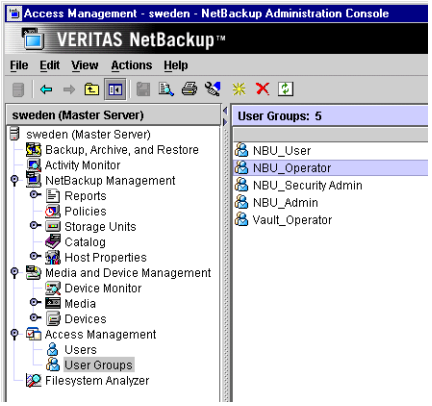
Note Although *root* (UNIX) or *administrator* (Windows) on the master server are added to the NetBackup Administrators user group and get NetBackup Administrator permissions, *root* and *administrator* are not predefined users.)

User Groups

Rather than assigning permissions directly to individual users, NetBackup Access Management is configured by assigning permissions to user groups, then assigning users to the user groups.

Upon successful installation, NetBackup provides five default user groups that complement how sites often manage the duties of NetBackup operation. The user groups are listed under **Access Management** > **NBU User Groups**. Keep in mind that the contents of **Access Management** are visible to members of the *NBU_Security Admin* group only.

The Security Administrator may choose to use the default NetBackup user groups, or may choose to create custom user groups.



Note: Contents of **Access Management** visible only to members of the *NBU_Security Admin* user group.

Default User Groups

The permissions granted to users in each of the five default user groups correlate to the group name. Essentially, an authorization object correlates to a node in the NetBackup Administration Console tree.

The following sections describe each NetBackup default user group:

Security Administrator (*NBU_Security Admin*)

There are usually very few members in the *NBU_Security Admin* user group. The only permission that the Security Administrator possesses by default is that of configuring Access Control within **Access Management**. Configuring Access Control includes the following permissions:

- Ability to see the contents of **Access Management** in the NetBackup Administration Console
- Ability to create, modify and delete users and user groups
- Ability to assign users to user groups
- Ability to assign permissions to user groups

Administrator (*NBU_Admin*)

By default, members of the *NBU_Admin* user group have full permission to access, configure, and operate any NetBackup authorization object. In other words, members have all the capabilities that are currently available to administrators without Access Management in place. However, as members of this group, it is not necessary to log on as root or administrator at the OS level.

Note Members of the *NBU_Admin* user group cannot see the contents of **Access Management**, and therefore, cannot ascribe permissions to other user groups.

Operator (*NBU_Operator*)

The main task of the *NBU_Operator* user group is to monitor jobs. For example, members of the *NBU_Operator* user group might monitor jobs and notify a NetBackup administrator if there is a problem so the problem can be addressed by the administrator. Using the default permissions, a member of the *NBU_Operator* user group would probably not have enough access to be address larger problems.

Members of the *NBU_Operator* user group have permissions that allow them to perform some tasks such as moving tapes, operating drives, and inventorying robots.

Note In order for members of the NBU_Operator user group to continue viewing media and device information, run the command `bpnbaz -UpGrade60`. Running this command brings the NetBackup 5.x permissions for the NBU_Operator user group up to the expected configuration for 6.0.

Default User (*NBU_User*)

The *NBU_User* user group is the default NetBackup user group with the fewest permissions. Members of the *NBU_User* user group can only backup, restore, and archive files. *NBU_User* user group members have access to the functionality of the NetBackup client interface (BAR).

Vault Operator (*Vault_Operator*)

The *Vault_Operator* user group is the default user group that contains permissions to perform the operator actions necessary for the Vault process.

Additional User Groups

The Security Administrator (member of *NBU_Security Admin* or equivalent) can create user groups as needed. Although the default user groups can be selected, changed and saved, NetBackup recommends that the groups be copied, renamed, then saved in order to retain the default settings for future reference.

User Group Configuration

The Security Administrator can create a new user groups by clicking **Actions** > **New Group** or by selecting an existing user group and selecting **Actions** > **Copy to New Group**.

▼ **To create a new user group**

1. As a member of the *NBU_Security Admin* user group (or equivalent), expand **Access Management** > **User Groups**.
2. Select **Actions** > **New User Group**. The Add New User Group dialog displays, opened to the **General** tab.
3. Type the name of the new group in the **Name** field, then click the **Users** tab. For more information on users, see "Users Tab" on page 61.
4. Select the defined users that you wish to assign to this new user group, then click **Assign**. Or, to include all the defined users in the group, click **Assign All**. To remove users from the assigned users list, select the user name, then click **Remove**.
5. Click the **Permissions** tab. For more information on permissions, see "Permissions Tab" on page 64.
6. Select a resource from the Resources list, then select the permissions for the object.
7. Click **OK** to save the user group and the group permissions.

▼ **To create a new user group by copying an existing user group**

1. As a member of the *NBU_Security Admin* user group (or equivalent), expand **Access Management** > **User Groups**.
2. Select an existing user group in the Details pane. (The pane on the left side of the NetBackup Administration Console.)

3. Select **Actions** > **Copy to New User Group**. A dialog based on the selected user group displays, opened to the **General** tab.

4. Type the name of the new group in the **Name** field, then click the **Users** tab.

5. Select the defined users that you wish to assign to this new user group, then click **Assign**. Or, to include all the defined users in the group, click **Assign All**. To remove users from the assigned users list, select the user name, then click **Remove**.

6. Click the **Permissions** tab.

7. Select a resource from the Resources list, then select the permissions for the object.

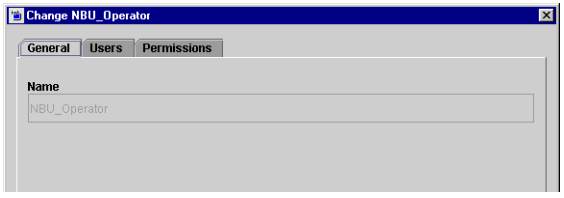
8. Click **OK** to save the user group and the group permissions. The new name for the user group appears in the Details pane.

Renaming User Groups

Once a NetBackup user group has been created, the user group cannot be renamed. The alternative to directly renaming a user group is to copy the user group, give the copy a new name, ensure the same membership as the original, then delete the original NetBackup user group.

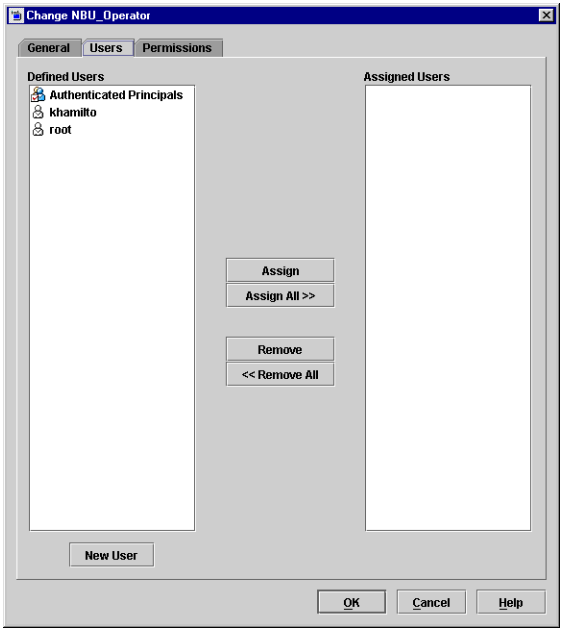
General Tab

The General tab contains the name of the user group. If creating a new user group, the **Name** field can be edited.



Users Tab

The Users tab contains controls to assign and remove users from user groups.



Defined Users

The Defined Users list is a list of all users defined manually within other groups.

- **Assign** button: Select a user in the Defined User list and click **Assign** to assign that user to a user group.
- **Assign All** button: Click **Assign All** to add all defined users to the user group.

Assigned Users

The **Assigned Users** list contains defined users who have been added to the user group.

- **Remove** button: Select a user in the Assigned Users list and click **Remove** to remove that user from the user group.
- **Remove All** button: Click **Remove All** to remove all assigned users from the Assigned User list.

New User

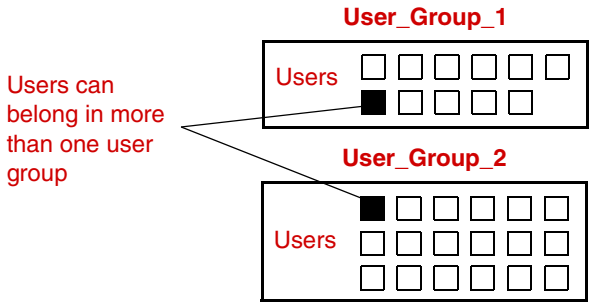
Click **New User** to add a user to the **Defined Users** list. After adding a user, the name appears in the **Defined Users** list and the Security Administrator can assign the user to the user group. (See "To add a new user to a user group" on page 63.)

Defining User Groups and Users

NetBackup authenticates existing users of the operating system rather than requiring that NetBackup users be created with a NetBackup password and profile.

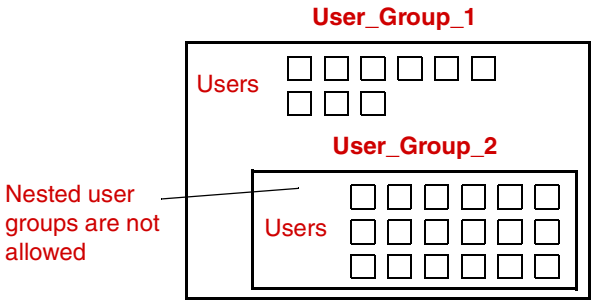
Defining a User Group

Users can belong to more than one user group and have the combined access of both groups.

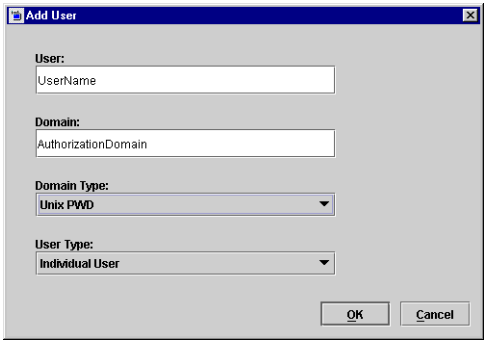


While users can be members of multiple user groups simultaneously, NetBackup does not allow user groups to be nested.

For example, while members of a user group can belong to more than one user group, a user group cannot belong to another user group.



▼ To add a new user to a user group



1. As a member of the *NBU_Security Admin* user group (or equivalent), expand **Access Management** > **NBU User Groups**.
2. Double-click on the user group to which you wish to add a user.
3. Select the **Users** tab and click **New User**.
4. Enter the user name and the authentication domain. Select the domain type of the user: NIS, NIS+, PASSWD, Windows or Vx. See the *VERITAS Security Services Administrator's Guide* for more information on domain types.

   For the **User Type**, select whether the user is an individual user or an OS domain.
5. Click **OK**. The name is added to the Assigned Users list.

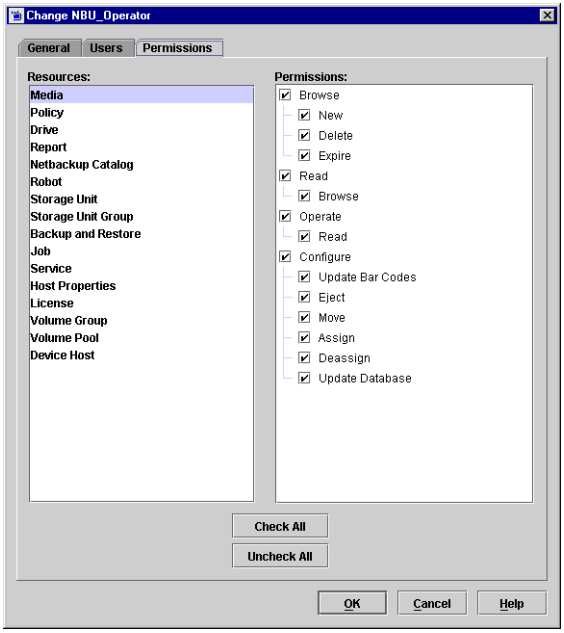
Permissions Tab

The **Permissions** tab contains a list of NetBackup authorization objects and configurable permissions associated with each object.

Authorization Objects and Permissions List

Select an authorization object, then place a check in front of a permission that you want to grant the members of the user group currently selected.

When a user group is copied to create a new user group, the permission settings are copied as well.



Permissions for Default NetBackup User Groups

The permissions granted to users in each of the five default user groups correlate to the name of the user group.

In the following tables:

- *X* indicates that the specified user group has permission to perform the activity.
- --- indicates that the user group does not have permission to perform the activity.

Backup, Archive, and Restore (BAR) Client Interface

The table below shows the permissions associated with the BAR authorization object for the five default NetBackup user groups. BAR includes only Access and Operate permission sets, and does not include a Configure permission set.

In the NetBackup Administration Console, BAR is accessed by selecting **File** > **Backup, Archive, and Restore**.

Backup, Archive, and Restore Permission Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read	---	X	X	X	X
	Browse	---	X	X	X	X
Operate	Backup	---	X	X	X	X
	Restore	---	X	X	X	---
	Alternate client	---	X	X	---	---
	List	---	X	X	X	X
	DB Agent	---	X	---	---	---
	Admin Access	---	X	---	---	---

License Permissions

The table below shows the permissions associated with the License authorization object for the five default NetBackup user groups.

In the NetBackup Administration Console, the license dialog is accessed by selecting **Help** > **License Keys**.

License Permission Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read license	---	X	---	---	---
	Browse license	---	X	---	---	---
Configure	New	---	X	---	---	---
	Delete	---	X	---	---	---
Operate	Assign license	---	X	---	---	---

Jobs Tab in the Activity Monitor Permissions

The table below shows the permissions associated with the Jobs tab authorization object for the five default NetBackup user groups.

The Jobs tab is found in the NetBackup Administration Console under **NetBackup Management** > **Activity Monitor** > **Jobs** tab.

Jobs Tab Permission Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read job	---	X	X	---	---
	Browse job	---	X	X	---	---
Configure	Delete job	---	X	X	---	---
	New job	---	X	X	---	---
Operate	Suspend job	---	X	X	---	---
	Resume job	---	X	X	---	---
	Restart job	---	X	X	---	---
	Cancel job	---	X	X	---	---

Permissions in the Device Monitor

The table below shows the permissions associated with the Device Monitor authorization object for the five default NetBackup user groups.

The Device Monitor is found in the NetBackup Administration Console under **Media and Device Management**.

Device Monitor Permission Default

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read device host	---	X	X	---	---
	Browse device host	---	X	X	---	---
Configure	New	---	X	---	---	---
	Delete	---	X	---	---	---
Operate	Up drive	---	X	X	---	---
	Down drive	---	X	X	---	---
	Reset drive	---	X	X	---	---

Daemons Tab Permissions in the Activity Monitor

The table below shows the permissions associated with the Daemons tab authorization object for the five default NetBackup user groups. The Daemons tab includes only Access and Operate permission sets, and does not include a Configure permission set.

The Daemons tab is found in the NetBackup Administration Console under **NetBackup Management** > **Activity Monitor** > **Daemons** tab.

Daemons Tab Permission Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read	---	X*	X	---	---
	Browse	---	X*	X	---	---
Operate	Stop daemon	---	X**	X	---	---

* The Read and Browse permissions do not have an affect on the Daemons tab. This information is harvested from the server using user level calls to access the process list and is displayed to all users for informational purposes.

** If a user is *not* a member of the NBU_Admin user group, but *is* logged on as an OS administrator (`root`), the user will be able to restart a daemon from the command line only:

```
/etc/init.d/netbackup start
```

If a user is a member of the NBU_Admin user group, but *is not* logged on as an OS administrator (`root`), the user will *not* be able to restart a daemon from the NetBackup Administration Console or from the command line.

Reports Permissions

The table below shows the permissions associated with the Reports authorization object for the five default NetBackup user groups. Reports includes only the Access permission set, and does not include a Configure or Operate permission set.

Reports is found in the NetBackup Administration Console under **NetBackup Management** > **Reports**.

Reports Permission Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read report	---	X	---	---	X
	Browse report	---	X	---	---	X

Policy Permissions

The table below shows the permissions associated with the Policy authorization object for the five default NetBackup user groups.

Policy is found in the NetBackup Administration Console under **NetBackup Management** > **Policies**.

Policy Permission Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read policy	---	X	X	---	---
	Browse policy	---	X	X	---	---
Configure	New policy	---	X	---	---	---
	Delete policy	---	X	---	---	---
Operate	Activate policy	---	X	---	---	---
	Deactivate policy	---	X	---	---	---
	Backup (manually)	---	X	X	---	---

Storage Units Permissions

The table below shows the permissions associated with the Storage Unit authorization object for the five default NetBackup user groups.

Storage Units is found in the NetBackup Administration Console under **NetBackup Management** > **Storage Units**.

Storage Unit Permission Set Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read storage unit	---	X	---	---	---
	Browse storage unit	---	X	---	---	---
Configure	New storage unit	---	X	---	---	---
	Delete storage unit	---	X	---	---	---
Operate	Assign storage unit	---	X	---	---	---

Storage Unit Groups Permissions

The table below shows the permissions associated with the Storage Unit Groups authorization object for the five default NetBackup user groups.

Storage Unit Groups is found in the NetBackup Administration Console under **NetBackup Management** > **Storage Unit Groups**.

Storage Unit Groups Permission Set Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read storage unit group	---	X	---	---	---
	Browse storage unit group	---	X	---	---	---
Configure	New storage unit group	---	X	---	---	---
	Delete storage unit group	---	X	---	---	---
Operate	Assign storage unit group	---	X	---	---	---

Catalog Permissions

The table below shows the permissions associated with the Catalog authorization object for the five default NetBackup user groups.

Catalog is found in the NetBackup Administration Console under **NetBackup Management** > **Catalog**.

Catalog Permission Set Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read catalog	---	X	---	---	---
	Browse catalog	---	X	---	---	---
Configure	Online, hot catalog backup	---	X	---	---	---
	Offline, cold catalog backup	---	X	---	---	---
	Delete	---	X	---	---	---
	Expire	---	X	---	---	---
Operate	Verify catalog	---	X	---	---	---
	Duplicate catalog	---	X	---	---	---
	Import catalog	---	X	---	---	---
	Set Primary Copy	---	X	---	---	---
	Backup (online, hot method)	---	X	---	---	---
	Backup (offline, cold method)	---	X	---	---	---
	Recover online, hot catalog backup	---	X	---	---	---
	Recover offline, cold catalog backup	---	X	---	---	---
	Read configuration	---	X	---	---	---
	Set configuration	---	X	---	---	---

Host Properties Permissions

The table below shows the permissions associated with the Host Properties authorization object for the five default NetBackup user groups.

Host Properties is found in the NetBackup Administration Console under **NetBackup Management** > **Host Properties**.

Host Properties Permission Set Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read host properties	---	X	X	---	---
	Browse host properties	---	X	X	---	---
Configure	New host properties	---	X	---	---	---
	Delete host properties	---	X	---	---	---

Media Permissions

The table below shows the permissions associated with the Media authorization object for the five default NetBackup user groups.

Media is found in the NetBackup Administration Console under **Media and Device Management** > **Media**.

Media Permission Set Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read media	---	X	X	---	X
	Browse media	---	X	X	---	X
Configure	New media	---	X	---	---	---
	Delete media	---	X	---	---	---
	Expire media	---	X	---	---	---
Operate	Update barcode	---	X	X	---	X
	Inject media	---	X	X	---	X
	Eject media	---	X	X	---	X
	Move media	---	X	X	---	X
	Assign media	---	X	X	---	X
	Deassign media	---	X	X	---	X
	Update database	---	X	X	---	X

Volume Group Permissions

The table below shows the permissions associated with the Volume Group authorization object for the five default NetBackup user groups.

Volume Group is found in the NetBackup Administration Console under **Media and Device Management** > **Media** > **Volume Groups**.

Volume Group Permission Set Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read volume group	---	X	X	---	---
	Browse volume group	---	X	X	---	---
Configure	New volume group	---	X	---	---	---
	Delete volume group	---	X	---	---	---

Volume Pools Permissions

The table below shows the permissions associated with the Volume Pools authorization object for the five default NetBackup user groups.

Volume Pools is found in the NetBackup Administration Console under **Media and Device Management** > **Media** > **Volume Pools**.

Volume Pools Permission Set Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read volume pool	---	X	X	---	---
	Browse volume pool	---	X	X	---	---
Configure	New volume pool	---	X	---	---	---
	Delete volume pool	---	X	---	---	---
Operate	Assign volume pool	---	X	---	---	---

Robots Permissions

The table below shows the permissions associated with the Robots authorization object for the five default NetBackup user groups.

Robots is found in the NetBackup Administration Console under **Media and Device Management** > **Media** > **Robots**.

Volume Robots Permission Set Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read robot	---	X	X	---	X
	Browse robot	---	X	X	---	X
Configure	New robot	---	X	---	---	---
	Delete robot	---	X	---	---	---
Operate	Inventory robot	---	X	X	---	X

Device Host Permissions

The table below shows the permissions associated with the Device Host authorization object for the five default NetBackup user groups.

Device Host is found in the NetBackup Administration Console under **Media and Device Management** > **Devices** > **Hosts**.

Device Host Permission Set Defaults

Set	Activity	Sec Admin	NBU_Admin	NBU_Operator	NBU_User	Vault_Operator
Access	Read device host	---	X	X	---	---
	Browse device host	---	X	X	---	---
Configure	New device host	---	X	---	---	---
	Delete device host	---	X	---	---	---
	Synchronize device host	---	X	X	---	---
Operate	Stop device host	---	X	X	---	---

Enhanced Authentication and Authorization 2

Enhanced *authentication* allows each side of a NetBackup connection to verify the host and user on the other side of the connection. By default, NetBackup runs without enhanced authentication.

Enhanced *authorization* determines if authenticated users (or groups of users) have NetBackup administrative privileges. By default, NetBackup provides administrative privileges to UNIX `root` administrators or Windows system administrators on NetBackup servers. In order to use the enhanced authorization, you must configure and enable it.

This chapter contains the following sections:

Note Access Management and Enhanced Authorization and Authentication are independent methods of access control. Access Management is the newest method and will be the preferred method in future NetBackup releases. If both Access Management and Enhanced Authorization and Authentication are configured, Access Management takes precedence.

Note Please note that Enhanced Authorization and Authentication will be removed from the next major release of NetBackup.

There are additional types of authorization outside of what is described in this chapter.

One of these is the appearance of `MEDIA_SERVER` entries in the `bp.conf`. The machine listed as a `MEDIA_SERVER` has media server privileges *only* and has no administrative privileges. For more information, see "MEDIA_SERVER" on page 140.

Another form of authorization concerns restricting administrative privileges when using the NetBackup Java Console (`jnbSA`) through entries in `auth.conf`.

Refer to "NetBackup-Java Administration Console Architectural Overview" on page 484 in *NetBackup System Administrator's Guide, Volume I* for information relevant to understanding this topic.

Common Configuration Elements

The following sections describe elements involved in configuring enhanced authentication and enhanced authorization.

Configuration Files

The following configuration files are used by enhanced authentication, enhanced authorization, or both of these files. Some may need to be modified during configuration.

Location of Configuration Files

Option	File	Master or Media Server Platform	Path to Directory
Enhanced Authentication and Enhanced Authorization	methods.txt template.methods.txt* methods_allow.txt template.methods_allow.txt* methods_deny.txt template.methods_deny.txt* names_allow.txt template.names_allow.txt* names_deny.txt template.names_deny.txt*	UNIX	`/usr/openv/var/auth`
		Windows	*`install_path`*`\NetBackup\var\auth`
Enhanced Authorization	authorize.txt	UNIX	`/usr/openv/var/`
		Windows	*`install_path`*`\NetBackup\var\`

* If it is necessary to create a new .txt file, base the new .txt file on the template file.

methods.txt

The `methods.txt` file is an essential file which defines the supported enhanced authentication methods.

By default, `methods.txt` lists the two supported methods:

- `vopie`: one-time password authentication. The `vopie` method authenticates user name, host names, and group/domain names.
- `noauth` authentication: The `noauth` method exchanges user name, host names, and group/domain names, but makes no attempt to verify that the information is correct.

Each method is listed on a separate line in the file, and shows the method number, method name, and the path to a shared library:

Entries in methods.txt File

Platform	Line in methods.txt
UNIX (except HP-UX)	`128 vopie /usr/openv/lib/libvopie.so` `0 noauth /usr/openv/lib/libvnoauth.so`
UNIX (HP-UX only)	`128 vopie /usr/openv/lib/libvopie.sl` `0 noauth /usr/openv/lib/libvnoauth.sl`
Windows	`128 vopie` *`install_path`*`\NetBackup\lib\libvopie.dll` `0 noauth` *`install_path`*`\NetBackup\lib\libvnoauth.dll`

The order in which the methods are listed in the file is important: The method listed first indicates that it is preferred to the second method.

Syntax rules for `methods.txt`

- Empty lines are ignored
- The # character and all following characters on a line are ignored.

methods_allow.txt

The `methods_allow.txt` file defines the authentication methods that NetBackup servers and clients can use.

When a client or server attempts a connection, it specifies the authentication method it is using. The other server or client then checks its `methods_allow.txt` file to determine if that method is allowed for the system that is attempting the connection. If an entry in this file matches the host and method, the method is allowed. Otherwise, NetBackup checks the `methods_deny.txt` file.

```
# All hosts in the ourcompany.com domain and host name
# bob.theircompany.com can use the vopie method.
vopie : .ourcompany.com, bob.theircompany.com
```


```
#
# Hosts with IP addresses in the 12.123.56 network and IP address
# 2.123.57.23 can use all methods.
ALL : 12.123.56.
ALL : 12.123.57.23
```

The keyword `ALL` is used to specify all valid methods, as in the previous example, or all possible hosts.

The default file is empty.

- Each entry must be on a separate line.
- Empty lines are ignored.
- The # character and all following characters on a line are ignored.
- If a domain name is preceded by a dot (.), all hosts in that domain will match.
- If a network number is followed by a dot (.), all IP numbers in that network will match.
- A comma-separated list of domain name patterns and network number patterns can be specified on a single line.

methods_deny.txt

The `methods_deny.txt` file defines the authentication methods that NetBackup servers and clients *cannot* use.

NetBackup checks this file only if the `methods_allow.txt` file does not have a matching entry for the host and method. If a matching entry is found in `methods_deny.txt` the method is not allowed and authentication is not used. Otherwise, the method is used and authentication proceeds.

Example methods_deny.txt File

```
# All hosts in the ourcompany.com domain cannot use the vopie method.
vopie : .ourcompany.com
#
# Hosts with IP addresses in the 12.123.56 network cannot use all
# methods.
ALL : 12.123.56.
```

The default file contains only the following entry:

```
ALL : ALL
```

This means that all methods are denied for all hosts, unless it is specified otherwise in the `methods_allow.txt` file.

Syntax Rules for methods_deny.txt

The syntax rules for `methods_deny.txt` are the same as for `methods_allow.txt`.(See "Syntax rules for `methods.txt`" on page 77.)

names_allow.txt

The `names_allow.txt` file defines the network host names that a NetBackup client or server can use when establishing connections. This file is required when NetBackup client or server names do not correlate to their host names and IP addresses.

For example, when:

- NetBackup clients are using DHCP or another dynamic addressing scheme. Here, a client probably uses a different IP address each time it attempts a connection.
- A NetBackup server or client has more than one network interface. Here, the host name associated with the IP address can be different than the NetBackup server or client name.
- A NetBackup server or client connects through a gateway. Here, the peername for the gateway can be different than the NetBackup server or client name.

In the above instances, when a client or server attempts a connection, NetBackup checks the `names_allow.txt` file to determine if the network-host name for the connection correlates to a NetBackup name. If a match is found, the connection is allowed. Otherwise, NetBackup checks the `names_deny.txt` file.

If NetBackup client and server names correlate to their host names and IP addresses, then neither the `names_allow.txt` file or the `names_deny.txt` file are used.

Each line in `names_allow.txt` contains a logical name (usually, a NetBackup client name) followed by a colon and then a list of comma-separated host names or IP addresses.

```
# The next three client entries can match IP numbers in the
# 123.123.56 network.
client1 : 123.123.56.
client2 : 123.123.56.
client3 : 123.123.56.
#
# The entry below permits the name fred to be used for hosts
# dhcp0 and dhcp1 in the ourcompany.com domain.
fred : dhcp0.ourcompany.com, dhcp1.ourcompany.com
```

The default file is empty.

The syntax rules for `names_allow.txt` are the same as for `methods_allow.txt`. The only variation is the `ALL` keyword, which in this case specifies all valid names or all possible hosts. (See "Syntax rules for `methods.txt`" on page 77.)

names_deny.txt

The `names_deny.txt` file defines the NetBackup client or server names that hosts cannot use. NetBackup checks this file only if the `names_allow.txt` file does not have a matching entry for the host and name. If a matching entry is found in `names_deny.txt` the name is not allowed and authentication fails. Otherwise, the name is used and authentication proceeds.

Example names_deny.txt File

```
# The entry below prevents the name fred to be used for hosts
# in the theircompany.com domain.
fred : .theircompany.com
#
# The entry below prevents any names from being used for hosts
# with IP addresses in the 12.123.53 network.
ALL : 123.123.53.
```

The default file contains only the following entry:

```
ALL : ALL
```

This means that all names are denied for all hosts, unless it is specified otherwise in the `names_allow.txt` file.

Syntax Rules for names_deny.txt

The syntax rules for `names_deny.txt` are the same as for `names_allow.txt` (See "Syntax rules for `methods.txt`" on page 77.)

authorize.txt

The `authorize.txt` file is created when a user is added to the list of authorized users. (See "To create a list of authorized users" on page 99.)

File Location of authorize.txt

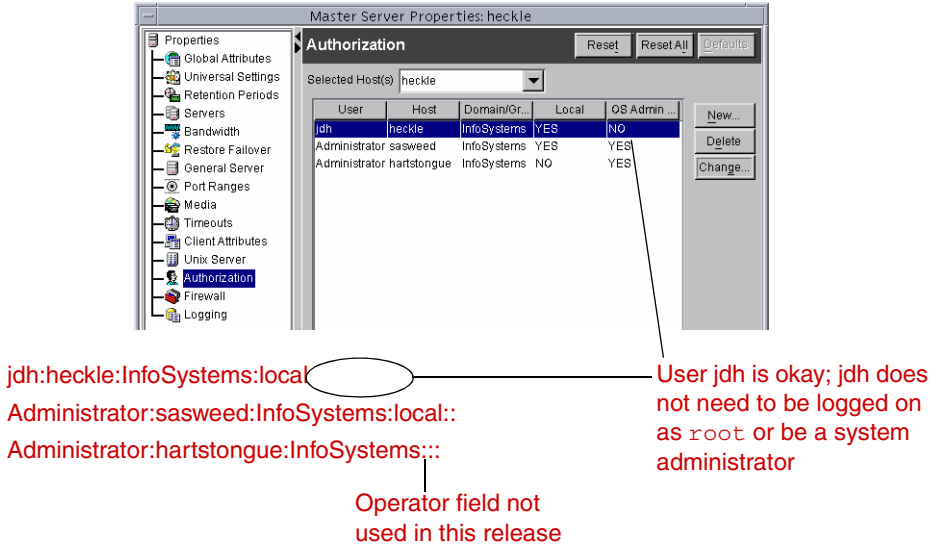
Platform	Path
UNIX	`/usr/openv/var/authorize.txt`
Windows	*`install_path`*`\NetBackup\var\authorize.txt`

Use the following format for authorization entries in the `authorize.txt` file:

`host_name:user_name:domain_group_name``[:local[:operator:][:userok]]]`

The figure below compares Authorization property page entries with the corresponding `authorize.txt` file.

Comparing Authorization Property Page Entries and authorize.txt Entries



If the NetBackup Administration Console is UNIX:

- *host_name* is the remote NetBackup Administration Console name, or * for all hosts.
- *user_name* is the UNIX user name, or * for all users.
- *domain_group_name* is a netgroup name or a local group name, or * for all groups. For information about netgroups refer to the `netgroup` man page.
- `local` (if specified) indicates that the *domain_group_name* is a local group name.
- `operator` is not in use for this release.
- `userok` (if specified) indicates that the user does not need to be an OS administrator.

Use * in the *user_name* and *host_name* fields to authorize all users and/or hosts. For comments, use a # symbol.

If the NetBackup Administration Console is Windows:

- *user_name* is the Windows Administrator name, or * for all users.
- *host_name* is the remote NetBackup Administration Console host name, or * for all hosts.
- *domain_group_name* is the Windows domain and group name in the form *domain**group*. Or, use * to indicate all domains/groups.

- `local` (if specified) indicates the group is not a domain group, but is local to the host specified by *`host_name`*.
- `operator` is not in use for this release.
- `userok` (if specified) indicates that the user does not need to be an OS administrator.

For comments, use a # symbol.

```
# Authorize 'root' with a local group name
# of 'admin' on the UNIX server
root:dog:admin:local
#
# Authorize all Windows Administrators that are
#members of NETBACKUP\Domain Admins
*:*:NETBACKUP\Domain Admins
```

Library Files

The library files that are required for authentication depend on the platform. (See "methods.txt" on page 76.)

Commands

The following commands are used to configure and manage authentication. For more information on these commands, see *NetBackup Commands for UNIX and Linux*.

bpauthorize

Use `bpauthorize` to manage the `authorize.txt` files on remote machines for enhanced authorization. Or, make changes in the NetBackup Administration Console of the master server. (See "To create a list of authorized users" on page 99.)

bpauthsync

Run `bpauthsync` on the master server to set up enhanced authentication for one or more clients and media servers. `bpauthsync` ensures that the hashed and unhashed files contain the correct information.

Location of bpauthsync and bpauthorize commands

Platform	Path
UNIX	`/usr/openv/netbackup/bin/admincmd/`

Location of bpauthsync and bpauthorize commands

Windows	*install_path*\NetBackup\bin\admincmd\

vopie_util

Run `vopie_util` on NetBackup servers and clients to update the hashed (public) and unhashed (secret) key files for the vopie authentication method on the local system. Typically, `vopie_util` is used to synchronize the `vopie` key files between two systems.

Location of vopied_util command

Platform	Path
UNIX	/usr/openv/bin/
Windows	*install_path*\NetBackup\bin\

Processes: vopied Daemon

The `vopied` daemon manages the authentication of nonroot users on Windows and UNIX clients and servers. By default, NetBackup configures the system to automatically start `vopied` when the system is started.

To start `vopied` directly, run `vopied` from the following directory on the client or server:

Location of vopied Daemon

Platform	Path
UNIX	/usr/openv/bin/vopied
Windows	*install_path*\NetBackup\bin\vopied

Files

The `vopie` processes use public and secret files during authentication. In addition, a temp file is created that contains challenges and responses to the system. The following sections describe those files.

vopie Files

The vopie processes use public (hashed) and secret (unhashed) files:

hashed (public key) Files

The hashed files contain the authentication challenges that the local system presents to remote systems.

Location of hashed Files

Platform	Path
UNIX	/usr/openv/var/auth/vopie/hashed/*localhost*/*remotehost*.txt
Windows	*install_path*\NetBackup\var\auth\vopie\hashed\ *localhost**remotehost*.txt

- The *localhost* is the host name of the local system. There will be a local host directory for every possible local host name.
- The *remotehost* contains the hashed or public key for the remote system named *remotehost*.

There is a *remotehost*.txt file for each remote system that can be authenticated. Only root on the local system can read or write these files.

unhashed (secret key) Files

The unhashed files contains the secret key that NetBackup uses when it responds to challenges from remote systems.

Location of Unhashed Files

Platform	Path
UNIX	/usr/openv/var/auth/vopie/unhashed/ *localhost/remotehost*.txt
Windows	*lnstall_path*\NetBackup\var\auth\vopie\unhashed\ *localhost**remotehost*.txt

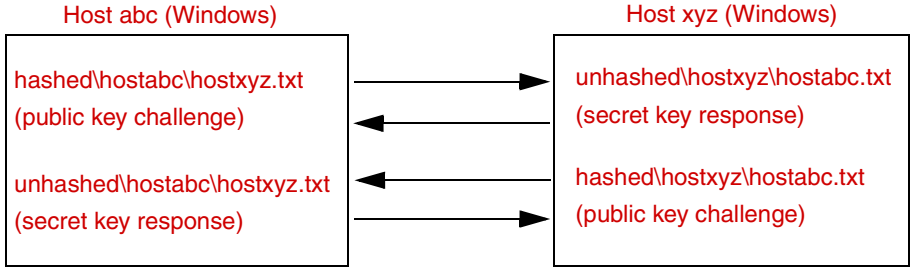
Where:

- *localhost* is the local system.
- *remotehost*.txt contains the responses for the remote system named *remotehost*.

There is a *remotehost*.txt file for each remote system that can request authentication. These files are created during installation and only root on the local system can read or write these files.

Caution Protect the unhashed files by allowing access only by root on the local system. Also, do not NFS-mount them on UNIX or place them on a network drive on Windows.

The bpauthsync command synchronizes the information between the hashed files on one system with the unhashed files on another system. This enables the remote host to offer the correct response when it is challenged. The following figure illustrates this exchange between Windows systems.



temp File

On a Windows or UNIX system, the vopie daemon, vopied, creates a temporary file where it stores the challenges and responses required to authenticate nonroot users. This is necessary because nonroot users cannot access the files in the hashed and unhashed directories. The temporary files are valid for only one connection and are automatically deleted.

Location of Temporary Files

Platform	Path
UNIX	/usr/openv/var/auth/vopie/temp/*username*/*tempname*.txt
Windows	*install_path*\NetBackup\var\auth\vopie\temp*username**tempname*.txt

Enhanced Authentication

The standard authentication that NetBackup uses is based on the network address of the connecting machine. NetBackup trusts that the connecting machine is who it says it is.

Enhanced authentication is additional authentication for NetBackup programs that communicate through sockets. It allows each side of a NetBackup connection to verify the host and user on the other side of the connection, taking place after a NetBackup connection has been established, but before any NetBackup transactions have taken place. For example, enhanced authentication could be enforced when a backup or restore operation is started from a client or during remote administration.

Enhanced authentication is performed through a series of challenges and responses that require the exchange of secret password information. Passwords are defined during installation and configuration so users do not have to enter passwords each time they start a backup, archive, or restore.

Note Enhanced authentication can be used without enhanced authorization.

There are two supported enhanced authentication methods:

- `vopie` – (VERITAS One-time Passwords In Everything)
  The `vopie` method authenticates user name, host names, and group/domain names.
- `noauth` authentication – ("No authorization" authorization)
  The `noauth` method exchanges user name, host names, and group/domain names, but makes no attempt to verify that the information is correct.

Using vopie Enhanced Authentication

`vopie` authenticates at two levels:

- At the host level: The hosts authenticate one another.
- At the user level: If the user attempting the connection is a nonroot user on UNIX or a non-administrator on Windows, the user is authenticated as well.

▼ To use the vopie enhanced authentication method

1. Install NetBackup on each system requiring authentication.

   The NetBackup installation process installs the necessary files and commands. The administrator then uses commands to set up the files so they contain the proper authentication information.

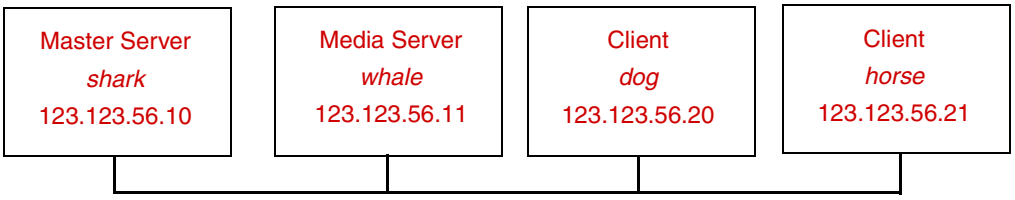
2. Configure NetBackup policies and add clients to the policies.

3. Run:
   `/usr/openv/netbackup/bin/admincmd/bpauthsync` on the master server. (See the following section to determine which options to use.)

   `bpauthsync` sets up authentication files on the NetBackup servers and clients. See *NetBackup Commands for UNIX and Linux*, for information on all NetBackup commands.

vopie Enhanced Authentication Examples

The examples in this section are based on the following configuration:



vopie Example 1: Typical Configuration

Assume that you want to configure `vopie` authentication for all systems in the figure below. NetBackup server and client software has already been installed.

1. Configure NetBackup policies and add clients to the policies.

2. Run the following command on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -vopie -servers
   -clients
   ```

   This synchronizes the key files on all the systems.

3. On the master server, copy the `methods_allow.txt` to a temporary file. For example, `/tmp/ma.txt`.

4. To the temporary file, add an entry for each host that requires authentication:

   ```
   vopie : shark
   vopie : whale
   vopie : dog
   vopie : horse
   ```

5. Synchronize the `methods_allow.txt` files on the servers and the clients by running the following on the master server (all on one line):

```
/usr/openv/netbackup/bin/admincmd/bpauthsync -methods
-methods_allow /tmp/ma.txt -servers -clients
```

The information in `/tmp/ma.txt` is written in the `methods_allow.txt` files on the servers and clients.

vopie Example 2: Disable Authentication for a Client

To disable authentication for client *horse* in the previous figure:

1. Push an empty `methods_allow.txt` file to the client by running the following on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -methods
   -methods_allow /dev/null -clients horse
   ```

   This disables authentication on the client.

2. On the master server, remove the entry for *horse* from the `/usr/openv/var/auth/methods_allow.txt` file.

3. Synchronize the methods files on all servers by running the following on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -methods -servers
   ```

   Authentication is no longer performed when communicating with client *horse*.

vopie Example 3: Adding a Client

Assume that all systems are configured for authentication, except for client *horse*. To add authentication for client *horse*:

1. On the master server, copy the `methods_allow.txt` to a temporary file. For example, `/tmp/ma.txt`.

2. Add an entry for the new client to the temporary file:

   ```
   vopie : horse
   ```

3. Synchronize the methods files on the servers and the new client by running the following on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -vopie -methods
   -methods_allow /tmp/ma.txt -servers -clients horse
   ```

   The information in `/tmp/ma.txt` is written in the `methods_allow.txt` files on the servers and the client.

vopie Example 4: Restoring Authentication After Client Disk Crash

Assume that *horse* was configured for authentication and the disk failed. To restore authentication so all files can be recovered:

1. On the master server, copy the current `methods_allow.txt` file to another file. For example, copy it to:

   `/usr/openv/var/auth/methods_allow.txt.save`

2. Remove the entry for the failed client from `methods_allow.txt` on the master server.

3. Push the modified `methods_allow.txt` file to the other servers by running the following (all on one line):

   `/usr/openv/netbackup/bin/admincmd/bpauthsync -methods -servers`

   This disables authentication for the failed client so the servers can communicate with it during recovery.

4. Reinstall the operating system (Windows or UNIX) and NetBackup on the failed client by following the instructions in Chapter 7, "Disaster Recovery," of the *Troubleshooting Guide for UNIX and Windows*. However, do not restore any NetBackup or user files at this time.

5. On the master server, run the following command to synchronize and push the original methods to the servers and the failed client. The command is on one line:

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -vopie -methods
   -servers -clients horse -methods_allow
   /usr/openv/var/auth/methods_allow.txt.save
   ```

   The information in `methods_allow.txt.save` is written in the `methods_allow.txt` files on servers and the client. The original authentication methods are now restored.

Note Do not restore the files in the `/usr/openv/var/auth` directory on the client or authentication will have to be resynchronized.

6. Complete the client recovery by restoring the original NetBackup and user files as explained in Chapter 7, "Disaster Recovery," of the *Troubleshooting Guide for UNIX and Windows*.

vopie Example 5: Restoring Authentication on NetBackup Master Server

Assume that authentication was configured on all servers and clients and the disk fails on the master server *shark*. If the NetBackup catalog backup was written to a storage unit on the master server *shark*:

1. On the master server, recover the disk as explained in Chapter 7, "Disaster Recovery" of the *Troubleshooting Guide for UNIX and Windows* and reinstall NetBackup.

2. Restore all files to the master server.

3. Synchronize all clients and servers by running the following on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -vopie -servers
   -clients
   ```

If the NetBackup catalog backup was written to a storage unit on *whale*, *shark* cannot recover the catalogs because the two servers cannot authenticate one another. In this instance, the following steps are required:

1. Install NetBackup on the master server (do not restore any files at this time).

2. Disable authentication between the master server and the media server where the catalog backup was written, by modifying their `methods_allow.txt` files:

   a. On the master server, remove the entry for the media server from the `methods_allow.txt` file (if an entry is present).

   b. On the media server, remove the entry for the master server from the `methods_allow.txt` file.

3. On the master server, run `bprecover` to restore the catalog files.

4. Restore all files to the master server, including those in the `/usr/openv/var/auth`*`install_path`*directory.

5. On the media server, add back the entry for the master server from the `methods_allow.txt` file.

6. Synchronize all servers and clients by running the following on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -vopie -servers
   -clients
   ```

   The original configuration is now restored.

Using noauth Rather than vopie Authentication

The noauth method exchanges user name, host names, and group/domain names, but makes no attempt to verify that the information is correct.

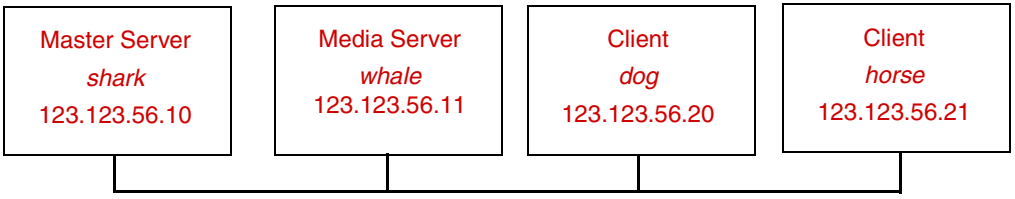
The noauth method is easier to configure than the vopie method. Consider using the noauth method rather than the vopie method if full authentication is not necessary, yet you want to use the Enhanced Authorization feature described in "Enhanced Authorization" on page 95.

Configuring for the noauth method is similar to configuring for the vopie method with these exceptions:

- Do not run the bpauthsync command with the -vopie argument
- Use string noauth instead of vopie in the methods_allow.txt file

Note The noauth method is not supported for Sequent systems.

The examples in this section are based on the following configuration:



Assume that this is an initial installation and you want to configure authentication for all systems. NetBackup server and client software has already been installed.

1. On the master server, copy the methods_allow.txt to a temporary file. For example, /tmp/ma.txt.

2. To the temporary file, add an entry for each host that requires noauth authentication:

```
noauth : shark
noauth : whale
noauth : dog
noauth : horse
```

3. Synchronize the methods_allow.txt files on the servers and the clients by running the following on the master server (all on one line):

```
/usr/openv/netbackup/bin/admincmd/bpauthsync -methods
-methods_allow /tmp/ma.txt -servers -clients
```


The information in `/tmp/ma.txt` is written to `methods_allow.txt` on the servers and clients.

To disable authentication for client *horse*:

1. Push an empty `methods_allow.txt` file to the client by running the following on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -methods
   -methods_allow /dev/null -clients horse
   ```

   This disables authentication on the client.

2. On the master server, remove the entry for *horse* from the `/usr/openv/var/auth/methods_allow.txt` file.

3. Synchronize the methods files on all servers by running the following on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -methods -servers
   ```

   Authentication is no longer performed when communicating with this client.

noauth Example 3: Adding a Client

Assume that all systems are configured for authentication, except for client *horse*.

To add authentication for client *horse*:

1. On the master server, copy the `methods_allow.txt` to a temporary file. For example, `/tmp/ma.txt`.

2. Add an entry for the new client to the temporary file:

   ```
   noauth : horse
   ```

3. Synchronize the `methods_allow.txt` files on the servers and the new client by running the following on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -methods
   -methods_allow.txt /tmp/ma.txt -servers -clients horse
   ```

   The information in `/tmp/ma.txt` is written to `methods_allow.txt` files on the servers and the client.

Assume that client *horse* was configured for authentication and the disk failed.

To restore authentication so all files can be recovered:

1. On the master server, copy the current `methods_allow.txt` file to another file. For example, copy it to `/usr/openv/var/auth/methods_allow.txt.save`

2. Remove the entry for the failed client from `methods_allow.txt` on the master server.

3. Push the modified `methods_allow.txt` file to the other servers by running the following (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -methods -servers
   ```

   This disables authentication for the failed client so the servers can communicate with it during recovery.

4. Reinstall the operating system (Windows or UNIX) and NetBackup on the failed client by following the instructions in Chapter 7, "Disaster Recovery" of the *Troubleshooting Guide for UNIX and Windows*. However, do not restore any NetBackup or user files at this time.

5. On the master server, run the following command to push the original methods to the servers and the failed client (the command is all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -methods -servers
   -clients horse -methods_allow
   /usr/openv/var/auth/methods_allow.txt.save
   ```

   The information in `methods_allow.txt.save` is written in `methods_allow.txt` on the servers and the client. The original authentication methods are restored.

6. Complete the client recovery by restoring the original NetBackup and user files as explained in Chapter 7, "Disaster Recovery" of the *Troubleshooting Guide for UNIX and Windows*.

Assume that authentication was configured on all servers and clients and the disk fails on master server *shark*.

If the NetBackup catalog backup was written to a storage unit on the master server *shark*:

1. On the master server, recover the disk as explained in Chapter 7, "Disaster Recovery" of the *Troubleshooting Guide for UNIX and Windows* and reinstall NetBackup.

2. Restore all files to the master server.

3. Synchronize all clients and servers by running the following on the master server (all on one line):

   ```
   /usr/openv/netbackup/bin/admincmd/bpauthsync -servers -clients
   ```


If the NetBackup catalog backup was written to a storage unit on *whale*, *shark* cannot recover the catalogs because the two servers cannot authenticate one another. In this instance, the following steps are required:

1. Install NetBackup on the master server (do not restore any files at this time).

2. Disable authentication between the master server and the media server where the catalog backup was written, by modifying their `methods_allow.txt` files:

   a. On the master server, remove the entry for the media server from the `methods_allow.txt` file (if an entry is present).

   b. On the media server, remove the entry for the master server from the `methods_allow.txt` file.

3. On the master server, run `bprecover` to restore the catalog files.

4. Restore all files to the master server, including those in the `/usr/openv/var/auth` directory.

5. On the media server, add back the entry for the master server from the `methods_allow.txt` file.

Troubleshooting Authentication

If you have problems with authentication, perform the following steps:

1. Look for status code 160 (authentication failed). If you see this status code, go to Chapter 5, "NetBackup Status Codes and Messages" of the *Troubleshooting Guide for UNIX and Windows* for corrective actions.

2. Create debug log directories for the processes involved in communication between NetBackup systems. These include:

   - On the server, create debug log directories for `bprd`, `bpdbm`, `bpcd` and `vopied`
   - On the client, create debug log directories for `bpcd`, `bpbackup`, `bprestore`, `bplist` and `vopied`

   See Chapter 3, "Using Logs and Reports," of the *Troubleshooting Guide for UNIX and Windows* for the location of the debug log directories.

3. Retry the operation and check the logs.

Enhanced Authorization

The standard authorization that NetBackup runs is based on listing the connecting server in the server list, and the user having `root` or administrator privileges.

Enhanced authorization provides a platform-independent mechanism for selected users (or groups of users) to administer a NetBackup server from a remote NetBackup Administration Console.

Note All references in this section to the NetBackup Administration Console host when the context is the NetBackup-Java Administration Console refer to the NetBackup-Java console's application server host. (See "NetBackup-Java Administration Console Architectural Overview" on page 484 in *NetBackup System Administrator's Guide, Volume I*.)

The user(s) can be given privileges to act as a NetBackup administrator, while not having system administrator or UNIX `root` privileges. Using enhanced authorization, a user can be given the following roles:

- NetBackup administrator on a NetBackup server with administration privileges
- Non-administrator with no administrative privileges

Note Enhanced authorization can only be used with enhanced authentication.

Enhanced Authorization Process

The following describes the flow for a request from a remote NetBackup Administration Console to a NetBackup master server.

Gaining Access to a Server

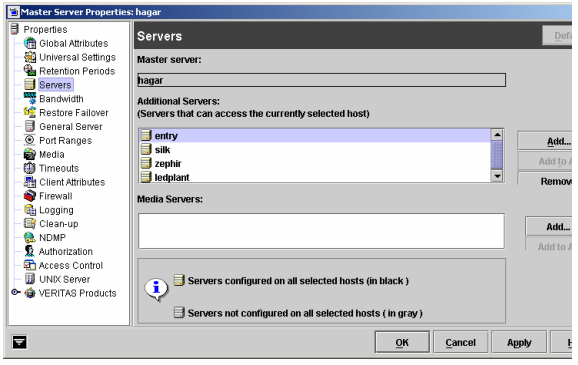
When an administrator on a remote NetBackup Administration Console makes a request to a NetBackup server, and enhanced authentication is enabled between the two systems, the *user_name*, *host_name*, *domain_group_name*, and `local` flag are passed from the requesting NetBackup Administration Console to the NetBackup master server accepting the request.

After passing authentication, the accepting NetBackup master server checks for the existence of the `authorize.txt` file and for an entry in the file that matches the information passed by requester.

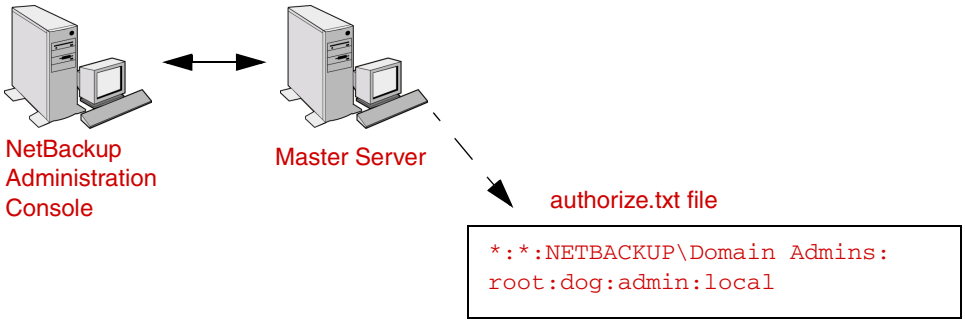
If a match exists, the request is authorized (allowed). If the request is not authorized, the request can proceed only if the NetBackup Administration Console making the request contains:

- On UNIX servers:
  `SERVER = server_name` entry in the `bp.conf` file of the accepting server. This is the host where the console runs.
- On Windows servers:
  The server must be among those listed under **Additional Servers** on the **Servers** properties page.

  (See the *NetBackup System Administrator's Guide, Volume I*.)



If the server name is not in the server list, the request fails, indicating a `request from invalid server`. You also need an entry in the `vm.conf` file in order to use Media Manager applications (see the *Media Manager System Administrator's Guide*).



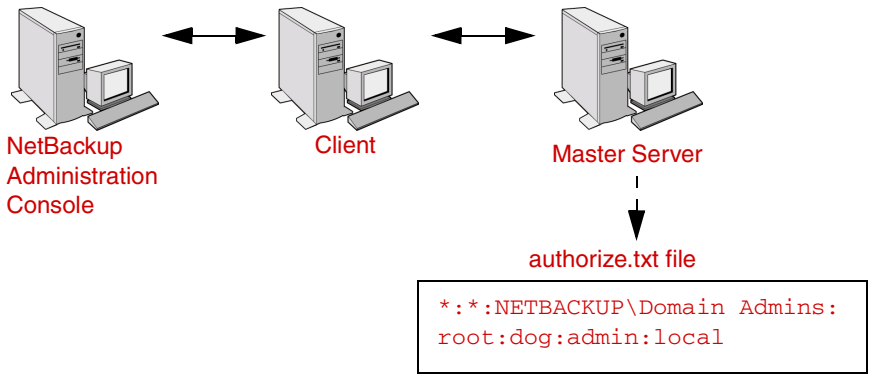
Gaining Access to a Client

Some requests, such as client configuration, are made directly to a client. These types of requests do not require an `authorize.txt` file on the client. The following describes the flow for a request from a remote NetBackup Administration Console to a NetBackup client.

When an administrator on a remote NetBackup Administration Console makes a request to a NetBackup client, and enhanced authentication is enabled between the two systems, the *`user_name`*, *`host_name`*, *`domain_group_name`*, and `local` flag are passed from the requesting NetBackup Administration Console to the NetBackup client accepting the request.

If the requesting host is not in the client's server list, the client requests authorization from its master server (the first server listed in the server list). The NetBackup Administration Console authorization information is passed to the master server. The master server

checks for the existence of the `authorize.txt` file and for an entry in the file that matches the information passed. If a match exists, authorization is granted, otherwise authorization is denied.



Configuring NetBackup Enhanced Authorization

The process of configuring NetBackup enhanced authorization can be broken down into four steps:

1. Add NetBackup servers to one another's server lists. (See "Adding a NetBackup Server to a Server List" on page 474.)
2. Enable NetBackup authentication. (See "Enabling NetBackup Enhanced Authentication" on page 98.)
3. Add an authorized user (creating an `authorize.txt` file). (See "Adding an Authorized User" on page 99.)
4. Optionally, specify the preferred group. (See "Using the Administration Console to Specify Preferred Groups (Optional)" on page 99.)

Enabling NetBackup Enhanced Authentication

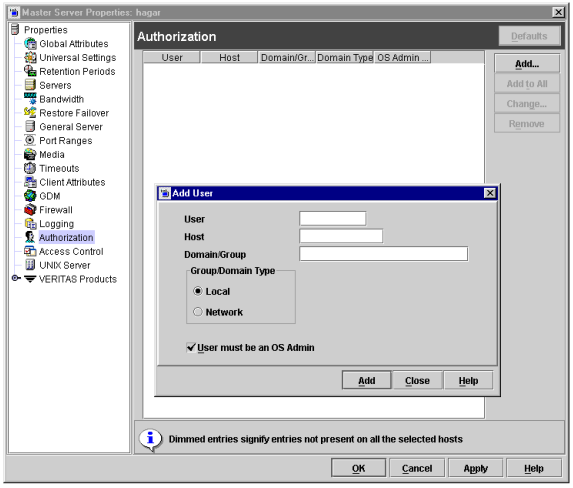
To use enhanced authorization, first enable NetBackup enhanced authentication between NetBackup Administration Consoles and the NetBackup servers to be administered. To perform administrative tasks on clients, such as client configuration, you must also enable NetBackup enhanced authentication between the clients and NetBackup Administration Consoles.

Adding an Authorized User

To enable enhanced authorization, create a list of authorized users.

▼ To create a list of authorized users

1. Expand **NetBackup Management** > **Host Properties** > **Master Server** (or **Media Servers**) > *Selected master or media server* > **Authorization**.



2. Click **Add**. The **Add User** dialog appears.
3. Type the user name that will have access to this server. To allow any user, type: *
4. Type the domain or group name to which the user belongs. To allow any domain group, type: *
5. Select whether the domain is local or on a network.
6. Type the host name that will be accessing the selected master or media server. To allow any host, type: *
7. Select to allow users onto the machine to administrate NetBackup who are not system administrators or logged on as UNIX `root`.
8. Click **OK**.

Upon the addition of the first user to the list of authorized users, the `authorize.txt` is created. After the creation of `authorize.txt`, the server requires authorization from any NetBackup Administration Console that attempts remote administration.

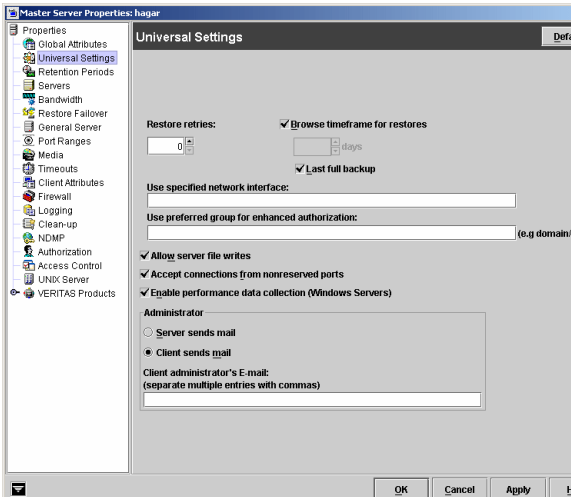
Using the Administration Console to Specify Preferred Groups (Optional)

You can specify a preferred group of administrative users in the NetBackup Administration Console. The preferred group entry is intended specifically for use with NetBackup enhanced authorization and determines the *`domain_group_name`* that is sent to the NetBackup server.

Some NetBackup processes also use the preferred group entry for Media Manager authorization. For more information on this subject, see "Media Manager Configuration File (vm.conf)" in the *NetBackup Media Manager System Administrator's Guide*.

▼ To specify a preferred group

1. Expand **NetBackup Management** > **Host Properties** > **Master Server** (or **Media Servers**) > *Selected master or media server* > **Universal Settings**.



Note To facilitate a platform-independent implementation, the string in the preferred group entry is case sensitive for both UNIX and Windows.

Adding a **Preferred Group** in the NetBackup Administration Console has the following effect on UNIX and Windows systems.

On UNIX

The `PREFERRED_GROUP` entry is added to the `bp.conf` file:

```
PREFERRED_GROUP = netgroup name
```

- If the `bp.conf` configuration file has a `PREFERRED_GROUP` entry, the `innetgr()` function is used to determine if the user is in the netgroup (for further details refer to the `innetgr` man page).
- If the `PREFERRED_GROUP` entry does not exist or the user is not a member of the netgroup, the local group name is obtained.

Note Netgroups are not supported for Sequent systems.

On Windows

The PREFERRED_GROUP NetBackup configuration is added to the KEY_LOCAL_MACHINE\SOFTWARE\VERITAS\NetBackup\CurrentVersion\Config registry key.

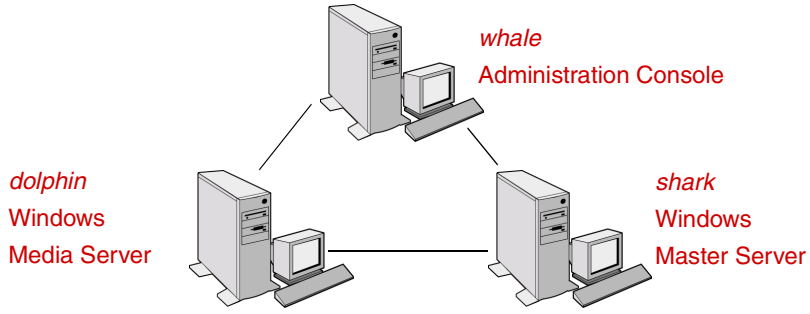
A check is made to determine if the user is a member of domain\group. This check is limited to Windows global groups. In other words, if PREFERRED_GROUP is set to a domain local group, a match will not occur and the user's primary domain\group will be used.

If the PREFERRED_GROUP configuration option does not exist or the user is not a member of the domain\group, the user's primary domain\group is obtained. When the domain name is an empty string or is the name of the local machine, it is considered to be local.

2. Click **OK**.

Example Configuration

The following explains how to set up NetBackup enhanced authorization between the computers in the figure below.



1. Update the server lists and `vm.conf` files as follows:
   - On *shark*, add *dolphin* to the server list and `vm.conf` file.
   - On *dolphin*, add *shark* to the server list and `vm.conf` file.
   - On *whale*, add *shark* and *dolphin* to the server list.
2. Enable NetBackup enhanced authentication:
   a. On *shark*, run:

      ```
      bpauthsync -vopie -servers shark dolphin whale
      ```

   b. On *shark*, create a temporary file (`C:\tmp_file`) with the following values:

      ```
      vopie: shark
      vopie: dolphin
      ```


```
vopie: whale
```

c. On *shark*, run (all on one line):

```
bpauthsync -methods_allow c:\tmp_file -servers shark dolphin
whale
```

3. Create a global network group named:

```
MYDOMAIN\NetBackup Admins
```

Someone logging in as a member of this group will be able to be a NetBackup administrator.

4. Edit the `authorize.txt` files on *shark* and *dolphin* so they contain:

```
*:*:MYDOMAIN\NetBackup Admins
```

5. On *whale*, set the preferred group to:

```
MYDOMAIN\NetBackup Admins
```

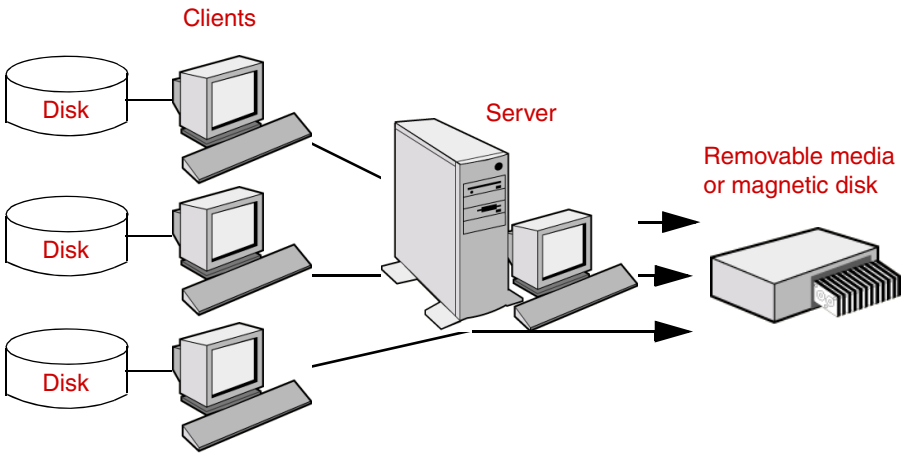
Additional Configuration 3

This chapter explains settings that, in most instances, are optional. The sections in this chapter include the following:

Multiplexing

NetBackup multiplexing sends concurrent backups from one or several clients to a single storage device (see figure below). NetBackup multiplexes the backups sequentially onto the media. Multiplexed and unmultiplexed backups can reside on the same volume. It is not necessary to create separate volume pools or media IDs.

No special action is required to restore a multiplexed backup. NetBackup finds the media and restores the requested backup.



When to Use Multiplexing

Multiplexing is generally used to reduce the amount of time required to complete backups. The following are situations where multiplexing can improve backup performance.

- Slow clients. This includes instances where NetBackup is using software compression, which normally reduces client performance.
- Multiple slow networks. The parallel data streams take advantage of whatever network capacity is available.
- Many short backups (for example, incrementals). In addition to providing parallel data streams, multiplexing reduces the time each job spends waiting for a device to become available, and therefore better utilizes the transfer rate of storage devices.

Multiplexing reduces performance on restores because it uses extra time to read the images.

Note To reduce the impact of multiplexing on restore times, set maximum fragment size for the storage units to a value smaller than the largest allowed value. Also, enable fast-tape positioning (locate block), if it applies to the tape drives you are using.

How to Configure Multiplexing

Multiplexing must be set in two places in the NetBackup configuration:

- Storage unit
- Schedule

Note If you change these values, it does not take effect until the next time a schedule runs.

Maximum Multiplexing Per Drive for Storage Unit

The **Maximum Multiplexing Per Drive** setting for a storage unit specifies how many backups NetBackup can multiplex onto any single drive in the storage unit. You set this value for each storage unit. (See "Enable Multiplexing" on page 40 in the *System Administrator's Guide, Volume I*.) The number can range from 1 through 32, where 1 is the default and specifies no multiplexing.

Choose a value based on the ability of your central processing unit to handle parallel jobs. Because extra buffers are required, memory is also important. If the server cannot perform other tasks or runs out of memory or processes, reduce the **Maximum Multiplexing Per Drive** setting for the storage unit. Consider the following when estimating the load that multiplexing can potentially put on your central processing unit:

- The maximum number of concurrent backup jobs that NetBackup is allowed to attempt is equal to the sum, for all storage units, of the concurrent backup jobs that can run on each storage unit.
- The maximum number of concurrent backup jobs that can run on a single storage unit is equal to the Maximum Multiplexing per drive, multiplied by the number of drives.

Media Multiplexing for a Schedule

In addition to the **Maximum Multiplexing Per Drive** setting for a storage unit, you specify a **Media Multiplexing** value for each schedule. This setting is discussed in the section "Media Multiplexing" on page 117 in the *System Administrator's Guide, Volume I*. This setting specifies the maximum number of backups from the schedule that you can multiplex onto any single drive in the configuration.

The Media multiplexing setting can range from 1 through 32, where 1 is the default and specifies no multiplexing. Regardless of the setting on a schedule, the maximum jobs that NetBackup starts never exceeds the storage unit's **Maximum Multiplexing Per Drive**. When adding jobs to drives, NetBackup attempts to add multiplex jobs to drives that are already using multiplexing. This leaves other drives available for non-multiplex jobs.

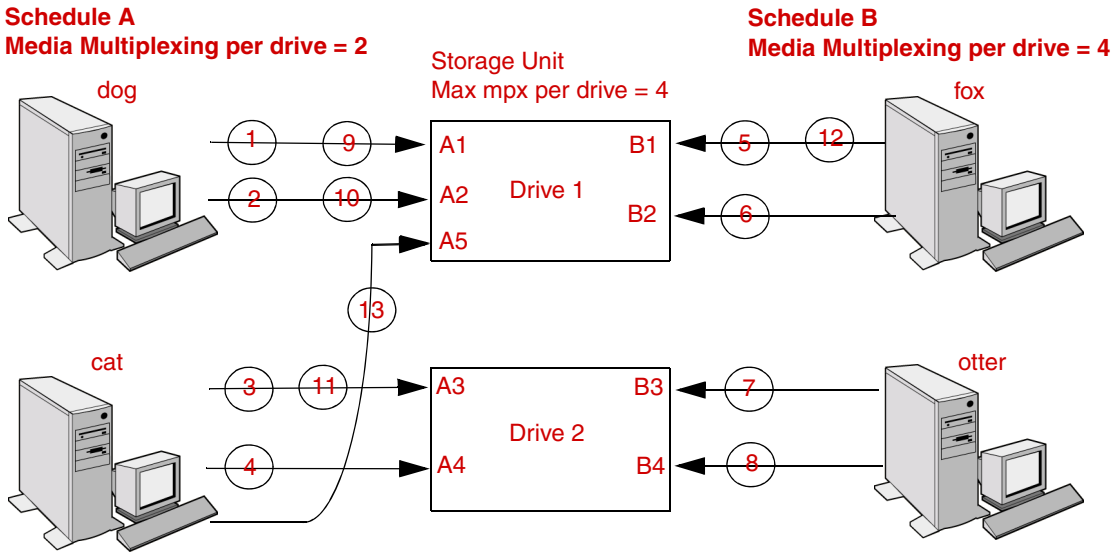
When NetBackup multiplexes jobs, it continues to add jobs to a drive until the number of jobs on the drive matches either of the following:

- This schedule's **Media Multiplexing** setting.

  If the limit is reached for a drive, NetBackup starts sending jobs to another drive. In the following figure, when the Schedule A limit is reached on Drive 1, NetBackup starts adding Schedule A jobs to Drive 2.

- The storage unit's **Maximum multiplexing per drive** setting. NetBackup can add jobs from more than one schedule to a drive.

  In the following figure, unshaded numbers denote job starting. Shaded numbers denote job completion. For example, (1) denotes the start of job A1 on Drive 1. (9) denotes the completion of job A1 on Drive 1.



Assume schedule A begins first (note that the schedules can be in the same or different policies). Also, assume that Allow Multiple Data Streams is enabled, so a client can have multiple data streams.

(1) (2) Jobs A1 and A2 from client dog start on drive 1. Schedule A Media Multiplexing limit of 2 is reached for this drive.

(3) (4) Jobs A3 and A4 from client cat start on drive 2. Schedule A Media Multiplexing limit of 2 is reached for this drive.

(5) (6) Jobs B1 and B2 for client fox start on drive 1. Storage unit max mpx is reached for this drive.

(7) (8) Jobs B3 and B4 from client otter start on drive 2. All jobs are now running for schedule B. Storage Unit Max mpx is reached for drive 2.

(9) (10) Jobs A1 and A2 from client dog finish on drive 1. However, jobs B1 and B2 for client fox are still running, so Schedule A Media Multiplexing limit of 2 still prevents job A5 from starting on drive 1.

(11) (12) Job A3 from client cat finishes on drive 2 and job B1 from client fox finishes on drive 1. Job B2 is the only job currently running on drive 1.

(13) Job A5 from client cat starts on drive 1. This is the last job for schedule A. Schedule A Media Multiplexing limit of 2 prevents job A5 from starting on Drive 2. Therefore, job A5 starts on Drive 1. When adding jobs to drives, NetBackup attempts to add multiplex jobs to drives that are already using multiplexing. This leaves other drives available for non-multiplex jobs.

Note If the backup window closes before NetBackup can start all the jobs in a multiplexing set, NetBackup completes only the jobs that have actually started. For example, on the figure above, assume that the Activity Monitor shows A1 through A5 as queued and active. If only A1 and A2 start before the window closes, NetBackup does not perform the other jobs that are in the set. If the window closes before any jobs have started, then only the first queued and active job starts and completes. (A1 in this example.)

Other Configuration Settings to Consider Using Multiplexing

Limit Jobs per Policy

Set **Limit Jobs Per Policy** high enough to support the specified level of multiplexing. (See "Limit Jobs Per Policy" on page 77 in the *System Administrator's Guide, Volume I*.)

Maximum Jobs per Client

The **Maximum Jobs Per Client** global attribute limits the number of backup jobs that can run concurrently on any NetBackup client. Usually, its setting does not affect multiplexing. However, to illustrate its effect, consider a case where there are jobs from different schedules on the same client and all are going to the same storage unit. In this case, it is possible for the maximum number of jobs permitted on the client to be reached before the multiplexing limit is reached for the storage unit. If this occurs, it prevents NetBackup from fully utilizing the storage unit's multiplexing capabilities.

Maximum Jobs this Client

You can also set the maximum number of jobs that are allowed on a specific client without affecting other clients. This can be set with the `bpconfig` command. (See "Setting the Number of Streams That Can Run Concurrently" on page 94 in the *System Administrator's Guide, Volume I*.)

MPX Restore Delay

The NetBackup configuration option, **Delay On Multiplexed Restores**, applies to multiplexed restores. The option specifies how long (in seconds) the server waits for additional restore requests of files and (or) raw partitions that are in a set of multiplexed images on the same tape. The **Delay On Multiplexed Restores** option appears on the General Server properties dialog.

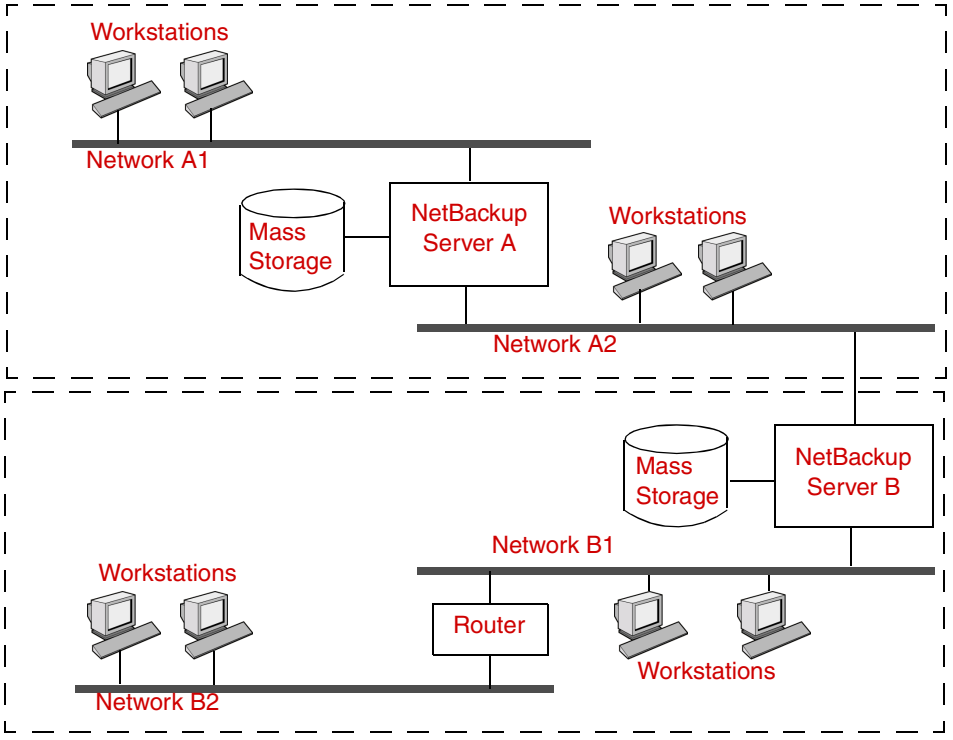
Demultiplexing

Demultiplexing speeds up future restores and is also useful for creating a copy for off-site storage. Use duplication to demultiplex a backup. Duplication lets you copy one multiplexed backup at a time from the source media to the target media. When duplication is complete, the target contains a single demultiplexed copy of each duplicated backup. (The target can also have other backups.) If desired, you can make the duplicate copy the primary copy. Do not select Preserve Multiplexing when duplicating the backups.

Note If you use the `bpduplicate` command instead of the NetBackup Administration Console, do not include the `-mpx` option on that command.

Using Multiple NetBackup Servers

A large site that has more than one master server can divide the clients between the servers as necessary to optimize the backup loads. The figure below shows a multiple-server configuration where the two sets of networks (A1/A2 and B1/B2) each have enough clients to justify separate servers. In this environment, the two NetBackup server configurations are completely independent. You can also create a configuration where one server is the master and the other is a media server.



Configuring a Master and Media Server Grouping

NetBackup lets you set up a group of NetBackup servers where one server is the master and the others are used only as media servers and have peripherals to provide additional storage. The master server controls all backup scheduling and the other media servers provide additional storage.

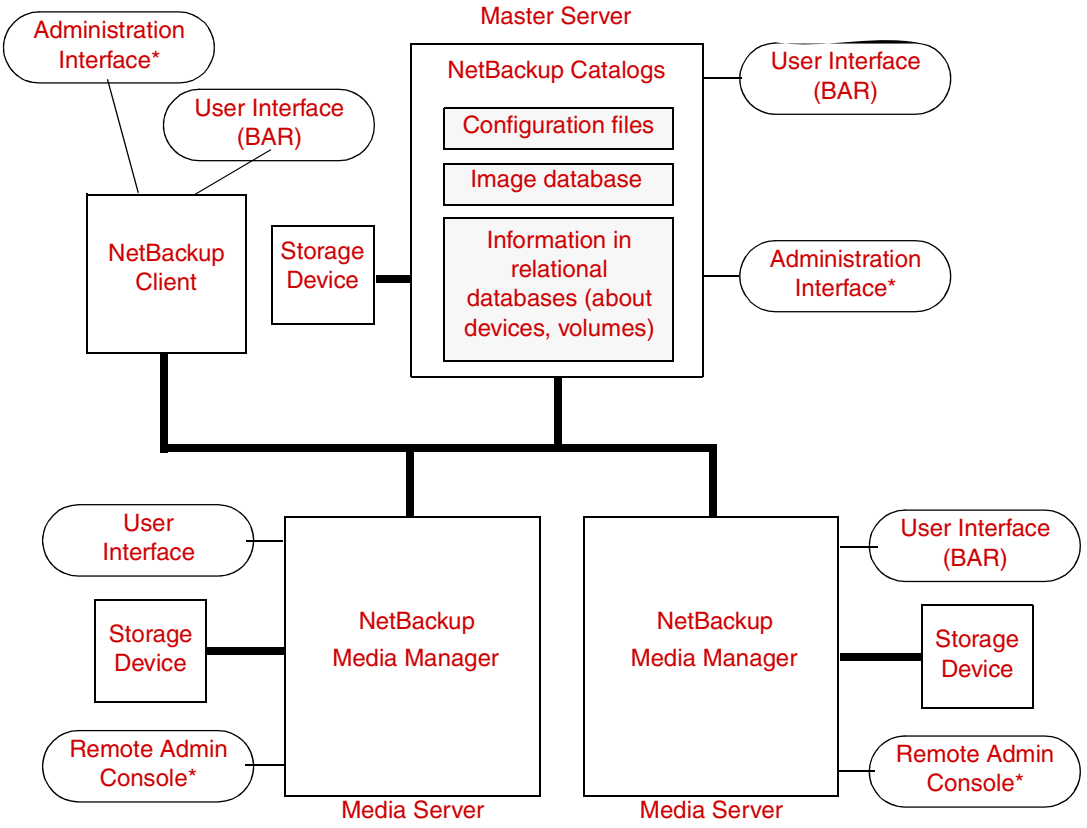
Grouping refers collectively to the master and its media servers. In a grouping of NetBackup servers, a client can have its backup directed to any device on any server in the grouping.

A common strategy is to install extra peripherals on clients that produce large amounts of data and make them media servers. The data from the client is then directed to the client's own peripherals. This reduces network traffic by allowing the data to be backed up without transferring it over the network. It also distributes the backup load between the master and the media servers.

Two important points to remember about master and media servers:

- There can be only one master server in a grouping.
- A NetBackup server is a media server for itself but cannot be a media server for another master.

The following figure shows where software is installed and where the NetBackup catalogs are located (by default). The following topics provide more details on master and media servers along with a procedure to configure them.



* You can also use the Backup, Archive, and Restore NetBackup user interface from a Windows client that has the Remote Administration Console installed.

Software on Each Server

Applies to NetBackup Enterprise Server only.

Install NetBackup server software on each NetBackup server that has a peripheral that you want to include in a storage unit. The NetBackup install program has choices for master and media server installation.

NetBackup Catalogs

Applies to NetBackup Enterprise Server only.

The master server is the default location for the NetBackup catalogs. This includes the media and volume database (emm_data.db), containing media usage and volume information which is used during the backups.

Adding a Media Server

The following section applies to NetBackup Enterprise Server only:

▼ To add a media server

1. Install the following software packages on the media server as explained in the vendor's documentation:
   - Any software required to drive the storage devices.
   - NetBackup server software as explained in the *NetBackup Installation Guide.*

Note To make a UNIX media server a client, install the client software from the master server, not from the distribution media. When the installation script asks if the host is the master server, reply *no* and enter the name of the master server when prompted for it.

2. Configure the drives and robots as explained in the *Media Manager System Administrator's Guide*.

3. Add the volumes for each robot or nonrobotic drive configured in the previous step.

   Always add the volumes on the server that you specified as the Enterprise Media Manager Server for the devices in the previous step. See the *Media Manager System Administrator's Guide* for instructions on adding volumes.

   Note Use only one server as an EMM server and add all volumes to that host. .

   Note Defining a separate volume pool for volumes used on the media server can simplify administration.

4. On the master server, make the following changes to the NetBackup configuration:

   a. Add storage units to the media server. Always specify the media server as the media server for the storage unit.

   b. Enter the catalog paths if necessary:

      If using the online, hot catalog backup method:

      NetBackup enters the paths automatically.

      If using the offline, cold catalog backup method:

Add the catalog paths for the media server to the NetBackup catalog backup configuration. For instructions, see Chapter 4, "NetBackup Catalogs" on page 211 in the *System Administrator's Guide, Volume I*.

Paths on a Windows media server:

```
media_server_name:install_path\NetBackup\db
media_server_name:install_path\NetBackup\var
media_server_name:install_path\Volmgr\database
```

Where *install_path* is the directory where the NetBackup software is installed on the media server.

Paths on a UNIX media server:

```
media_server_name:/usr/openv/netbackup/db
media_server_name:/usr/openv/var
media_server_name:/usr/openv/volmgr/database
```

c. Configure the NetBackup policies and schedules to use the storage units configured on the media server.

5. Add the new media server to the **Servers** list for each master server, media server, and client in the configuration:

In the NetBackup Administration Console, select **NetBackup Management** > **Host Properties**.

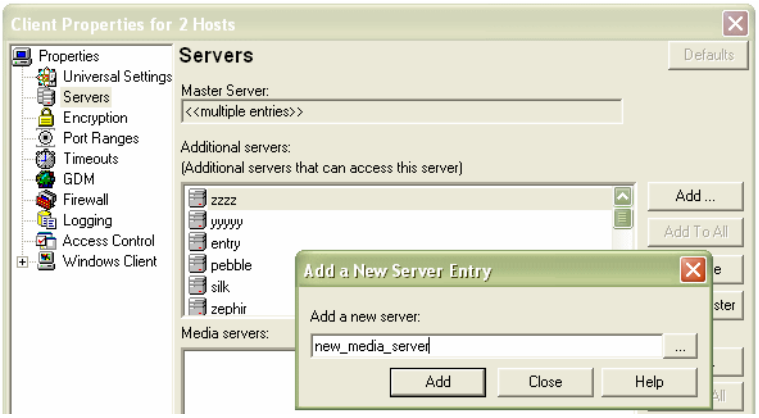
It is possible to make this change to more than one host at a time. For example, change all clients at once:

a. Select **Host Properties** > **Clients**. Hold down the Shift key and select all clients in the right pane.

b. With all clients highlighted, select **Actions** > **Properties**.

c. Select the **Servers** properties.

d. Click **Add** and type the name of the new server.



e. Click **Add** to add the server to the server list for all selected clients.

For more information, see "Servers Properties" on page 439 in the *System Administrator's Guide, Volume I*.

- On NetWare target clients, add a `SERVER` entry to the `bp.ini` file.

Note Ensure that the host names match throughout your network's TCP/IP configuration or you will encounter problems with NetBackup.

Note The host names in the `bp.conf` file must match those shown in the `/etc/hosts` file (or appropriate NIS, or DNS file).
The host names must also match throughout the network. If you are using NIS, this applies to the NIS hosts file. See "Rules for Using Host Names in NetBackup" on page 328, for more information on choosing host names for NetBackup hosts and clients.
In addition, the `SERVER` entries MUST be the same on all servers in a master and media server grouping. It is recommended (but not mandatory) that all other `bp.conf` entries, except `CLIENT_NAME`, also match on all servers.

6. Test your configuration by performing a user backup or a manual backup that uses a schedule specifying a storage unit on the media server.

NetBackup Configuration Options

NetBackup configuration options allow an administrator to customize NetBackup to meet specific site preferences and requirements. In most instances, the defaults provide good results. However, if the defaults require changing, do so according to the one of the following methods:

- In the NetBackup Administration Console, navigate to the various properties by selecting **NetBackup Management** > **Host Properties** within **Master Servers**, **Media Servers**, or **Clients**. Configuration options are described in Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.

  Note After making a change to the `/usr/openv/netbackup/bp.conf` file on the master server, stop and restart all NetBackup daemons and utilities. This ensures that the new `bp.conf` values will be used by all the NetBackup processes that require them. This action is not required for changes to `bp.conf` files on a client or to a `$HOME/bp.conf` file on the master server.

- On NetBackup UNIX servers and clients, options can be changed by:
  - Using the `bpgetconfig` command to obtain a list of configuration entries, then using `bpsetconfig` to change the entries as desired. The commands are described in *NetBackup Commands for UNIX and Linux*.
  - Entering the option in the `bp.conf` file as explained in this chapter. This can be done with most of the options.
  - Using the `nbemmcmd` command to modify some options as noted in this chapter or as described in *NetBackup Commands for UNIX and Linux*.
- On clients, specify configuration options as explained in the *Backup, Archive, and Restore Getting Started Guide* for the client.

Syntax Rules for bp.conf Options

Use the following syntax rules when creating entries in `bp.conf`:

- Use the # symbol to comment out lines
- Any number of spaces or tabs are allowed on either side of = signs
- Blank lines are allowed
- Any number of blanks or tabs are allowed at the start of a line

bp.conf Options for Servers

The bp.conf options for NetBackup UNIX servers are located in the following file:

```
/usr/openv/netbackup/bp.conf
```

If a single UNIX system is running as both a client and a server, the /usr/openv/netbackup/bp.conf file will contain both server and client options.

Each nonroot user on a UNIX client can also have a personal bp.conf file in their home directory:

```
$HOME/bp.conf
```

See the bp.conf discussion for UNIX clients later in this chapter for an explanation of client options and which of these can be in a personal bp.conf file.

Note The SERVER option *must* be present in the /usr/openv/netbackup/bp.conf file on all NetBackup UNIX clients and servers. It is also the *only required* entry in these bp.conf files. As installed, NetBackup uses internal software defaults for all options in the bp.conf file, except SERVER. During installation, NetBackup sets the SERVER option to the name of the master server where the software is installed.

Applies to NetBackup Enterprise Server only.
The SERVER entries *MUST* be the same on all servers in a master and media server cluster. It is recommended (but not mandatory) that all other entries, except CLIENT_NAME, also match on all servers.

ALLOW_MEDIA_OVERWRITE

The ALLOW_MEDIA_OVERWRITE option overrides NetBackup's overwrite protection for various media formats on removable media.

For example, to permit overwriting the cpio format, add the following on the master server (and media servers if applicable):

```
ALLOW_MEDIA_OVERWRITE = CPIO
```

Note This option can also be set by changing the **Allow Media Overwrite** property in the Media host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

ALLOW_MULTIPLE_RETENTIONS_PER_MEDIA

This option can be set using either of the following methods:

- Changing the **Enable Standalone Drive Extension** property in the Media host properties. (Default: enabled.) (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)
- By using the `nbemmcmd` command. (See *NetBackup Commands for UNIX and Linux*.)

The ALLOW_MULTIPLE_RETENTIONS_PER_MEDIA option allows NetBackup to mix retention levels on media. Default: This option is not present and each volume can contain backups of only a single retention level.

ALLOW_NON_RESERVED_PORTS

The ALLOW_NON_RESERVED_PORTS option specifies that the NetBackup client daemon (`bpcd`) can accept remote connections from nonprivileged ports (port numbers 1024 or greater). If this entry is not present, then `bpcd` requires remote connections to come from privileged ports (port numbers 1024 or smaller). This option can be useful when NetBackup clients and servers are on opposite sides of a firewall.

```
ALLOW_NON_RESERVED_PORTS = YES | NO
```

For use on a client, see "ALLOW_NON_RESERVED_PORTS" on page 119.

AUTHENTICATION_DOMAIN

The AUTHENTICATION_DOMAIN entry defines a set of VxSS authentication principals. A master server that uses VxSS must have at least one `AUTHENTICATION_DOMAIN` entry, and more than one can be specified.

If a media server or client does not define an authentication domain, it will use the authentication domains of its master server.

```
AUTHENTICATION_DOMAIN = domain "comment" mechanism broker [ port ]
```

Where:

- *`domain`* is an Internet domain name or a Windows domain name.
- *`"comment"`* is a quoted comment describing the authentication domain.
- *`mechanism`* is the authentication mechanism. The mechanism is indicated by one of the following keywords:
  - `NIS` (Network Information Service version 1)
  - `NIS+` (Network Information Service version 2)
  - `PASSWD` (Local UNIX password file on the specified broker)
  - `VXPD` (VxSS private database)
  - `WINDOWS` (Windows Active Directory or primary domain controller)

- *broker* is the host name or IP address of the authentication broker.
- *port* is the port number of the authentication broker. The default is the standard port number for authentication brokers.

Example

```
AUTHENTICATION_DOMAIN = mycompany.com "Typical UNIX logins" NIS
broker1.mycompany.com
AUTHENTICATION_DOMAIN = OurEnterprise "Typical Windows logins" WINDOWS
broker2.mycompany.com 5544
AUTHENTICATION_DOMAIN = mycompany.com "VxSS-Only Identities" VXPD
broker1.mycompany.com
AUTHENTICATION_DOMAIN = broker3.mycompany.com "Local UNIX Logins on
host broker3" PASSWD broker3.mycompany.com
```

In the example, `mycompany.com` is the Internet domain name and `OurEnterprise` is the Windows domain name.

The broker on host name `broker1` handles both NIS and private authentication for VxSS.

The broker on host name `broker2` handles Windows authentication for VxSS.

`broker2` uses the non-standard port number 5544.

The broker on host name `broker3` uses its local `/etc/passwd` file for VxSS authentication.

Note This option can also be set by changing the **Authentication Domain** property in the Access Control host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

AUTHORIZATION_SERVICE

The `AUTHORIZATION_SERVICE` entry defines the VxSS authorization service to be used by the local NetBackup server. A master server that uses VxSS must define an authorization service. If a media server does not define an authorization service, it will use its master server's authorization service.

`AUTHORIZATION_SERVICE = host [ port ]`

Where:

host is the host name or IP address of the authorization service.

port is the port number of the authorization service. The default is the standard port number for the authorization service.

Note This option can also be set by changing the **Authentication Service** property in the Access Control host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

BPBRM_VERBOSE

Used for debugging purposes, the BPBRM_VERBOSE option controls the amount of information NetBackup includes in its bpbrm debug log. Default: The same value as the bp.conf VERBOSE entry (**Global Logging Level**). The BPBRM_VERBOSE entry overrides the bp.conf VERBOSE entry.

Note This option can also be set by changing the **BPBRM Logging Level** property in the Logging host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

To use the same value as the bp.conf VERBOSE entry for bpbrm, enter:

```
BPBRM_VERBOSE = 0
```

This is the same as setting **BPBRM Logging Level** in the Logging host properties to *Same as Global*.

To log the minimum amount of information for bpbrm, enter:

```
BPBRM_VERBOSE = -1
```

This is the same as setting **BPBRM Logging Level** in the Logging host properties to 0.

To log additional information for bpbrm, enter a value of 1 through 5:

```
BPBRM_VERBOSE = 1
```

This is the same as setting **BPBRM Logging Level** in the Logging host properties to 1.

To log the maximum amount of information for bpbrm, enter:

```
BPBRM_VERBOSE = 5
```

This is the same as setting **BPBRM Logging Level** in the Logging host properties to 5.

For information about enabling the bpbrm debug log, see the section titled, "Debug Logs" in the *NetBackup Troubleshooting Guide for UNIX and Windows*.

BPDBJOBS_COLDEFS

Add BPDBJOBS_COLDEFS entries to the bp.conf file to customize the output of bpdbjobs. Add a BPDBJOBS_COLDEFS entry for every column you wish to include in the output using the following format:

```
BPDBJOBS_COLDEFS = COLDEFS_ENTRY [minimum_size [true | false]]
```

Where:

COLDEFS_ENTRY is the name of the column to include in the output. See the following table for valid BPDBJOBS_COLDEFS entries.

minimum_size is the minimum column width. If not specified, the default is a width of 5.

`true` indicates that the column should expand as needed. If not specified, `true` is the default.

`false` indicates that the column should not expand beyond the *minimum_size*.

The order of the entries determines the order that the column headings will appear.

Example

```
BPDBJOBS_COLDEFS = JOBID 5 true
BPDBJOBS_COLDEFS = TYPE 4 true
BPDBJOBS_COLDEFS = STATE 5 true
BPDBJOBS_COLDEFS = STATUS 6 true
BPDBJOBS_COLDEFS = POLICY 6 true
BPDBJOBS_COLDEFS = SCHEDULE 8 true
BPDBJOBS_COLDEFS = CLIENT 6 true
BPDBJOBS_COLDEFS = DSTMEDIA_SERVER 12 true
BPDBJOBS_COLDEFS = ACTPID 10 true
```

Note Keep in mind the following ramifications of adding a BPDBJOBS_COLDEFS entry to the `bp.conf` conditions:
– Adding even one `BPDBJOBS_COLDEFS` entry overrides all default columns.
– All users on the local system will see only those columns specified in the `bp.conf` file.

BPDBJOBS_COLDEFS Entries and Corresponding Column Head Names

COLDEFS Entry	Column Name	COLDEFS Entry	Column Name
ACTIVEELAPSED	**Active Elapsed** (elapsed active time)	PATHNAME	**KB Per Sec**
ACTPID	**Active PID** (PID of job)	PARENTJOBID	**Parent JobID**
ATTEMPT	**Attempt**	POLICY	**Policy**
BACKUPTYPE	**Backup Type**	POLICYTYPE	**Policy Type**
CLIENT	**Client**	PRIORITY	**Priority**
COMPLETION	**Completion** (percent complete)	PROFILE	**Profile** (Vault only)
COMPRESSION	**Compression** (yes or no)	RETENTION	**Retention** (retention period)
DSTMEDIA_SERVER	**Dest Media Svr** (writing media server)	RESUMABLE	**Resumable**
DSTMEDIAID	**Dest Media ID** (writing media ID)	ROBOT	**Robot** (Vault only)
DSTSTORAGE_UNIT	**Dest StUnit** (writing storage unit)	RQSTPID	**Request PID** (PID requesting job, if applicable)
ELAPSED	**Elapsed** (elapsed time)	SCHEDULE	**Schedule**
ENDED	**Ended**	SCHEDULETYPE	**Schedule Type**
ESTFILE	**Est File** (estimated number of files)	SESSIONID	**Session ID** (Vault only)
ESTKB	**Est KB** (estimated number of kilobytes)	SRCMEDIA_SERVER	**Src Media Svr**
FILES	**Files**	SRCMEDIAID	**Src Media ID**
GROUP	**Group**	SRCSTORAGE_UNIT	**Src StUnit**
JOBID	**JobID**	STARTED	**Started**

BPDBJOBS_COLDEFS Entries and Corresponding Column Head Names (continued)

COLDEFS Entry	Column Name	COLDEFS Entry	Column Name
KBPERSEC	**Pathname**	STATE	**State**
KILOBYTES	**Kilobytes**	STATUS	**Status**
LASTBACKUP	**Last Backup** (date and time)	STREAMNUMBER	**Stream Number**
MAINPID	**Main PID** (PID spawning job, if applicable)	SUSPENDABLE	**Suspendable**
NUMTAPESEJECT	**Media to Eject** (number of tapes to eject; Vault only)	TYPE	**Type** (job type)
OPERATION	**Operation** (current operation)	VAULT	**Vault** (Vault only)
OWNER	**Owner**		

BPDBM_VERBOSE

Used for debugging purposes, the BPDBM_VERBOSE option controls the amount of information NetBackup includes in its bpdbm debug logs.

Default: The same value as the bp.conf VERBOSE entry (**Global Logging Level**). The BPDBM_VERBOSE entry overrides the bp.conf VERBOSE entry (**Global Logging Level**).

Note This option can also be set by changing the **BPDBM Logging Level** property in the Logging host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

To use the same value as the bp.conf VERBOSE entry for bpdbm, enter:

```
BPDBM_VERBOSE = 0
```

This is the same as setting **BPDBM Logging Level** in the Logging host properties to *Same as Global*.

To log the minimum amount of information for bpdbm, enter:

```
BPDBM_VERBOSE = -1
```

This is the same as setting **BPDBM Logging Level** in the Logging host properties to 0.

To log additional information for bpdbm, enter a value of 1 through 5:

```
BPDBM_VERBOSE = 1
```

This is the same as setting **BPDBM Logging Level** in the Logging host properties to 1.

To log the maximum amount of information for bpdbm, enter:

```
BPDBM_VERBOSE = 5
```

This is the same as setting **BPDBM Logging Level** in the Logging host properties to 5.

The following examples show two bp.conf entries that enable logging, while minimizing the rate of growth of the bpdbm debug file:

```
VERBOSE = 5
BPDBM_VERBOSE = -1
```

For information about enabling the bpdbm debug log, see the *NetBackup Troubleshooting Guide for UNIX and Windows*.

BPRD_VERBOSE

Used for debugging purposes, the BPRD_VERBOSE option controls the amount of information NetBackup includes in its bprd debug logs.

Default: The same value as the bp.conf VERBOSE entry (**Global Logging Level**). The BPRD_VERBOSE entry overrides the bp.conf VERBOSE entry (**Global Logging Level**).

Note This option can also be set by changing the **BPRD Logging Level** property in the Logging host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

To use the same value as the bp.conf VERBOSE entry for bprd, enter:

```
BPRD_VERBOSE = 0
```

This is the same as setting **BPRD Logging Level** in the Logging host properties to *Same as Global*.

To log the minimum amount of information for bprd, enter:

```
BPRD_VERBOSE = -1
```

This is the same as setting **BPRD Logging Level** in the Logging host properties to 0.

To log additional information for bprd, enter a value of 1 through 5:

```
BPRD_VERBOSE = 1
```

This is the same as setting **BPRD Logging Level** in the Logging host properties to 1.

To log the maximum amount of information for bprd, enter:

```
BPRD_VERBOSE = 5
```

This is the same as setting **BPRD Logging Level** in the Logging host properties to 5.

For information about enabling the bprd debug log, see the section titled, "Debug Logs" in the *NetBackup Troubleshooting Guide for UNIX and Windows*.

BPTM_VERBOSE

Used for debugging purposes, the BPTM_VERBOSE option controls the amount of information NetBackup includes in its bptm debug logs.

Default: The same value as the bp.conf VERBOSE entry (**Global Logging Level**). The BPTM_VERBOSE entry overrides the bp.conf VERBOSE entry (**Global Logging Level**).

Note This option can also be set by changing the **BPTM Logging Level** property in the Logging host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

To use the same value as the bp.conf VERBOSE entry for bptm, enter:

```
BPTM_VERBOSE = 0
```

This is the same as setting **BPTM Logging Level** in the Logging host properties to *Same as Global*.

To log the minimum amount of information for bptm, enter:

```
BPTM_VERBOSE = -1
```

This is the same as setting **BPTM Logging Level** in the Logging host properties to 0.

To log additional information for bptm, enter a value of 1 through 5:

```
BPTM_VERBOSE = 1
```

This is the same as setting **BPTM Logging Level** in the Logging host properties to 1.

To log the maximum amount of information for bptm, enter:

```
BPTM_VERBOSE = 5
```

This is the same as setting **BPTM Logging Level** in the Logging host properties to 5.

For information about enabling the bptm debug log, see the section titled, "Debug Logs" in the *NetBackup Troubleshooting Guide for UNIX and Windows*.

BPEND_TIMEOUT

Note If you change this option, verify that the CLIENT_READ_TIMEOUT option is set to the same or higher value.

Specifies the number of seconds to wait for the bpend_notify script on a client to complete. Default: Timeout is 300 seconds.

Note This option can also be set by changing the **Backup End Notify Timeout** property in the Timeouts host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

BPSTART_TIMEOUT

Note If you change this option, verify that the `CLIENT_READ_TIMEOUT` option is also set to the same or higher value.

Specifies the number of seconds to wait for the `bpstart_notify` script on a client to complete. Default: 300 seconds.

Note This option can also be set by changing the **Backup Start Notify Timeout** property in the Timeouts host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

CHECK_RESTORE_CLIENT

Specifies that the client being restored to is checked before starting the restore. This prevents an unresponsive client from slowing down the restores of other clients that have data on the same tapes. This option only applies to master servers.

CLIENT_CONNECT_TIMEOUT

Specifies the number of seconds that the server waits before timing out when connecting to a client. Default: 300 seconds.

Note This option can also be set by changing the **Client Connect Timeout** property in the Timeouts host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

CLIENT_PORT_WINDOW

Specifies the range of nonreserved ports on this computer that are used for connecting to NetBackup on other computers. This setting applies when connecting to a client configured to accept nonreserved ports. For information on client configuration, see "ALLOW_NON_RESERVED_PORTS" on page 119.

You can add this option to the `/usr/openv/netbackup/bp.conf` files on NetBackup servers or clients.

The following example permits ports from 4800 through 5000:

```
CLIENT_PORT_WINDOW = 4800 5000
```

If you specify 0 for the first number (default), the operating system determines the nonreserved port to use.

Refer to "NBJAVA_CLIENT_PORT_WINDOW" on page 495 in the *System Administrator's Guide, Volume I* for connections from the NetBackup-Java console.

CLIENT_READ_TIMEOUT

Note Use this option only on a server or a database agent (such as NetBackup for Oracle). This option has a reasonable default and has to be changed only if problems are encountered.

Specifies the number of seconds to use for the client-read timeout.

Note This option can also be set by changing the **Client Read Timeout** property in the Timeouts host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

You can also add this option on database agents (such as NetBackup for Oracle).

The CLIENT_READ_TIMEOUT on a database agent is a special case because these types of clients can initially require more time to get ready than other clients. This is the case because database backup utilities frequently start several backup jobs at the same time, which slows the CPU.

The sequence on a database agent is as follows:

- NetBackup on the database agent reads the client's CLIENT_READ_TIMEOUT to find the value to use initially. If the option is not set, the standard default of five minutes is used.
- When the database agent API receives the server's value, it uses it as the CLIENT_READ_TIMEOUT.

Default: CLIENT_READ_TIMEOUT is not specified on either a server or database agent and the timeout is 300 seconds.

Note We suggest that you set CLIENT_READ_TIMEOUT on the database agent to a value greater than 5 minutes. A setting of 15 minutes has been found to be adequate for many installations.

CLIENT_RESERVED_PORT_WINDOW

Specifies the range of reserved ports on this computer that are used for connecting to NetBackup on other computers. This setting applies when connecting to a client configured to accept only reserved ports. For information on client configuration, see "ALLOW_NON_RESERVED_PORTS" on page 119.

The following example permits ports from 900 through 1023:

```
CLIENT_RESERVED_PORT_WINDOW = 900 1023
```

Default: Range of 512 through 1023. Note that if you specify 0 for the first number, a nonreserved port is used instead and is chosen by the operating system.

CONNECT_OPTIONS

Specifies three options designed to enhance firewall efficiency with NetBackup:

- Whether the host will be connected to using a reserved or nonreserved port number.
- Whether the host will be connected to by another server using the traditional call-back method or using the VERITAS Network daemon (`vnetd`).
- Whether the host will be connected to by using one of the following methods:
  - `vnetd` or the daemon's port number,
  - by using `vnetd` only, or
  - by using the daemon's port number only.

Note This option can also be set in the Firewall host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

To use this entry, add it to `/usr/openv/netbackup/bp.conf` on NetBackup servers in the following format:

```
CONNECT_OPTIONS = host [ 0 | 1 | 2 ][ 0 | 1 | 2 | 3 ]
[ 0 | 1 | 2 | 3 ]
```

Where:

- *host* is the host name of the server or client to be connected to. *host* must be at NetBackup version 4.5 or greater.
- The first setting indicates the type of port to use to connect to `bpcd` on *host*:

  `0` = Use a reserved port number.

1 = Use a non-reserved port number. If you select this option, enable **Accept Connection on Non-reserved Ports** for the selected *host*. See the Universal Settings dialog under **Host Properties** > **Media Servers**. (Configuration options are described in Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

2 = Use the value defined by the DEFAULT_CONNECT_OPTIONS configuration entry (default).

- The second setting indicates the bpcd connect-back method to use to connect to *host*:

  0 = Use the traditional connect-back method (default).

  1 = Use the vnetd no connect-back method.

  2 = Use the value defined by the DEFAULT_CONNECT_OPTIONS configuration entry (default). (See "DEFAULT_CONNECT_OPTIONS" on page 131.)

- The third setting is relevant to NetBackup clients and servers. This setting indicates the daemon connection port to use to connect to *host*:

  0 = Connect to a daemon on the host using vnetd if possible, otherwise connect using the traditional port number of the daemon.

  1 = Connect to a daemon on the host using vnetd only. This setting turns on unidirectional bpcd.

  2 = Connect to a daemon on the host using the traditional port number of the daemon only.

  3 = Use the value defined by the DEFAULT_CONNECT_OPTIONS configuration entry (default). (See "DEFAULT_CONNECT_OPTIONS" on page 131.)

Note If vnetd only (1) is selected as the daemon connection port, the BPCD connect-back setting is not applicable. If vnetd only (1) is selected as the daemon connection port, the non-reserved ports setting (1) is always used regardless of the value of the ports setting.

The bp.conf file may contain CONNECT_OPTIONS settings for multiple hosts. For example:

```
CONNECT_OPTIONS = shark 0 0 0
```

bpcd connections to server *shark* must use a reserved port number and the traditional call-back method.

Connections to bpdbm, vmd, bprd, and robotic daemons on server *shark* can use either vnetd or the daemon's port number.

```
CONNECT_OPTIONS = dolphin 1 0 1
```

bpcd connections to server *dolphin* must use a nonreserved port number and the traditional call-back method.

Connections to bpdbm, vmd, bprd, and robotic daemons on server *dolphin* must use vnetd.

```
CONNECT_OPTIONS = perch 0 1 2
```

bpcd connections to server *perch* must use a reserved port number and vnetd.

Connections to bpdbm, vmd, bprd, and robotic daemons on server *perch* must use the daemon's port number.

```
CONNECT_OPTIONS = trout 1 1 2
```

bpcd connections to server *trout* must use a nonreserved port number and vnetd.

Connections to bpdbm, vmd, bprd, and robotic daemons on server *trout* must use the daemon's port number.

Refer to "NBJAVA_CONNECT_OPTION" on page 496 in the *System Administrator's Guide, Volume I* for connections from the NetBackup-Java Console.

DEFAULT_CONNECT_OPTIONS

Specifies default values for the CONNECT_OPTIONS configuration entry. If a host name is not specified in any CONNECT_OPTIONS entry, the value from the DEFAULT_CONNECT_OPTIONS entry is used.

Note This option can also be set in the Firewall host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

To use this entry, add it to /usr/openv/netbackup/bp.conf on NetBackup servers in the following format:

```
DEFAULT_CONNECT_OPTIONS = [ 0 | 1 ][ 0 | 1 ][ 0 | 1 | 2 ]
```

Where:

- The first setting indicates the type of port to use to connect to bpcd on the remote host:

  0 = Use a reserved port number (default).

  1 = Use a non-reserved port number. If you select this option, enable **Accept Connection on Non-reserved Ports** for the selected *host*. See the Universal Settings dialog under **Host Properties** > **Media Servers**. (Configuration options are described in Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

- The second setting indicates the bpcd connect-back method to use to connect to the remote host:

  0 = Use the traditional connect-back method.

1 = Use the vnetd no connect-back method (default).

- The third setting indicates the connection method to use to connect to the remote host:

  0 = Connect to a daemon on the host using vnetd if possible, otherwise connect using the traditional port number of the daemon (default).

  1 = Connect to a daemon on the host using vnetd only.

  2 = Connect to a daemon on the host using the traditional port number of the daemon only.

Note If vnetd only (1) is selected as the daemon connection port, the BPCD connect-back setting is not applicable. If vnetd only (1) is selected as the daemon connection port, the non-reserved ports setting (1) is always used regardless of the value of the ports setting.

DISABLE_JOB_LOGGING

Disables the logging of job information required by the NetBackup Activity Monitor. Default: job logging occurs.

DISABLE_STANDALONE_DRIVE_EXTENSIONS

This option can be set using either of the following methods:

- Changing the **Enable Standalone Drive Extension** property in the Media host properties. (Default: enabled.)(See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)
- By using the nbemmcmd command. (See *NetBackup Commands for UNIX and Linux*.)

Disables the nonrobotic drive operations. This means that during a backup, NetBackup does not automatically attempt to use whatever labeled or unlabeled media it finds in a nonrobotic drive.

DISABLE_SCSI_RESERVE

Disables the use of SCSI reserve to all tape devices from this host.

Note This option can also be set by changing the **Enable SCSI Reserve/Release** property in the Media host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

DISALLOW_BACKUPS_SPANNING_MEDIA

Prevents backups from spanning media. If the end of media is encountered and this option is present, the media is set to FULL and the operation terminates abnormally (applies to both robotic and nonrobotic drives). Default: Backups can span media.

Note This option can also be set by changing the **Allow Backups to Span Media** property in the Media host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

DISALLOW_CLIENT_LIST_RESTORE

Note Override the `DISALLOW_CLIENT_LIST_RESTORE` option for individual clients by changing their `list_restore` setting. (See "Setting Client List and Restore Permissions" on page 513 in the *System Administrator's Guide, Volume I*.)

Denies list and restore requests for all clients. When this option is present, clients cannot list or restore files that they have backed up through this master server. Default: This option is not present and clients can list and restore their files.

DISALLOW_CLIENT_RESTORE

Note You can override the `DISALLOW_CLIENT_RESTORE` option for individual clients by changing their `list_restore` setting. (See "Setting Client List and Restore Permissions" on page 513 in the *System Administrator's Guide, Volume I*.)

Denies restore requests for all clients. When this option is present, clients cannot restore files that they have backed up through this master server. Default: This option is not present and clients can restore their files.

EMMSERVER

The EMMSERVER entry indicates the master or media server which is acting as the Enterprise Media Manager server for one or more master servers. The EMM server contains the database where media and device configuration information is stored.

The EMMSERVER entry applies only to servers at version 6.0 and later.

`EMMSERVER = server_name`

ENABLE_ROBUST_LOGGING

Helps limit the amount of disk space that can be consumed by one debug log directory. When a log file grows to the maximum size, the log file is closed and a new log file is opened. If the new log file causes the maximum number of log files in the directory to be exceeded, the oldest log file is deleted.

The maximum size of a log file is set using the NetBackup command `vxlogcfg` with parameters `NumberOfLogFiles` and `MaxLogFileSizeKB`. See the *NetBackup Troubleshooting Guide* for more information on controlling the log file size.

Note If a NetBackup environment uses scripts depending on the *`MMDDYY`*`.log` naming convention, either update the scripts or disable Robust Logging.

Note This option can also be set by changing the **Robust Logging** property in the Logging host properties. (See "Logging Properties" on page 418 of the *NetBackup System Administrator's Guide, Volume I*.)

FAILOVER_RESTORE_MEDIA_SERVERS

Applies to NetBackup Enterprise Server:

Specifies automatic failover to another NetBackup server if a server is temporarily inaccessible for a restore. This failover does not require administrator intervention. Default: NetBackup does not perform automatic failover. The format for the entry follows:

`FAILOVER_RESTORE_MEDIA_SERVERS = failed_host host1 host2 ... hostN`

Where:

`failed_host` is the server that is not operational.

`host1 ... hostN` are the servers that provide failover capabilities.

When automatic failover is necessary for a server, NetBackup searches from left to right through the associated `FAILOVER_RESTORE_MEDIA_SERVERS` list until it finds one that is eligible to perform the restore.

Note There can be multiple `FAILOVER_RESTORE_MEDIA_SERVERS` entries and each entry can have multiple servers. However, a NetBackup server can be a *`failed_host`* in only one entry.

After adding the `FAILOVER_RESTORE_MEDIA_SERVERS` entry, stop and restart the NetBackup Request daemon on the master server where you are changing the configuration. (See "Server Independent Restores" on page 522 in the *System Administrator's Guide, Volume I*.)

FORCE_RESTORE_MEDIA_SERVER

Applies to NetBackup Enterprise Server:

Forces restores to go to a specific server, regardless of where the files were backed up. The format for the entry follows:

```
FORCE_RESTORE_MEDIA_SERVER = fromhost tohost
```

Where *fromhost* is the server that performed the original backup and *tohost* is the server to use for the restore.

After adding the FORCE_RESTORE_MEDIA_SERVER entry, stop and restart the NetBackup Request daemon on the master server. Before attempting a restore, physically move the media to *tohost* and update the Media Manager volume database to reflect the move.

This setting applies to all storage units on the original server. Restores for any storage unit on *fromhost* will go to *tohost*. To revert to the original configuration for future restores, delete the entry. (See "Server Independent Restores" on page 522 in the *System Administrator's Guide, Volume I*.)

GENERATE_ENGLISH_LOGS

Enables the generation of an English error log, and English trace logs for the bparchive, bpbackup, bpduplicate, bpimport, and bprestore commands. This option is useful to support personnel assisting in distributed environments where differing locales result in logs with various languages.

When enabled, an English text error log (indicated by the suffix _en) is created in the following directory:

```
/usr/openv/netbackup/db/error
```

Setting the GENERATE_ENGLISH_LOGS option also forces the -en argument on the execution of all bparchive, bpbackup, bpduplicate, bpimport, and bprestore commands when the progress log is specified (-L). The English text progress log is indicated by the suffix _en.

INCOMPLETE_JOB_CLEAN_INTERVAL

Indicates the number of days a failed restore job can remain in the incomplete state before being moved to the done state:

```
INCOMPLETE_JOB_CLEAN_INTERVAL = x
```

Where ***x*** is a value between 0 and 365. A value of 0 indicates that failed, incomplete jobs will never be automatically moved to the done state. (Default: 7 days.)

Note This option can also be set by changing the **Move Restore Job From Incomplete State to Done State** property in the Global Attributes host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

INITIAL_BROWSE_SEARCH_LIMIT

Specifies the number of days back that NetBackup searches for files to restore. The value is in days. For example, to limit the browse range to the seven days prior to the current date specify the following:

```
INITIAL_BROWSE_SEARCH_LIMIT = 7
```

This option can be specified on the master server and applies to all NetBackup clients. It can also be specified on a UNIX client. When specified on a UNIX client, it applies only to that client and can reduce the size of the search window from what you specify on the server (the client setting cannot make the window larger).

Default: NetBackup includes files from the time of the last full backup through the latest backup for the client. If the client belongs to more than one policy, then the browse starts with the earliest of the set of last full backups.

LIMIT_BANDWIDTH

Note Read "Notes on Bandwidth Limiting" on page 161 before setting this option.

Specifies a limit for the network bandwidth used by one or more NetBackup clients on a network. The actual limiting occurs on the client side of the backup connection. This feature limits only backups. Restores are unaffected. Default: The bandwidth is not limited.

Each `LIMIT_BANDWIDTH` entry specifies the bandwidth value and the IP address of the clients and networks to which it applies. The syntax is as follows:

```
LIMIT_BANDWIDTH = xxx.xxx.xxx.xxx yyy.yyy.yyy.yyy zzz
```

```
LIMIT_BANDWIDTH = xxx.xxx.xxx.xxx yyy.yyy.yyy.yyy zzz
```

Where:

- *xxx.xxx.xxx.xxx* is the beginning of the IP address range. (For example, 10.0.0.2.)
- *yyy.yyy.yyy.yyy* is the end of the IP address range. (For example, 10.0.0.49.)
- *zzz* is the bandwidth limitation in kilobytes per second. (For example, 200.) A value of 0 disables throttling for the individual client or the range of IP addresses covered by this entry.

You can add LIMIT_BANDWIDTH entries to the /usr/openv/netbackup/bp.conf file on NetBackup master servers.

Rules for IP Address Ranges

The IP address ranges can specify individual clients or entire subnets. The following are some specific rules on addresses:

- An IP address can have any one of the following forms:
  - a.b.c.d

    Where a, b, c, and d are integers in the range 0-255.
  - 128.net.host

    Policy B address (16-bit host).
  - net.host

    Policy A address (24-bit host).
  - a

    A 32-bit integer, representing the full IP address in network byte order (that is, big endian, the most significant byte is first on the wire).
- You can enter IP addresses as decimal, octal or hexadecimal numbers. Numbers beginning with 0 are assumed to be octal, numbers beginning with 0x are hexadecimal and all others are assumed to be decimal.
- Neither the net nor the host part of an IP address can be zero.
- Only ordinary IP addresses are accepted (policy A, B & C, no multicast or reserved addresses).
- Do not create multiple entries that specify the same range of IP addresses. If you do, NetBackup uses the last one it finds. In the following example, NetBackup uses the second entry.

  ```
  LIMIT_BANDWIDTH = 111.222.333.1 111.222.333.255 500
  LIMIT_BANDWIDTH = 111.222.333.1 111.222.333.255 200
  ```

  This rule also applies to multiple entries that specify an exact client address:

  ```
  LIMIT_BANDWIDTH = 111.222.333.111 111.222.333.111 200
  LIMIT_BANDWIDTH = 111.222.333.111 111.222.333.111 100
  ```
- Do not specify IP address ranges that overlap one another. Consider the following:

  ```
  LIMIT_BANDWIDTH = 111.222.333.1 111.222.333.255 500
  LIMIT_BANDWIDTH = 111.222.333.5 111.222.333.255 500
  ```

  The ranges overlap, and bandwidth limiting results are unpredictable.

- You can specify a range of addresses in one entry and an address for a specific client in other entries.

  If a client is covered by an entry that specifies its exact IP address and by another entry that specifies a range of IP addresses, NetBackup uses the bandwidth value in the entry with the exact IP address.

  The following sets the bandwidth for a range of IP addresses:

  ```
  LIMIT_BANDWIDTH = 111.222.333.1 111.222.333.255 500
  ```

  The following sets the bandwidth for a specific address that is within the above range.

  ```
  LIMIT_BANDWIDTH = 111.222.333.111 111.222.333.111 200
  ```

  In this case, NetBackup uses the specific entry (bandwidth of 200) for the client whose address is 111.222.333.111. You can also use this capability to exclude specific clients from bandwidth limiting (see Example 3 below). The order in which the range and specific address entries appear in the `bp.conf` file is not significant.

Rules for Setting Bandwidth Values

When setting bandwidth values for individual clients, you must set it to either:

- 0 (no bandwidth limiting), or
- Less than or equal to any value set for the IP address range containing the IP address for the client.

  For example, the following is valid:

  ```
  LIMIT_BANDWIDTH = 111.222.333.1 111.222.333.255 500
  LIMIT_BANDWIDTH = 111.222.333.111 111.222.333.111 300
  ```

If you set the bandwidth higher for an individual client than it is for the range, NetBackup ignores that setting and uses the value for the range. In this case, the client gets its share of the bandwidth specified for the network.

If the bandwidth limit for an individual client is equal to or lower than the value for the range, the client uses one of the following, whichever is lower:

- Its share of the network bandwidth value
- Its individual bandwidth value

The bandwidth value that NetBackup uses for a client will always be at least one kilobyte per second.

Examples

- Configure a bandwidth limit of 500 kilobytes per second for all machines on the subnet 111.222.333 as follows:

```
LIMIT_BANDWIDTH = 111.222.333.1 111.222.333.255 500
```

- Configure a bandwidth limit of 700 kilobytes per second for a particular client (111.222.333.111) as follows:

```
LIMIT_BANDWIDTH = 111.222.333.111 111.222.333.111 700
```

- To disable bandwidth limiting for a client in a subnet that has a bandwidth limit, specify 0 for the kilobytes per second:

```
LIMIT_BANDWIDTH = 111.222.333.1 111.222.333.255 500
LIMIT_BANDWIDTH = 111.222.333.111 111.222.333.111 0
```

  In this case, no limiting occurs for the client with IP address 111.222.333.111

MEDIA_ID_PREFIX

This option can be set using either of the following methods:

- Changing the **Media ID Prefix (non-robotic)** property in the Media host properties dialog. (Default: checkbox clear.) (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)
- By using the `nbemmcmd` command. (See *NetBackup Commands for UNIX and Linux*.)

The prefix must be one to three alpha-numeric characters. NetBackup appends remaining numeric characters. The following is an example entry:

```
MEDIA_ID_PREFIX = FEB
```

NetBackup appends remaining numeric characters so the assigned media IDs become FEB000, FEB001, and so on.

The default media ID prefix is `A`: NetBackup assigns A00000, then A00001, and so on.

```
MEDIA_ID_PREFIX = A
```

MEDIA_UNMOUNT_DELAY

When `MEDIA_UNMOUNT_DELAY` is specified, the media unload is delayed for the specified number of seconds after the requested operation has completed. (Applies only to user operations.)

For example, assume the delay is 120 seconds:

```
MEDIA_UNMOUNT_DELAY = 120
```

Note This option can also be set by changing the **Media Unmount Delay** property in the Media host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

MEDIA_REQUEST_DELAY

This option can be set using either of the following methods:

- Changing the **Media Request Delay** property in the Media host properties. (Default: 0 seconds.) (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)
- By using the `nbemmcmd` command. (See *NetBackup Commands for UNIX and Linux*.)

Applies only to nonrobotic drives and specifies the number of seconds that NetBackup waits for a drive to become ready.

MEDIA_SERVER

The `MEDIA_SERVER` entry is similar to the `SERVER` entry.

A host specified as a `MEDIA_SERVER` is able to back up and restore clients. However, if the host is not specified as a `SERVER`, the host has limited administrative capabilities.

For example, assume the media server's name is *oak*:

```
MEDIA_SERVER = oak
```

Note This option can also be set by entering a media server name in the Media Servers list in the Servers host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

MPX_RESTORE_DELAY

Applies to multiplexed restores and specifies how long (in seconds) the server waits for additional restore requests of files and (or) raw partitions that are in a set of multiplexed images on the same tape. All the restore requests that are received within the delay period are included in the same restore operation (one pass of the tape). Default: 30 seconds.

For example, assume the delay is 60 seconds:

```
MPX_RESTORE_DELAY = 60
```

MUST_USE_LOCAL_DRIVE

This option can be set using either of the following methods:

- Changing the **Must Use Local Drive** property in the General Server host properties dialog. (Default: checkbox clear.) (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)
- By using the `nbemmcmd` command. (See *NetBackup Commands for UNIX and Linux*.)

If the client is also a media server and this entry is present, backups for this client must occur on a local drive. If the client is not a media server, this entry has no effect.

NBRB_CLEANUP_OBSOLETE_DBINFO

The NBRB_CLEANUP_OBSOLETE_DBINFO entry serves as a performance tuning option for the Intelligent Resource Manager. This entry indicates the number of seconds (default: 60) that can elapse between the cleanup of obsolete information in the NetBackup Resource Broker (nbrb) database.

There is no equivalent for this entry in the NetBackup Administration Console host properties.

NBRB_ENABLE_OPTIMIZATIONS

The NBRB_ENABLE_OPTIMIZATIONS entry serves as a performance tuning option for the Intelligent Resource Manager. This entry indicates whether the Resource Broker caches states of resource requests. Default: 1 (true).

There is no equivalent for this entry in the NetBackup Administration Console host properties.

NBRB_FORCE_FULL_EVAL

The NBRB_FORCE_FULL_EVAL entry serves as a performance tuning option for the Intelligent Resource Manager. This entry indicates the number of seconds (default: 1800 seconds/30 minutes) that can elapse between full evaluations of all NetBackup Resource Broker (nbrb) queues, using no cached EMM information. Full evaluations include, for example, matching job resource requests with available resources.

There is no equivalent for this entry in the NetBackup Administration Console host properties.

NBRB_REEVAL_PENDING

The NBRB_REEVAL_PENDING entry serves as a performance tuning option for the Intelligent Resource Manager. This entry indicates the number of seconds (default: 60) that can elapse between evaluations of the pending request queue. A pending request queue can include, for example, jobs awaiting resources.

There is no equivalent for this entry in the NetBackup Administration Console host properties.

NBRB_REEVAL_PERIOD

The NBRB_REEVAL_PERIOD entry serves as a performance tuning option for the Intelligent Resource Manager and NetBackup Resource Broker (nbrb). This entry indicates the number of seconds/minutes that will elapse between evaluations if there is an outstanding request that was not satisfied, and if there have been no other requests or no resources released. Default: 5 minutes will pass before the initial request is reevaluated.

There is no equivalent for this entry in the NetBackup Administration Console host properties.

NBRB_RETRY_DELAY_AFTER_EMM_ERR

The NBRB_RETRY_DELAY_AFTER_EMM_ERR entry serves as a performance tuning option for the Intelligent Resource Manager. This entry indicates the number of seconds (default: 60) NetBackup waits after an EMM error before attempting again. The error must be one where a retry is possible. For example, if a media server is down.

There is no equivalent for this entry in the NetBackup Administration Console host properties.

NBRB_MPX_GROUP_UNLOAD_DELAY

The NBRB_MPX_GROUP_UNLOAD_DELAY entry serves as a performance tuning option for the Intelligent Resource Manager. This entry indicates the number of seconds (default: 10) that the NetBackup Resource Broker (nbrb) will wait for a new job to appear before unloading a tape. This setting can help avoid unnecessary reloading of tapes and applies to all backup jobs.

During user backups, nbrb uses the maximum value of NBRB_MPX_GROUP_UNLOAD_DELAY and the **Media Mount Timeout** host property setting when unmounting the tape. (This host property is found in the NetBackup Administration Console under **NetBackup Management** > **Host Properties** > *Select master server* > **Timeouts** > **Media Mount Timeout**. See Chapter 7 in the *System Administrator's Guide, Volume I* for more details.)

During restores, **Media Mount Timeout** is used, not NBRB_MPX_GROUP_UNLOAD_DELAY.

There is no equivalent for this entry in the NetBackup Administration Console host properties.

RANDOM_PORTS

Specifies whether NetBackup chooses port numbers randomly or sequentially when it requires one for communication with NetBackup on other computers.

- If RANDOM_PORTS = YES (default), NetBackup chooses port numbers randomly from those that are free in the allowed range. For example, if the range is from 1024 through 5000, it chooses randomly from the numbers in this range.
- If RANDOM_PORTS = NO, NetBackup chooses numbers sequentially, starting with highest number that is available in the allowed range. For example, if the range is from 1024 through 5000, NetBackup chooses 5000 (assuming it is free). If 5000 is being used, port 4999 is chosen.

By default, this option is not present and NetBackup uses the random method for selecting port numbers.

RE_READ_INTERVAL

Determines how often NetBackup checks disk storage units for available capacity. Default: 300 seconds (5 minutes).

For example, assume the re-read interval is 350 seconds:

```
RE_READ_INTERVAL = 350
```

Note This option can also be set by changing the frequency value for the **Check the Capacity of Disk Storage Units** property in the General Server host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

REQUIRED_INTERFACE

Specifies the network interface that NetBackup uses when connecting to another NetBackup client or server. A NetBackup client or server can have more than one network interface and, by default, the operating system determines the one to use. To force NetBackup connections to be through a specific network interface, use this entry to specify the network host name of that interface.

In the following example, host1 is the network host name of the interface:

```
REQUIRED_INTERFACE = host1
```

You can add this option to the /usr/openv/netbackup/bp.conf file on a NetBackup client or server. Default: The entry does not exist and the operating system determines the interface to use.

Example 1 - Client with multiple network interfaces

Assume you have a NetBackup client with two network interfaces. One is for the regular network and one is for the backup network:

- The host name for the regular interface is *fred*

- The host name for the backup interface is *fred_nb*

The NetBackup client name setting on both the client and server is *fred_nb*.

When users on *fred* start a backup, restore, or list operation, the request ideally always goes out on the *fred_nb* interface and over the backup network. This assumes that *fred* and the network are set up for this. However, if this configuration is not in place, *fred* can send the request out on the *fred* interface and over the regular network. The server receives the request from client *fred_nb* with host name *fred* and refuses it because the host and client names do not match.

One way to solve this problem is to set up the master server to allow alternate client restores for *fred*. This allows the server to accept the request, but leaves NetBackup traffic on the regular network. A better solution is to add the following entry to the `bp.conf` file on fred:

```
REQUIRED_INTERFACE = fred_nb
```

Now, all backup, restore, and list requests use the *fred_nb* interface, the server receives requests from client *fred_nb* with host name *fred_nb*, and everything works as intended.

Example 2 - Server with multiple network interfaces.

Assume you have a NetBackup server with two network interfaces. One is for the regular network and one is for the backup network:

- The host name for the regular interface is *barney*
- The host name for the backup interface is *barney_nb*

The `bp.conf` file on all NetBackup servers and clients has a `SERVER = barney_nb` entry.

When *barney* connects to a client for a backup, the request ideally goes out on the *barney_nb* interface and over the backup network. This assumes that *barney* and the network are set up for this. However, if this configuration is not in place, *barney* can send the request out on the *barney* interface and over the regular network. The client now receives the request from barney rather than *barney_nb* and refuses it as coming from an invalid server.

One way to solve this problem is to add `SERVER = barney` to the `bp.conf` file on the client. The client now accepts requests from *barney*, but NetBackup traffic is still on the regular network.

A better solution is to add the following entry to the `bp.conf` file on *barney*:

```
REQUIRED_INTERFACE = barney_nb
```

Now, when *barney* connects to a client, the connection is always through the *barney_nb* interface and everything works as intended.

REQUIRED_NETWORK

The REQUIRED_NETWORK entry specifies the required route for backup traffic in an environment where the network traffic is segregated.

For example, an environment may contain a production network at 145.21.14.0 and a backup network at 192.132.28.0. To indicate that NetBackup should use only the backup network, add the following entry in the bp.conf file:

```
REQUIRED_NETWORK = 192.132.28.0
```

Note If the variable is set and the network is not available, all connections fail and no backups are performed.

There is no equivalent for this entry in the NetBackup Administration Console host properties.

SERVER

For a NetBackup master server, the first SERVER entry in the bp.conf file must point to that master server itself. During installation, SERVER is automatically set to the name of the system where you are installing NetBackup server software.

The SERVER option *must* be present in the /usr/openv/netbackup/bp.conf file on all NetBackup UNIX servers and clients. It is the only required entry in these bp.conf files. This option is not used in $HOME/bp.conf files on a client.

Applies to NetBackup Enterprise Server:

If you configure NetBackup media servers for a master server, the bp.conf file on the master server must have a SERVER entry or MEDIA_SERVER entry for each. As previously mentioned, the first SERVER entry in the list designates the master server itself. The SERVER or MEDIA_SERVER entries should be added after the first, self-referencing entry.

A NetBackup master server can be backed up as a NetBackup client by servers belonging to another cluster, in which case the bp.conf file on the master server should have SERVER entries for those servers as well.

The following is an example bp.conf file on a master server:

```
SERVER = Master_server (this master server itself)
SERVER = NBU_server  (master server of another cluster)
SERVER = Media_server_#1
MEDIA_SERVER = Media_server_#2
.
.
.
```


The first SERVER entry in the bp.conf files on all the media servers must point to the master server for those media servers. A media server can have only one master server. However, a media server can be backed up as a NetBackup client by servers belonging to another cluster, in which case the bp.conf on the media server should have SERVER entries for those servers as well.

The following is an example bp.conf file on a media server:

```
SERVER = Master_server (for this media server)
SERVER = NBU_server (master server of another cluster)
SERVER = Media_server_#1
MEDIA_SERVER = Media_server_#2
.
.
.
```

The SERVER entries must be the same on all servers in a master and media server cluster.

If you modify or add a SERVER entry in the bp.conf file on the master server, stop and restart both the NetBackup request daemon (bprd) and NetBackup database manager (bpdbm) so NetBackup will recognize the change.

Note If you modify the first bp.conf SERVER entry (the master server) on a media server, the EMM database also needs to be updated. To update the EMM database, run nbemmcmd -updatehost to change the master server for a media server.

SERVER_PORT_WINDOW

Specifies the range of nonreserved ports on which this computer accepts connections from NetBackup on other computers. Default range: 1024 through 5000. This option can also be useful on clients that are running the NetBackup-Java application server. For information on client configuration, see "ALLOW_NON_RESERVED_PORTS" on page 119.

The following example permits ports from 4900 through 5000:

```
SERVER_PORT_WINDOW = 4900 5000
```

Note This option can also be set by changing the **Server Port Window** range property in the Port Ranges host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

SERVER_RESERVED_PORT_WINDOW

Specifies the range of local reserved ports on which this computer accepts connections from NetBackup on other computers. Default range: 512 through 1023.

This setting applies when connecting to a client configured to accept only reserved ports. This entry is generally not useful on clients. For information on client configuration, see "ALLOW_NON_RESERVED_PORTS" on page 119.

The following example permits ports from 900 through 1023:

```
SERVER_RESERVED_PORT_WINDOW = 900 1023
```

Note This option can also be set by changing the **Server Reserved Port Window** range property in the Port Ranges host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

SKIP_RESTORE_TO_SYMLINK_DIR

`SKIP_RESTORE_TO_SYMLINK_DIR` forces NetBackup to check all directories on a UNIX client into which files are being restored. If the file to be restored is under a symbolically linked directory, NetBackup does not restore the file.

For example, if the UNIX client requests a restore for `/home/user/.cshrc` and `/home/user` is a symbolic link, NetBackup will not restore `.cshrc`.

The addition of `SKIP_RESTORE_TO_SYMLINK_DIR` helps minimize potential security and data-loss problems if the restore is being performed with root permissions. Without `SKIP_RESTORE_TO_SYMLINK_DIR` indicated in the `bp.conf` file, NetBackup follows any symbolically linked directories and restores files to that location.

Note There will be a performance degradation to restore jobs using this option.

`SKIP_RESTORE_TO_SYMLINK_DIR` and `UNLINK_ON_OVERWRITE` do not affect each other if both are specified, with one exception:

If **Overwrite Existing Files** is selected with `SKIP_RESTORE_TO_SYMLINK_DIR` and `UNLINK_ON_OVERWRITE`, symbolic links that the restore job comes across will be unlinked before checking, and the files and directory will be restored.

For example, if `/home/user/` was backed up as a directory and, when restored, it is a symbolic link to a directory:

- With just `SKIP_RESTORE_TO_SYMLINK_DIR` set (and **Overwrite Existing Files** indicated), no files will be restored into the directory the symbolic link points to, and the symbolic link will remain.
- With both `UNLINK_ON_OVERWRITE` and `SKIP_RESTORE_TO_SYMLINK_DIR` (and **Overwrite Existing Files** indicated), the symbolic link directory will be unlinked, the original directory will be restored, and all files within the directory will also be restored.

- With neither set (and **Overwrite Existing Files** indicated), NetBackup will follow the symbolic link and restore all files into the directory the symbolic link points to.

SERVER_CONNECT_TIMEOUT

Applies to NetBackup Enterprise Server:

SERVER_CONNECT_TIMEOUT specifies the number of seconds that the master server waits before timing out when connecting to a media server. Default: Timeout period is 30 seconds.

The following example permits a timeout of 60 seconds:

```
SERVER_CONNECT_TIMEOUT = 60
```

UNLINK_ON_OVERWRITE

When a UNIX client indicates **Overwrite Existing Files** as a restore option, UNLINK_ON_OVERWRITE forces NetBackup to first check for the existence of a file to be restored, unlink the file if it exists, then restore the file. The file can be any normal file, symbolic link, hard link, or empty directory.

The addition of UNLINK_ON_OVERWRITE helps minimize potential security and data-loss problems from following existing symbolic links. It also guarantees that files will be restored exactly as they were backed up.

Note There will be a performance degradation to restore jobs using this option.

Without UNLINK_ON_OVERWRITE indicated in the bp.conf file (or set to NO), but overwrite is specified, NetBackup will unlink existing files or empty directories when restoring symbolic links, hard links, or special files (CHR, BLK, and FIFO). However, NetBackup will *not* unlink when restoring normal files or directories. This can be a problem with symbolic links because NetBackup will follow the symbolic link to create or replace file(s) pointed to by the symbolic link or in a directory pointed to by a symbolic link.

SKIP_RESTORE_TO_SYMLINK_DIR and UNLINK_ON_OVERWRITE do not affect each other if both are specified, with one exception:

If **Overwrite Existing Files** is selected with SKIP_RESTORE_TO_SYMLINK_DIR and UNLINK_ON_OVERWRITE, symbolic links that the restore job comes across will be unlinked before checking, and the files and directory will be restored.

For example, if /home/user/ was backed up as a directory and, when restored, it is a symbolic link to a directory:

- With just SKIP_RESTORE_TO_SYMLINK_DIR set (and **Overwrite Existing Files** indicated), no files will be restored into the directory the symbolic link points to, and the symbolic link will remain.
- With both UNLINK_ON_OVERWRITE and SKIP_RESTORE_TO_SYMLINK_DIR (and **Overwrite Existing Files** indicated), the symbolically linked directory will be unlinked, the original directory will be restored, and all files within the directory will also be restored.
- With neither set (and **Overwrite Existing Files** indicated), NetBackup will follow the symbolic link and restore all files into the directory the symbolic link points to.

USE_VXSS

The USE_VXSS entry specifies whether the local system uses VxSS.

```
USE_VXSS = REQUIRED | PROHIBITED | AUTOMATIC
```

Where:

REQUIRED indicates that the local system always uses VxSS. Connections from systems not using VxSS are rejected.

PROHIBITED indicates that the local system never uses VxSS. Connections from systems using VxSS are rejected (default).

AUTOMATIC indicates that the local system negotiates with the remote system whether to use VxSS.

If USE_VXSS = AUTOMATIC is specified, VXSS_NETWORK entries can be used to require or prohibit VxSS connections with specified remote systems. See VXSS_NETWORK for an example using USE_VXSS = AUTOMATIC.

Note This option can also be set by changing the **Use VERITAS Security Subsystem** property in the Access Control host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

VERBOSE

Used for debugging purposes, the VERBOSE option controls the amount of information NetBackup includes in its legacy logs. Default: Disabled.

```
VERBOSE [ 0 | 1 | 2 | 3 | 4 | 5 ]
```

Note This option can also be set by changing the **Global Logging Level** property in the Logging host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

VXSS_NETWORK

The VXSS_NETWORK entry identifies whether a specific network or remote system must or must not use VxSS with the local system.

If a media server or client does not define a VxSS network, it will use the VxSS networks of its master server.

VXSS_NETWORK is relevant only if USE_VXSS is set to AUTOMATIC (USE_VXSS = AUTOMATIC). More than one VXSS_NETWORK entry can be specified.

```
VXSS_NETWORK = hostname | IP_address | .domain | network.
[AUTOMATIC | REQUIRED | PROHIBITED]
```

Possible values:

- hostname
  The host name of the remote system.
- IP_address
  The IP address of the remote system.
- .domain
  A dot followed by the Internet domain name of the remote systems.
- network.
  The network of the remote systems followed by a dot.

The optional second value can be one of the following keywords:

- AUTOMATIC
- REQUIRED
- PROHIBITED

Note If a system is specified by more than one VXSS_NETWORK entry, the first occurance takes precedence.

Example

```
USE_VXSS = AUTOMATIC
VXSS_NETWORK = fred.mycompany.com
VXSS_NETWORK = 10.0.0.37 REQUIRED
VXSS_NETWORK = 10.0.0. PROHIBITED
VXSS_NETWORK = .theircompany.com
VXSS_NETWORK = wilma.theircompany.com PROHIBITED
VXSS_NETWORK = barney.mycompany.com PROHIBITED
```

In the example, VxSS is required for connections between the local system and the system with host fred.mycompany.com.

VxSS is required for connections between the local system and the system with IP address 10.0.0.37.

VxSS is prohibited for connections between the local system and systems in the 10.0.0 network except for 10.0.0.37.

VxSS is required for connections between the local system and systems within the theircompany.com Internet domain.

VxSS is required for connections between the local system and the system with host name wilma.theircompany.com despite the PROHIBITED entry for wilma.theircompany.com. The REQUIRED entry for .theircompany.com takes precedence.

VxSS is prohibited for connections between the local system and the system with host name barney.mycompany.com

Note This option can also be set by changing the **VxSS Networks List** property in the Access Control host properties. (See Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

bp.conf Options for UNIX Clients

On NetBackup UNIX clients, the main bp.conf file is located in the following pathname:

```
/usr/openv/netbackup/bp.conf
```

As installed, NetBackup uses internal software defaults for all options in the bp.conf file, except SERVER. During installation, NetBackup sets the SERVER option to the name of the master server where the software is installed.

Note The SERVER option must be in the /usr/openv/netbackup/bp.conf file on all NetBackup UNIX clients. It is also the only required entry in this file.

If a single UNIX system is running as both a client and a server, both the server and client options are in the /usr/openv/netbackup/bp.conf file.

Each nonroot user on a UNIX client can have a personal bp.conf file in their home directory as follows:

```
$HOME/bp.conf
```

The options in personal bp.conf files apply only to user operations. During a user operation, NetBackup checks the $HOME/bp.conf file before /usr/openv/netbackup/bp.conf. Root users do not have personal bp.conf files. NetBackup uses the /usr/openv/netbackup/bp.conf file for root users.

The following topics describe the options that you can specify in the /usr/openv/netbackup/bp.conf and $HOME/bp.conf files on a NetBackup UNIX client.

Note PC clients provide similar options that you can change either through the client-user interface or in a configuration file, depending on the client. For instructions, see the online help in the Backup, Archive, and Restore client interface.

ALLOW_NON_RESERVED_PORTS

Specifies that the NetBackup client daemon (bpcd) can accept remote connections from non-privileged ports (port numbers 1024 or greater). If this entry is not present, then bpcd requires remote connections to come from privileged ports (port numbers less than 1024). This option can be useful when NetBackup clients and servers are on opposite sides of a firewall.

You can add this option to the /usr/openv/netbackup/bp.conf file on a UNIX client.

In addition to adding ALLOW_NON_RESERVED_PORTS to the client, execute the following commands as root on the master server.

```
cd /usr/openv/netbackup/bin/admincmd
./bpclient -client client_name -add -connect_nr_port 1
```

Where *client_name* is the name of the client where you added the ALLOW_NON_RESERVED_PORTS option. These commands instruct the master server to use nonprivileged ports.

AUTHENTICATION_DOMAIN

The AUTHENTICATION_DOMAIN entry defines a set of VxSS authentication principals. A client that uses VxSS must have at least one AUTHENTICATION_DOMAIN entry, and more than one can be specified. (See "AUTHENTICATION_DOMAIN" on page 119 for more information.)

If a media server or client does not define an authentication domain, it will use the authentication domains of its master server.

Use this option by adding it to the /usr/openv/netbackup/bp.conf file on a UNIX client or by setting the **Authentication Domains** in the Access Control properties under client host properties. (See "Authentication Domain Tab within Access Control Properties Dialog" on page 347 in *NetBackup System Administrator's Guide, Volume I*.)

BPARCHIVE_POLICY

Specifies the name of the policy to use for user archives. Default: BPARCHIVE_POLICY is not in any bp.conf file and NetBackup uses the first policy that it finds that has the client and a user archive schedule.

For example:

```
BPARCHIVE_POLICY = arch_1
```

You can add this option to the /usr/openv/netbackup/bp.conf and $HOME/bp.conf files on a UNIX client.

The value in the user's $HOME/bp.conf file takes precedence if it exists.

BPARCHIVE_SCHED

Specifies the name of the schedule for user archives. Default: BPARCHIVE_SCHED is not in any bp.conf file and NetBackup uses the first archive schedule in the first policy that it finds that has this client.

For example

```
BPARCHIVE_SCHED = user_arch1
```

You can add this option to the /usr/openv/netbackup/bp.conf and $HOME/bp.conf files on a UNIX client.

The value in the user's $HOME/bp.conf file takes precedence if it exists.

BPBACKUP_POLICY

Specifies the name of the policy name to use for user backups. Default: BPBACKUP_POLICY, is not in any bp.conf file and NetBackup uses the first policy it finds that has both the client and a user backup schedule.

For example:

```
BPBACKUP_POLICY = userback_1
```

You can add this option to the /usr/openv/netbackup/bp.conf and (or) $HOME/bp.conf files on a UNIX client.

The value in user's $HOME/bp.conf file takes precedence if it exists.

BPBACKUP_SCHED

Specifies the name of the schedule to use for user backups. Default: BPBACKUP_SCHED is not in any bp.conf file and NetBackup uses the first policy it finds that has both the client and a user backup schedule.

For example:

BPBACKUP_SCHED = user_back1

You can add this option to the `/usr/openv/netbackup/bp.conf` and `$HOME/bp.conf` files on a UNIX client.

The value in the user's `$HOME/bp.conf` file takes precedence if it exists.

BUSY_FILE_ACTION

Directs the action that NetBackup performs on busy files when busy-file processing is enabled.

You can add this option to the `/usr/openv/netbackup/bp.conf` and `$HOME/bp.conf` files on a UNIX client.

The value in the user's `$HOME/bp.conf` file takes precedence if it exists.

There can be multiple entries of the following form:

BUSY_FILE_ACTION = *`filename_template action_template`*

Where

- *`filename_template`* is the absolute pathname and file name of the busy file. The shell language metacharacters `*, ?, [], [ - ]` can be used for pattern matching of filenames or parts of filenames.
- *`action_template`* is one of the following:

  `MAIL | mail`

  Directs NetBackup to E-mail a busy file notification message to the user specified by the `BUSY_FILE_NOTIFY_USER` option.

  `REPEAT | repeat [repeat_count]`

  Directs NetBackup to retry the backup on the specified busy file. A repeat count can be specified to control the number of backup attempts. The default repeat count is 1.

  `IGNORE | ignore`

  Directs NetBackup to exclude the busy file from busy file processing.

BUSY_FILE_DIRECTORY

The `BUSY_FILE_DIRECTORY` option specifies the path to the busy-files working directory when busy-file processing is enabled. Default: `BUSY_FILE_DIRECTORY` is not in any `bp.conf` file and NetBackup creates the `busy_files` directory in `/usr/openv/netbackup`.

You can add this option to the /usr/openv/netbackup/bp.conf and $HOME/bp.conf files on a UNIX client.

The value in the user's $HOME/bp.conf file takes precedence, if it exists.

BUSY_FILE_NOTIFY_USER

The BUSY_FILE_NOTIFY_USER option specifies the recipient of the busy file notification message when BUSY_FILE_ACTION is set to MAIL or mail. Default: BUSY_FILE_NOTIFY_USER is not in any bp.conf file and the E-mail recipient is root.

You can add this option to the /usr/openv/netbackup/bp.conf and $HOME/bp.conf files on a UNIX client.

The value in the user's $HOME/bp.conf file takes precedence, if it exists.

BUSY_FILE_PROCESSING

The BUSY_FILE_PROCESSING option lets the user control the actions that NetBackup performs when it determines that a file is changing while it is being backed up. Default: BUSY_FILE_PROCESSING option is not in bp.conf and busy-file processing does not occur. (See "Busy-File Processing (UNIX Clients Only)" on page 173 for instructions on setting this option.)

You can add this option to the /usr/openv/netbackup/bp.conf file on a UNIX client.

CLIENT_NAME

Specifies the name of the client as it is known to NetBackup. There can be one CLIENT_NAME entry and it must match the name used in the policy that is backing up the client. The only exception is for an alternate client restore, where the name must match that of the client whose files are being restored. (See "Client-Redirected Restores" on page 505.) The client installation procedures automatically set CLIENT_NAME to the value specified on the ftp_to_client or install_client command in the installation scripts.

You can add this option to the /usr/openv/netbackup/bp.conf file on a UNIX client.

It can also be added to a $HOME/bp.conf file on a UNIX client but this is normally done only for alternate-client restores.

If the value is not in any bp.conf file, NetBackup uses the value returned by the gethostname() library function.

CLIENT_PORT_WINDOW

Specifies the range of nonreserved ports on this computer that are used for connecting to NetBackup on other computers. (See "CLIENT_PORT_WINDOW" on page 127.)

CLIENT_READ_TIMEOUT

Specifies the number of seconds for the client-read timeout on a server or a database agent. (See "CLIENT_READ_TIMEOUT" on page 128.)

CLIENT_RESERVED_PORT_WINDOW

Specifies the range of reserved ports on this computer that are used for connecting to NetBackup on other computers. (See "CLIENT_RESERVED_PORT_WINDOW" on page 129.)

COMPRESS_SUFFIX

Note This option has a reasonable default and has to be changed only if problems are encountered.

Specifies a list of file extensions. During a backup, NetBackup does not compress files with these extensions because the file can already be in a compressed format. Default, `COMPRESS_SUFFIX` is not in the `bp.conf` file. (See "Compression" on page 85 for more information on compressing files.)

You cannot use wildcards when specifying these extensions. For example, you can specify the following:

.A1

You cannot specify either of the following:

.A* or .A[1-9]

You can add this option to the `/usr/openv/netbackup/bp.conf` file on a UNIX client.

CRYPT_CIPHER

Note `CRYPT_CIPHER` applies only to clients that have the NetBackup Encryption option installed. For information on NetBackup Encryption, see the *NetBackup Encryption System Administrator's Guide*.

The CRYPT_CIPHER entry on the client takes one the following values:

- AES-128-CFB (used when no method is specified; default)
- AES-256-CFB
- BF-CFB
- DES-EDE-CFB

This client property can also be configured on the Encryption host properties dialog for each client. (Configuration options are described in Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

CRYPT_KIND

Note CRYPT_KIND applies only to 5.1 clients that have the NetBackup Encryption option installed. For information on NetBackup Encryption, see the *NetBackup Encryption System Administrator's Guide*.

The CRYPT_KIND entry on the client determines whether the standard encryption or legacy encryption will be used in the backup. Normally, CRYPT_KIND is set automatically. The values that can be entered are the following:

NONE = No encryption is used on the client (default)

LEGACY = Use on NetBackup clients running versions previous to 5.1. Legacy pertains to 40-bit and 56-bit Data Encryption Standard (DES).

STANDARD = Use on NetBackup 5.1 clients in order to use the 128-bit and 256-bit options of NetBackup Encryption.

This client property can also be configured on the Encryption host properties dialog for each client. (Configuration options are described in Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

CRYPT_OPTION

Note CRYPT_OPTION applies only to clients that have the NetBackup Encryption option installed. For information on NetBackup Encryption, see the *NetBackup Encryption System Administrator's Guide*.

CRYPT_OPTION specifies the encryption options on NetBackup clients. NetBackup creates this entry automatically in the /usr/openv/netbackup/bp.conf file on a UNIX client when you run the bpinst_crypt command on the NetBackup master server.

Do not alter the entry or create this file manually unless it has been accidentally deleted. The allowable values follow:

`DENIED|denied`

Specifies that the client does not permit encrypted backups. If the server requests an encrypted backup, it is considered an error. This option is the default for a client that has not been configured for encryption.

`ALLOWED|allowed`

Specifies that the client allows either encrypted or unencrypted backups.

`REQUIRED|required`

Specifies that the client requires encrypted backups. If this value is specified and the server requests an unencrypted backup, it is considered an error.

This client property can also be configured on the Encryption host properties dialog for each client. (Configuration options are described in Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

CRYPT_STRENGTH

Note `CRYPT_STRENGTH` applies only to clients that have the NetBackup Encryption option installed. See the *NetBackup Encryption System Administrator's Guide*.

Specifies the encryption strength on NetBackup clients. NetBackup creates this entry automatically in the `/usr/openv/netbackup/bp.conf` file on a UNIX client when you run the `bpinst_crypt` command on the NetBackup master server.

Do not alter the entry or create it manually unless it has been accidentally deleted. The possible values follow:

`DES_40|des_40`

Specifies 40-bit DES encryption. This is the default value for a client that has not been configured for encryption.

`DES_56|des_56`

Specifies 56-bit DES encryption.

This client property can also be configured on the Encryption host properties dialog for each client. (Configuration options are described in Chapter 7 of the *NetBackup System Administrator's Guide, Volume I*.)

CRYPT_LIBPATH

Note `CRYPT_LIBPATH` applies only to clients that have the NetBackup Encryption option installed. See the *NetBackup Encryption System Administrator's Guide*.

Specifies the directory that contains the encryption libraries for NetBackup clients. NetBackup creates this entry automatically in the `/usr/openv/netbackup/bp.conf` file on a UNIX client when you run the `bpinst_crypt` command on the NetBackup master server.

Do not alter the entry or create it manually unless it has been accidentally deleted.

- The following is the default value on UNIX systems:

  `/usr/openv/lib/`

- The following is the default value on Windows systems:

  `install_path``\bin\`

  Where *`install_path`* is the directory where NetBackup is installed and by default is `C:\Program Files\VERITAS`.

CRYPT_KEYFILE

Note `CRYPT_KEYFILE` applies only to clients that have the NetBackup Encryption option installed. See the *NetBackup Encryption System Administrator's Guide*.

Specifies the file that contains the encryption keys on NetBackup clients. NetBackup creates this entry automatically in the `/usr/openv/netbackup/bp.conf` file on a UNIX client when you run the `bpinst_crypt` command on the NetBackup master server.

Do not alter the entry or create it manually unless it has been accidentally deleted. The default values follow:

- On UNIX systems: `/usr/openv/netbackup/keyfile`
- On Windows systems: *`install_path`*`\bin\keyfile.dat`

  Where *`install_path`* is the directory where NetBackup is installed and by default is `C:\Program Files\VERITAS`.

DISALLOW_SERVER_FILE_WRITES

Prevents the NetBackup server from creating files on the NetBackup client. For example, this prevents server-directed restores or server-directed updates of the `bp.conf` file on the client.

You can add this option to the `/usr/openv/netbackup/bp.conf` file on a UNIX client. By default, server writes are allowed.

DO_NOT_RESET_FILE_ACCESS_TIME

Note This setting affects software and administration scripts that examine a file's access time. DO NOT use this option or `USE_CTIME_FOR_INCREMENTALS` if you are running Storage Migrator on the system. Setting these options causes the atime for files to be updated every time they are backed up. This makes it appear as if the files are frequently used and stops Storage Migrator from selecting them for migration.

Specifies that if a file is backed up, its access time (atime) will show the time of the backup. Default: NetBackup preserves the access time by resetting it to the value it had before the backup.

You can add this option to the `/usr/openv/netbackup/bp.conf` file on a UNIX client.

GENERATE_ENGLISH_LOGS

Enables the generation of an English error log, and English trace logs for the `bparchive`, `bpbackup`, `bpduplicate`, `bpimport`, and `bprestore` commands. This option is useful to support personnel assisting in distributed environments where differing locales result in logs with various languages.

You can add this option to the `/usr/openv/netbackup/bp.conf` file on NetBackup servers and clients.

IGNORE_XATTR

By default, extended attribute files on Solaris 9 clients and named data streams on VxFS 4.0 clients are backed up. To disable the backing up of extended attributes and named data streams, add IGNORE_XATTR to the `/usr/openv/netbackup/bp.conf` file on the Solaris 9 or VxFS 4.0 client. (IGNORE_XATTR was formerly IGNORE_XATTR_SOLARIS.)

The presence of this entry in the `bp.conf` file means that NetBackup will not check for the existence of extended attributes or named data streams. (See "Backup and Restore of Extended Attribute Files and Named Data Streams" on page 174.)

INFORMIX_HOME

Specifies the path to the Informix home directory and is required when the client is using NetBackup for Informix.

You must add this option to the `/usr/openv/netbackup/bp.conf` file on UNIX clients that are running NetBackup for Informix.

INITIAL_BROWSE_SEARCH_LIMIT

Reduces the default number of days back that NetBackup searches for files to restore.

You can add this option to the `/usr/openv/netbackup/bp.conf` file on NetBackup master servers and clients. (See "INITIAL_BROWSE_SEARCH_LIMIT" on page 136.)

KEEP_DATABASE_COMM_FILE

Causes NetBackup to keep database agent logs for seven days. Default: NetBackup keeps database agent logs for only one day.

You can add this option to the `/usr/openv/netbackup/bp.conf` file on a UNIX database agent (for example, a client that is running NetBackup for Informix).

KEEP_LOGS_DAYS

Specifies the number of days to keep job and progress logs generated by the NetBackup Java program, Backup, Archive, and Restore. NetBackup writes these files in the `usr/openv/netbackup/logs/user_ops/`*`username`*`/jobs` and `/usr/openv/netbackup/logs/user_ops/`*`username`*`/logs` directories. A directory exists for each user that uses the Backup, Archive, and Restore program. The number of days to keep the NetBackup-Java GUI log files contained in `/usr/openv/netbackup/logs/user_ops/nbjlogs` is controlled by this option as well.

Default: Three days.

You can add this option to the `/usr/openv/netbackup/bp.conf` file on a UNIX client.

LIST_FILES_TIMEOUT

Specifies the number of minutes to wait for a response from the NetBackup server when listing files by using the client-user interface or `bplist`. If this time is exceeded, the user receives a `socket read failed` error even if the server is still processing the user's request. Default: `LIST_FILES_TIMEOUT` is not in any `bp.conf` file and NetBackup uses a value of 30 minutes.

You can add this option to the `/usr/openv/netbackup/bp.conf` and `$HOME/bp.conf` files on a UNIX client.

The value in the user's `$HOME/bp.conf` file takes precedence if it exists.

LOCKED_FILE_ACTION

Specifies the behavior of NetBackup when it tries to back up a file that has mandatory file locking enabled in its file mode (see `chmod(1)`). If `LOCKED_FILE_ACTION` is specified and has a value of `SKIP` (the only legal value), NetBackup skips files that currently have mandatory locking set by another process and logs a message to this effect.

You can add this option to the `/usr/openv/netbackup/bp.conf` files on a UNIX client. Default: NetBackup waits for files to become unlocked.

MEDIA_SERVER

Specifies that the listed machine is a media server *only*. Machines listed as media servers can back up and restore clients, but have limited administrative privileges.

MEGABYTES_OF_MEMORY

Note This option has a reasonable default and has to be changed only if problems are encountered.

Specifies how much memory is available on the client to use when compressing files during backup. If you select compression, the client software uses this value to determine how much space to request for the compression tables. The more memory that is available to the compress code, the greater the compression. The percentage of machine resources used is also greater. If other processes also need memory, it is generally best to use a maximum value of 1/2 the actual physical memory on a machine to avoid excessive swapping.

You can add this option to the `/usr/openv/netbackup/bp.conf` file on a UNIX client. Default: NetBackup assumes a value of one megabyte.

NFS_ACCESS_TIMEOUT

Specifies the number of seconds that the backup process waits when processing an NFS mount table before considering an NFS file system unavailable.

You can add this option to the `/usr/openv/netbackup/bp.conf` file on a UNIX client. Default: Timeout period is five seconds.

RANDOM_PORTS

Specifies whether NetBackup chooses port numbers randomly or sequentially when it requires one for communication with NetBackup on other computers. (See "RANDOM_PORTS" on page 171.)

RESTORE_RETRIES

Note This option has a reasonable default and will have to be changed only if problems are encountered.

Specifies the number of times to retry a restore after a failure. Default: There are no retries.

You can add this option to the `/usr/openv/netbackup/bp.conf` file on a UNIX client.

REQUIRED_INTERFACE

Specifies the network interface that NetBackup uses when connecting to another NetBackup client or server. (See "REQUIRED_INTERFACE" on page 172.)

SERVER_PORT_WINDOW

Specifies the range of nonreserved ports on which this computer accepts connections from NetBackup on other computers.

SERVER

Applies to NetBackup Enterprise Server only.

Defines the list of NetBackup master servers and media servers that can access the NetBackup client. During client installation, the `SERVER` is set to the name of the primary master server for this client. Other `SERVER` entries can be added for any other master servers for this client, and for media servers for this client. (Media servers for this NetBackup client can also be added using the `MEDIA_SERVER` option.)

If you configure media servers, you must have a `SERVER` or `MEDIA_SERVER` entry for each media server in the NetBackup client's `bp.conf` file.

The following is an example `bp.conf` file on a client:

```
SERVER = Master_server (default master server)
SERVER = NBU_server (other master server)
SERVER = Media_server_#1
MEDIA_SERVER = Media_server_#2
.
.
.
```

The first `SERVER` entry denotes the master server to which the client would connect by default for any requests (for example, backing up, listing or restoring files). The `SERVER` option must be present in the `/usr/openv/netbackup/bp.conf` file on all UNIX

clients. It is also the only required entry in the bp.conf file for clients. This option is not used in a $HOME/bp.conf file. On NetBackup UNIX servers, the SERVER entry applies to both client and the server.

SYBASE_HOME

Specifies the path to the Sybase home directory and is required when using NetBackup for Sybase to back up Sybase databases. Default: SYBASE_HOME is not in the bp.conf file.

You must add this option to the /usr/openv/netbackup/bp.conf file on a NetBackup for Sybase client.

Note This entry is not required in order to back up the Sybase ASA that NetBackup uses as part of the NetBackup catalog.

USE_CTIME_FOR_INCREMENTALS

Note If you specify USE_CTIME_FOR_INCREMENTALS, you must also specify DO_NOT_RESET_FILE_ACCESS_TIME.

DO NOT use these options if you are running Storage Migrator on the system. Setting these options causes the atime for files to be updated every time they are backed up. This makes it appear as if the files are frequently used and stops Storage Migrator from selecting them for migration.

Causes NetBackup client software to use both modification time (mtime) and inode change time (ctime) during incremental backups to determine if a file has changed.

You can add this option to the /usr/openv/netbackup/bp.conf file on a UNIX client. Default: NetBackup uses only mtime.

USE_FILE_CHG_LOG

The USE_FILE_CHG_LOG entry specifies whether NetBackup utilitzes the file change log on VxFS 4.1 clients. This feature is supported on only the Solaris platform in this release. Default: off.

Use this option by adding it to the /usr/openv/netbackup/bp.conf file on the client or by setting the **Use VxFS File Change Log for Incremental Backups** property in the UNIX Client Settings under client host properties. (See "Client Settings (UNIX) Properties" on page 372 in *NetBackup System Administrator's Guide, Volume I* for more information.)

USE_VXSS

The USE_VXSS entry specifies whether the local system uses VxSS.

Use this option by adding it to the /usr/openv/netbackup/bp.conf file on the client or by setting the **Use VERITAS Security Subsystem** in the Access Control properties under client host properties. (See "VERITAS Security Services (VxSS)" on page 344 in *NetBackup System Administrator's Guide, Volume I* for more information.)

USEMAIL

Specifies the E-mail address where NetBackup sends status on the outcome of operations for a UNIX client. Default: USEMAIL is not present in any bp.conf file and no E-mail is sent.

Note You can use multiple addresses or an E-mail alias as long as there are no blanks or white space between them.

You can add this option to the /usr/openv/netbackup/bp.conf and $HOME/bp.conf files on a UNIX client.

- If the /usr/openv/netbackup/bp.conf file specifies an address, NetBackup sends automatic backup and manual backup status to that address.
- If the $HOME/bp.conf file specifies an address, NetBackup also sends status on the success or failure of user operations to that address.

VERBOSE

The VERBOSE entry causes NetBackup to include more information in its logs. Default: Disabled.

You can add this option to the /usr/openv/netbackup/bp.conf file on a UNIX client.

VXSS_NETWORK

The VXSS_NETWORK entry identifies whether a specific network or remote system must or must not use VxSS with the local system.

If a media server or client does not define a VxSS network, it will use the VxSS networks of its master server. (See "VXSS_NETWORK" on page 150 for more information.)

Use this option by adding it to the /usr/openv/netbackup/bp.conf file on a UNIX client or by setting the **VxSS Networks List** in the Access Control properties under client host properties. (See "VxSS Networks List" on page 345 in *NetBackup System Administrator's Guide, Volume I*.)

UNIX Client Examples

Example /usr/openv/netbackup/bp.conf File

```
SERVER = hare
CLIENT_NAME = freddie
USEMAIL = abc@bdev.com
COMPRESS_SUFFIX = .Addrs
COMPRESS_SUFFIX = .Counts
VERBOSE
RESTORE_RETRIES = 1
BPBACKUP_POLICY = U1userdir
BPBACKUP_SCHED = userbackups
BPARCHIVE_POLICY = U1userdir
BPARCHIVE_SCHED = userarchives
LOCKED_FILE_ACTION = SKIP
```

Example $HOME/bp.conf File

Nonroot users on UNIX clients can have a personal `bp.conf` file in their home directory. A personal `bp.conf` file can have any of the following options

Note A root user cannot have a personal `bp.conf` file. For root users, NetBackup uses the `/usr/openv/netbackup/bp.conf` file.

```
USEMAIL = mars@bdev.com
BPBACKUP_POLICY = user1
BPBACKUP_SCHED = userback
BPARCHIVE_POLICY = user1
BPARCHIVE_SCHED = userarch
LIST_FILES_TIMEOUT = 10
CLIENT_NAME = alternate_client_name
```

Specify `CLIENT_NAME` only when doing restores to an alternate client. (See "Redirected Restore Examples" on page 507.)

Dynamic Host Name and IP Addressing

By default, a NetBackup server assumes that a NetBackup client name is the same as the network host name of the client machine. This makes it difficult to back up clients that have network host names that might change; examples of this are portable machines that plug into a LAN and obtain IP addresses from a DHCP server or remote machines that dial into a PPP server. NetBackup dynamic host name and IP addressing allows you to define NetBackup clients that do not have fixed IP addresses and host names.

Note If you use dynamic addressing, remember that the NetBackup servers still require fixed IP addresses and host names.

Note All clients configured to use dynamic addressing and host names must trust each other in a way similar to that provided by the NetBackup altnames feature.

The following steps are required to support configurations that use dynamic IP addressing for NetBackup. Read all sections of this topic prior to making any changes to your configuration.

1. Configure your network to use a dynamic IP addressing protocol like DHCP.

   NetBackup requires that IP addresses of clients have a network host name. Be sure to define network host names for the range of dynamic IP addresses in the `hosts` file, NIS, and (or) DNS on your network.

2. Determine the NetBackup client names for the machines that have dynamic IP addresses and network host names.

   You will use these NetBackup client names in step 3 and step 6 of this procedure. Each NetBackup client must have a unique NetBackup client name. The NetBackup client name assigned to a client is permanent—do not change it.

3. Make changes on the master server:

   a. Create NetBackup policies with client lists that include the names from step 2.

   b. Create entries in the NetBackup client database for the client names from step 2.

      Create the entries by using the `bpclient` command.

4. Make changes on each dynamic NetBackup Windows client:

   Start the Backup, Archive, and Restore user interface on the client and select **File** > **NetBackup Client Properties**. The NetBackup Client Properties dialog appears. Select the **General** tab. Change the **Client Name** to the correct NetBackup client name for the machine.

5. On the master server, enable the **Announce DHCP Interval** option:

   Open the NetBackup Administration Console and navigate to the **Host Properties** for clients. (To do this, select **NetBackup Management** > **Host Properties** > **Clients**.) Open the client properties for the Windows client(s). Under the **Windows Client** host properties, select **Network**. Check the **Announce DHCP Interval** checkbox.

6. Make changes on each dynamic NetBackup UNIX client:

   a. Modify the `bp.conf` file to include a `CLIENT_NAME` entry with the correct NetBackup client name for the machine.

   b. Configure the system to notify the master server of the machine's NetBackup client name and current network host name during startup. The `bpdynamicclient` command is used to notify the master server.

   c. Configure the system to periodically notify the master server of the machine's NetBackup client name and current network host name.

Setting up Dynamic IP Addresses and Host Names

Configure your network to use a dynamic IP addressing protocol. A protocol like DHCP will have a server and several clients. For example, when a DHCP client starts up, it requests an IP address from the DHCP server. The server then assigns an IP address to the client from a range of predefined addresses.

NetBackup requires that the IP addresses of NetBackup clients have corresponding network host names. Ensure that each IP address that could be assigned to NetBackup clients has a network host name defined in the `host` file, NIS, and (or) DNS on your network.

As an example, suppose that you have 10 dynamic IP addresses and host names available. The dynamic IP addresses and host names might be:

```
123.123.123.70 dynamic00
123.123.123.71 dynamic01
123.123.123.72 dynamic02
123.123.123.73 dynamic03
.
.
.
123.123.123.79 dynamic09
```

Assign a unique NetBackup client name to each NetBackup client that might use one of these dynamic IP addresses. The NetBackup client name assigned to a client is permanent and should not be changed. The client name assigned to NetBackup clients with dynamic

IP addressing must not be the same as any network host names on your network. If the NetBackup client names are changed or are not unique, backup and restore results are unpredictable.

For example, suppose you have 20 machines that will share the IP addresses defined above. If you want these machines to be NetBackup clients, you might assign them these NetBackup client names as follows:

```
nbclient01
nbclient02
nbclient03
nbclient04
.
.
.
nbclient20
```

Configuring the NetBackup Master Server

On the master server, create your NetBackup backup policies as you would otherwise. For client name lists, use the NetBackup client names (for example, nbclient01) rather than the dynamic network host names (for example, `dynamic01`).

Next, create the client database on the master server. The client database consists of directories and files in the following directory:

`/usr/openv/netbackup/db/client`

You can create, update, list, and delete client entries with the `bpclient` command. The `bpclient` command is in the following directory:

`/usr/openv/netbackup/bin/admincmd`

- To create a dynamic client entry:

  `bpclient -add -client` *`client_name`* `-dynamic_address 1`

  where *`client_name`* is the NetBackup client name. The `-dynamic_address 1` argument indicates that the client uses dynamic IP addressing. You can create entries with `-dynamic_address 0` for static IP addressing, but that is unnecessary and will adversely affect performance.

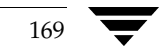
- To delete a client entry:

  `bpclient -delete -client` *`client_name`*

- To list a client entry:

  `bpclient -L -client` *`client_name`*

- To list all client entries:



```
bpclient -L -All
```

In our example, you can enter these commands to create the 20 clients:

```
cd /usr/openv/netbackup/bin/admincmd
bpclient -add -client nbclient01 -dynamic_address 1
bpclient -add -client nbclient02 -dynamic_address 1
bpclient -add -client nbclient03 -dynamic_address 1
bpclient -add -client nbclient04 -dynamic_address 1
.
.
.
bpclient -add -client nbclient20 -dynamic_address 1
```

To see what is currently in the client database, run `bpclient` as follows:

```
/usr/openv/netbackup/bin/admincmd/bpclient -L -All
```

The output is similar to the following:

```
Client Name: nbclient01
Current Host:
Hostname: *NULL*
IP Address: 0.0.0.0
Connect on non-reserved port: no
Dynamic Address: yes

Client Name: nbclient02
Current Host:
Hostname: *NULL*
IP Address: 0.0.0.0
Connect on non-reserved port: no
Dynamic Address: yes
.
.
.
Client Name: nbclient20
Current Host:
Hostname: *NULL*
IP Address: 0.0.0.0
Connect on non-reserved port: no
Dynamic Address: yes
```

After the NetBackup client notifies the NetBackup server of its NetBackup client name and network host name, the Current Host, Hostname, and IP Address fields will display the values for that NetBackup client.

Configuring a Dynamic Microsoft Windows Client

If it is not already installed, install NetBackup on the Windows client.

Start the Backup, Archive, and Restore user interface on the client and select **File** > **NetBackup Client Properties**. The NetBackup Client Properties dialog appears. Select the **General** tab. Change the **Client Name** to specify the NetBackup client name for the Windows client.

In the NetBackup Administration Console, set **Announce DHCP Interval** to specify how many minutes the client waits before announcing that it is using a different IP address. (See "Announce DHCP Interval" on page 429 in the *System Administrator's Guide, Volume I*.)

The server is not notified if the default value of 0 is used. For a DHCP client, a good value to use is one-half of the lease period.

On the client, stop and restart the NetBackup Client service to have the changes take effect.

Configuring a Dynamic UNIX NetBackup Client

If not already installed, install the NetBackup client software.

Edit the `/usr/openv/netbackup/bp.conf` file. Use the `CLIENT_NAME` entry to specify the NetBackup client name for the machine, as follows:

```
CLIENT_NAME = nbclient00
```

You must run the `bpdynamicclient` command once when the system first starts up. `bpdynamicclient` notifies the NetBackup server of the machine's NetBackup client name and current network host name. The `bpdynamicclient` command is in the directory:

```
/usr/openv/netbackup/bin
```

The format of the `bpdynamicclient` command is as follows:

```
bpdynamicclient -last_successful_hostname file_name
```

When `bpdynamicclient` starts up, it checks for the existence of *`file_name`*. If *`file_name`* does exist, `bpdynamicclient` determines if the host name written in the file is the same as the current network host name of the machine. If the host names match, `bpdynamicclient` exits and does not connect to the master server. If the host names do not match, `bpdynamicclient` connects to the master server and informs the server of its NetBackup client name and host name. If `bpdynamicclient` successfully informs the server, `bpdynamicclient` writes the current network host name into *`file_name`*. If `bpdynamicclient` cannot inform the server, `bpdynamicclient` deletes *`file_name`*.

Most UNIX systems provide a facility to define startup scripts. For example, on a Solaris system, you can create a script in the `/etc/rc2.d` directory:

```
# cat > /etc/rc2.d/S99nbdynamicclient <<EOF
#! /bin/sh

rm /usr/openv/netbackup/last_successful_hostname
/usr/openv/netbackup/bin/bpdynamicclient -last_successful_hostname
\
/usr/openv/netbackup/last_successful_hostname
EOF
# chmod 544 /etc/rc2.d/S99nbdynamicclient
```

Ensure that the dynamic client startup script is called after the machine obtains its IP address.

You must also create a root `crontab` entry to periodically call the `bpdynamicclient` command. For example, the following entry (one line) calls `bpdynamicclient` at seven minutes after each hour:

```
7 * * * * /usr/openv/netbackup/bin/bpdynamicclient
-last_successful_hostname
/usr/openv/netbackup/last_successful_hostname
```

If you are using DHCP, a good interval to use between calls to `bpdynamicclient` is one-half of the lease period.

Busy-File Processing (UNIX Clients Only)

Note Busy-file processing applies only to UNIX clients.
For information concerning Microsoft Windows clients, see "VSP (Volume Snapshot Provider) Properties," in the *NetBackup System Administrator's Guide, Volume I*. For clients other than Windows and UNIX, see "OTM Properties," in the *System Administrator's Guide, Volume I*.

A busy file is a file that was detected as changed during a user or scheduled backup. Typically, this occurs if a process is writing to a file while NetBackup is attempting to back it up. The backup usually completes with a status of 1, indicating that the backup was partially successful. Busy-file processing allows the user control the actions of NetBackup when busy files are detected.

Busy-file processing can be configured in the **Busy File Settings** host properties for UNIX clients. (See Chapter 7, "Configuring Host Properties," in the *NetBackup System Administrator's Guide, Volume I*.)

If you prefer, busy-file processing can be enabled, by adding the `BUSY_FILE_PROCESSING` option to the client `/usr/openv/netbackup/bp.conf` file. Then, add other busy-file options to control the processing of busy files. The options can exist in both the client `/usr/openv/netbackup/bp.conf` file and a user's `$HOME/bp.conf`. The user's `bp.conf` file takes precedence when the options are in both places.

NetBackup creates several files and directories when processing busy files. Initially, a working directory named `busy_files` is created under `/usr/openv/netbackup`. NetBackup then creates the `/actions` directory under `busy_files` and places `action` files in that directory. An `action` file contains the information that NetBackup uses to control the processing of busy files.

By default, the contents of the action file are derived from the `BUSY_FILE_ACTION` options in `bp.conf`. A user can also create an action file in order to control a specific backup policy and schedule. (See "Creating Action Files" on page 176.) NetBackup creates a logs directory under `busy_files` for storing busy file status and diagnostic information.

Getting Started

If configuring busy-file processing using the `bp.conf` file instead of using the **Busy File Settings** host properties, perform the following steps:

- Modify the `bp.conf` file options as described in the following section, "Modifying bp.conf to Configure Busy-File Processing" on page 174.
- Copy the script

```
/usr/openv/netbackup/bin/goodies/bpend_notify_busy
```

to

```
/usr/openv/netbackup/bin/bpend_notify
```

Be sure to set the file access permissions to allow *group* and *other* to execute `bpend_notify`.

- Configure a policy with a user backup schedule to be used by busy-file backups.

  This policy will service the backup requests generated by the `repeat` option in the `actions` file. The policy name is significant, since by default, NetBackup searches alphabetically (upper-case characters first) for the first available policy with a user backup schedule and an open backup window. For example, a policy name of `AAA_busy_files` is selected ahead of `B_policy`.

Modifying bp.conf to Configure Busy-File Processing

Direct busy-file processing in the **Busy File Settings** host properties for UNIX clients. (See Chapter 7, "Configuring Host Properties," in the *NetBackup System Administrator's Guide, Volume I*.)

Or, direct busy-file processing by setting the following in the `bp.conf` file:

BUSY_FILE_PROCESSING

Used in a `/usr/openv/netbackup/bp.conf` file on a client, this option enables the NetBackup busy-file-processing feature. By default, this option is not in `bp.conf`, thus disabling busy-file processing.

BUSY_FILE_DIRECTORY

Used in a `/usr/openv/netbackup/bp.conf` or `$HOME/bp.conf` file on a client, this option specifies the path to the busy files working directory. By default, `bp.conf` does not contain this option and NetBackup creates the `busy_files` directory in `/usr/openv/netbackup`.

BUSY_FILE_ACTION

Used in a `/usr/openv/netbackup/bp.conf` or `$HOME/bp.conf` file on a client, this option directs the action that NetBackup performs on busy files. There can be multiple entries of the following form:

```
BUSY_FILE_ACTION = filename_template action_template
```

Where

- *filename_template* is the absolute pathname and file name of the busy file. The shell language metacharacters `*, ?, [], [ - ]` can be used for pattern matching of filenames or parts of filenames.
- *action_template* is one of the following:

  `MAIL | mail`

  Directs NetBackup to mail a busy file notification message to the user specified by the `BUSY_FILE_NOTIFY_USER` option.

  `REPEAT | repeat [repeat_count]`

  Directs NetBackup to retry the backup on the specified busy file. A repeat count can be specified to control the number of backup attempts. The default repeat count is 1.

  `IGNORE | ignore`

  Directs NetBackup to exclude the busy file from busy file processing. The file will be backed up and a log entry indicating that it was busy will appear in the All Log Entries report.

  `BUSY_FILE_NOTIFY_USER`

  Used in a `/usr/openv/netbackup/bp.conf` or `$HOME/bp.conf` file on a client, this option specifies the recipient of the busy file notification message when `BUSY_FILE_ACTION` is set to `MAIL` or `mail`. By default, `BUSY_FILE_NOTIFY_USER` is not in `bp.conf` and the mail recipient is root.

Example 1

```
BUSY_FILE_PROCESSING
BUSY_FILE_NOTIFY_USER = kwc
BUSY_FILE_ACTION = /usr/* mail
BUSY_FILE_ACTION = /usr/local ignore
```

NetBackup sends an E-mail notification message to user *kwc* for all busy files that it finds under `/usr` except for those in `/usr/local`.

Example 2

```
BUSY_FILE_PROCESSING
BUSY_FILE_ACTION = /usr/openv mail
BUSY_FILE_ACTION = /usr/* repeat 2
BUSY_FILE_ACTION = /usr/local ignore
```

This set of options causes NetBackup to take the following actions when it encounters busy files:

- Send a busy-file-notification message to root for busy files in `/usr/openv`.

- Repeat the backup up to a maximum of two times for all busy files that it finds under `/usr`, except for those in `/usr/openv` and `/usr/local`.
- Exclude the busy files in `/usr/local` from all actions.

Creating Action Files

When a backup operation begins, NetBackup creates a default action file named `actions` in the `busy_files/actions` directory. The contents of the `actions` file are derived from the `BUSY_FILE_ACTION` options in the `bp.conf` file.

NetBackup refers to the default action file for all future busy-file processing, unless you override the default by creating an action file to control a specific backup policy and schedule. The naming convention for the policy and schedule action files is one of the following:

```
actions.policy_name.schedule_name
actions.policy_name
```

Where *`policy_name`* and *`schedule_name`* correspond to a predefined backup policy and schedule.

When searching for an action file, NetBackup does the following:

1. Checks for a file that names a specific policy and schedule, such as:

   ```
   actions.policy_name.schedule_name
   ```

2. If a file for a specific policy and schedule is not found, NetBackup searches for a less-specific name, such as the following:

   ```
   actions.policy_name
   ```

3. If a less-specific name does not exist, NetBackup refers to the default action file.

The contents of user-created action files are similar to the default. Optional comment lines can be included and the specification is the same as for the `BUSY_FILE_ACTION` option:

```
# comment_line
filename_template action_template
```

Example 1

The `bp.conf` file might contain the following:

```
BUSY_FILE_ACTION = /usr/openv mail
BUSY_FILE_ACTION = /usr/* repeat 2
BUSY_FILE_ACTION = /usr/local ignore
```

If it does, the default actions file, named `actions`, will contain the following:

```
/usr/openv mail
/usr/* repeat 2
/usr/local ignore
```

Example 2

An action file name for a backup policy production_servers with a schedule name full follows:

```
actions.production_servers.full
```

The `actions` file can contain the following:

```
/bin/* repeat
```

If it does, NetBackup repeats the backup for busy files in the `/bin` directory.

Logs Directory

During busy-file processing NetBackup creates a number of files under the `busy_files/logs` directory. These files contain status and diagnostic information that is recorded by NetBackup. NetBackup derives the names of these files from the policy name, schedule name, and process id (PID) of the backup.

- Busy-file log

  NetBackup records the names of any busy files in the busy file log. The name of the busy-file log has the following form:

  `policy_name.schedule_name.PID`

- Diagnostic-log file

  NetBackup generates a log file that contains diagnostic information. The name of the log file has the following form:

  log.*`policy_name.schedule_name.PID`*

- Retry-log file

  NetBackup also generates a retry file that contains diagnostic information that is recorded when the `repeat` option is specified. The name of the retry file has the following form:

  `policy_name.schedule_name.PID.retry.retry_count`

  Where *`retry_count`* starts at zero and is incremented by one every time a backup is repeated. Processing stops when *`retry_count`* is one less than the number specified on the `repeat` option.

Example

To service busy-file backup requests, the administrator defined a policy named AAA_busy_files that has a user backup schedule named user. A scheduled backup is initiated with the policy named production_servers, schedule named full, and PID of 1442.

If busy files are detected, NetBackup generates the following files in the `/usr/openv/netbackup/busy_files/logs` directory:

```
production_servers.full.1442
log.production_servers.full.1442
```

If the actions file has repeat count set to 2, NetBackup generates the following files:

```
production_servers.full.1442.retry.0
AAA_busy_files.user.10639
log.AAA_busy_files.user.10639
```

If a second repeat backup is attempted, NetBackup generates the following files:

```
production_servers.full.1442.retry.1
AAA_busy_files.user.15639
log.AAA_busy_files.user.15639
```

Modifying bpend_notify_busy

The administrator can modify busy-file processing by changing the `bpend_notify_busy` script. The *only* recommended changes are as follows:

- Changing the `RETRY_POLICY` and `RETRY_SCHED` variables from `NONE` to the busy-file-backup policy name and schedule name.
- Remove the files in the logs directory after busy-file processing (these logs are not removed automatically):

  a. At the end of the `busy_files()` function, add the following command:

  ```
  /bin/rm -f $LOG_FILE
  ```

  b. After the call to the `busy_files()` function in main, add the following commands:

  ```
  /bin/rm -f $BUSYFILELOG
  /bin/rm -f $RETRY_FILE
  ```

Configuring E-mail Notifications

You can configure NetBackup to send e-mail notifications to users and administrators with the results of backup, archive, and restore operations.

The types of notifications you can configure are as follows:

- Notify server administrators when a scheduled backup, administrator-directed manual backup, or a backup of the NetBackup databases occurs.

  Configure NetBackup to E-mail these notifications by specifying the server administrator's address with the NetBackup master server Global Attribute property, **Administrator's E-mail Address**. (See the *NetBackup System Administrator's Guide, Volume I*.)

  If you customize the `dbbackup_notify` script to include an e-mail message and recipient, this script also sends a message after each NetBackup database backup.

- Notify users on UNIX clients as to the success or failure of their user operations.

  To configure these notifications, specify the user's e-mail address with the `USEMAIL` option in the user's personal `bp.conf` file. This file is located in the user's home directory (create one if necessary).

- Notify system administrators of UNIX clients about the success or failure of scheduled or manual backups.

  To configure these notifications, specify the client administrator's address with the `USEMAIL` option in the `/usr/openv/netbackup/bp.conf` file on the client.

You can also set up e-mail notifications with the scripts provided with NetBackup UNIX server software. (See "Goodies Scripts" on page 522.)

Specifying the Locale of the NetBackup Installation

NetBackup applications can display a wide range of international date and time formats as determined by the locale of the installation. To help ensure consistency among the applications, NetBackup uses a single, configurable source to define the locale conventions.

To Specify the Locale of a NetBackup Installation

Platform	Directions
Windows	To access the regional settings, double-click **Regional Settings** in the Windows Control Panel. This provides access to the predefined Number and Date/Time formats. See the Microsoft Help pages for further assistance.

UNIX	The `/usr/openv/msg/.conf` file contains information on the supported locales. This file defines the date and time formats for each supported locale.
	The `.conf` file contains very specific instructions on how to add or modify the list of supported locales and formats. However, the format of the file is summarized here.
	The `.conf` file is divided into two parts, the `TL` lines and the `TM` lines.
	TL Lines
	The third field of the `TL` lines defines the case-sensitive locales that the NetBackup applications support. The fourth and fifth fields define the date and time fields and associated separators for that supported locale is as follows:
	You can modify the existing formats to change the default output. For example, the `TL` line for the C locale is:
	`TL 1 C :hh:mn:ss/mm/dd/yyyy`
	An alternate specification to the order of months, days, and years could be as follows:
	`TL 1 C :hh:mn:ss -yyyy-mm-dd`
	or:
	`TL 1 C :hh:mn:ss/dd/mm/yy`
	You can add more `TL` lines; see the comments in the `.conf` file.
	If the `.conf` file is not accessible, the default locales (`TL` lines) are:
	`TL 1 C :hh:mn:ss /mm/dd/yyyy`
	`TL 2 ov :hh:mn:ss/mm/dd/yyyy`
	Note that `C` and `ov` are synonymous.

To Specify the Locale of a NetBackup Installation (continued)

Platform	Directions

	TM Lines
	The `TM` lines define a mapping from unrecognized locales to those supported by NetBackup, as defined by the `TL` lines.
	The third field of the `TM` lines defines the unrecognized locale and the fifth field defines the supported equivalent identified in the `TL` lines.
	For example, use the following `TM` line to map the unrecognized locale *french* to the supported locale *fr*, the `TM` line is:
	`TM 6 french 2 fr`
	To map french to C
	`TM 6 french 1 C`
	To add more `TM` lines, see the specific instructions in the `.conf` file.
	If the `.conf` file is not accessible, there are no default `TM` lines as the default locale will be `C` (`ov`).

Adjusting Time Zones in the NetBackup-Java Console

Sites in a geographically dispersed NetBackup configuration may need to adjust the time zone in the NetBackup-Java Console for administration of remote NetBackup hosts. (In this context, a remote NetBackup host may either be the host specified in the console login dialog or one referenced via the **File** > **Change Server** capability in the console.)

The default time zone for the console is that of the host on which the console is started, not the host specified (if different) in the console login dialog.

- For backup, restore or archive operations from within the NetBackup-Java Console (`jnbSA`) or the Backup, Archive, and Restore application when running on a client (`jbpSA`), the time zone should be set relative to that of the NetBackup server from which the client restores files.
- When administering servers in different time zones, the time zone must be set in separate instances of the NetBackup-Java Console.

  For example, open a NetBackup-Java Console to set the time zone for your local server in the Central time zone. To set the time zone for a server in the Pacific time zone as well, open another NetBackup-Java Console.

  Do not simply open a new window (**File** > **New Window from Here**) in the first NetBackup-Java Console, change servers (**File** > **Change Server**), and set the time zone for the Pacific time zone server. Doing so changes the time zone for the Central time zone server as well.

▼ To set the time zone and Daylight Savings Time

1. In the NetBackup Administration Console, or in the Backup, Archive, and Restore client interface, select **File** > **Adjust Application Time Zone**. The Adjust Time Zone dialog appears.

2. To use the **Standard** tab to configure the time zone:

   a. Clear the **Use custom time zone** check box.

   b. Select the time zone.

   c. To use daylight savings time, select **Use daylight savings time**.

   d. To have administrative capabilities and apply the settings to the current session and all future sessions, select **Save as default time zone**.

3. To use the Custom tab to configure the time zone:

   a. Select the **Use custom time zone** check box.

   b. Select the time zone on which to base the Backup, Archive, and Restore interface time. For a list of time zones, see Time Zone Table.

   c. Adjust the time to reflect how many hours/minutes the server's time zone is offset (either behind or ahead) of Greenwich Mean Time.

   d. To use daylight savings time, select **Use daylight savings** time.

   e. Indicate when Daylight Savings Time (DST) should begin. You can use one of the following methods:

      - To begin DST on a specific date, select **Absolute date** and indicate the desired month and day.
      - To begin DST on the first occurrence of a day in a month, select **First day of week in month** and indicate the desired day of the week and the month.
      - To begin DST on the first occurrence of a day in a month and after a specific date, select **First day of week in month after date** and indicate the desired day of the week and the month and day.
      - To begin DST on the last occurrence of a day in a month, select **Last day of week in month** and indicate the desired day of the week and the month.

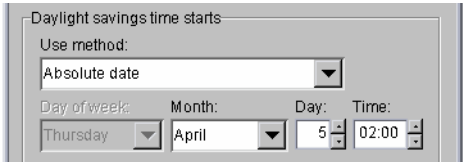
- To begin DST on the last occurrence of a day in a month and before a specific date, select **Last day of week in month after date** and indicate the desired day of the week and the month and day.

f. Select the appropriate **Day of week**, **Month**, **Day**, and **Time**.

Select **Absolute date** to have DST begin on a specific date.

Indicate the desired month and day.

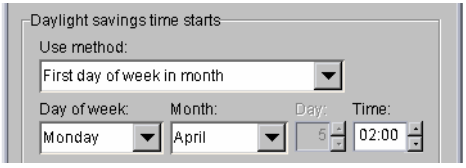
To have DST begin on April 5:



Select **First day of week in month** to have DST begin on the first occurrence of a day in a month.

Indicate the desired day of the week and the month.

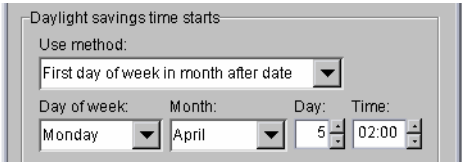
To begin DST on the first Monday in April:



Select **First day of week in month after date** to have DST begin on the first occurrence of a day in a month and after a specific date.

Indicate the desired day of the week and the month and day.

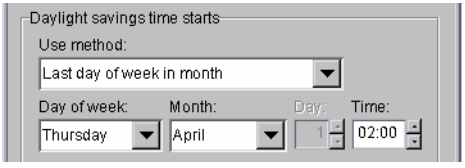
To begin DST on the first Monday after April 5:



Select **Last day of week in month** to have DST begin on the last occurrence of a day in a month.

Indicate the desired day of the week and the month.

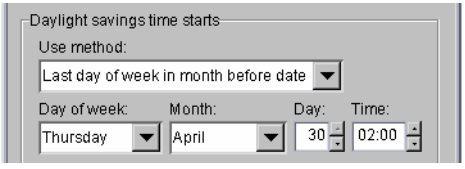
To begin DST on the last Thursday in April:



Select **Last day of week in month after date** to have DST begin on the last occurrence of a day in a month and before a specific date.

Indicate the desired day of the week and the month and day.

To begin DST before April 30:



g. Indicate when DST should end, using one of the methods defined in step e.

h. To have administrative capabilities and apply the settings to the current session and all future sessions, select **Save as default time zone**.

4. Click **OK**.

Using bpadm 4

The NetBackup `bpadm` administrator utility is a character-based, menu-driven interface that you can use at any terminal (or terminal emulation window) for which you have a `termcap` or `terminfo` definition.

This chapter describes procedures for configuring and managing NetBackup using `bpadm`. The areas covered are as follows:

Starting bpadm

Note Use bpadm only on the master server and ensure that no other instances of bpadm or the NetBackup Administration Console are active when you are modifying the configuration. If you attempt to modify the configuration by using more than one instance or a combination of these utilities, the results will be unpredictable.

Start the bpadm program by running the following command as a root user:

```
/usr/openv/netbackup/bin/bpadm
```

The main menu appears on your screen.

```
NetBackup Server: bunny

NetBackup Administration
------------------------
s)  Storage Unit Management...
t)  Storage Unit Group Management...
p)  Policy Management...
g)  Global Configuration...
r)  Reports...
m)  Manual Backups...
x)  Special Actions...
u)  User Backup/Restore...
e)  Media Management...
h)  Help
q)  Quit

   ENTER CHOICE:
```

The prompts that bpadm provides are generally self-explanatory, and all menus have online help available. If you need more information, the topics in this chapter provide detailed instructions on common operations. You can abort many operations by pressing the escape (**Esc**) key.

Defining and Managing Storage Units

The *NetBackup Media Manager System Administrator's Guide for UNIX* explains how to define storage devices and media using Media Manager. The procedures in this section explain how to define and manage them within NetBackup. The `Storage Unit Management` menu has options for defining and managing storage units. To display this menu, press **s** (`Storage Unit Management`) while viewing the `bpadm` main menu.

```
Storage Unit Label: <ALL>
Storage Unit Host: <ALL>
Storage Unit Type: <ALL>
Output Destination: SCREEN

Storage Unit Management
-----------------------
a) Add Storage Unit...
m) Modify Storage Unit...
d) Delete Storage Unit

b) Browse Storage Units Forward
r) Browse Storage Units Reverse
e) Enter Storage Unit
l) List/Display Storage Units
o) Output Destination  (SCREEN or FILE)
h) Help
q) Quit Menu

   ENTER CHOICE:
```

Adding a Removable or Robotic Storage Unit

To add a storage unit, press **a** (`Add Storage Unit`) while viewing the `Storage Unit Management` menu and follow the prompts.

Before adding a Removable or Robotic type storage unit, you must configure the related devices and media within Media Manager. When that configuration is complete, you can add a storage unit so that NetBackup can direct data to those devices and media.

The example below shows the dialog that occurs when adding a DLT tape stacker. User responses are in bold.

```
  Adding Storage Unit (<ESC> to abort)
  -----------------------------------
  Enter storage unit label: TLD_1 <Return>
  Enter host name:  (bunny) <Return>

  Storage Unit Type
  -----------------
   1) Disk
   2) Media Manager
Enter Choice [1-2]: 2 <Return>

For a Media Manager storage unit, you can choose to specify a Media
Server, or you can allow NetBackup to select from available Media
Servers when the job is run.

Would you like to specify a Media Server? (y/n): y <Return>

Enter host name: bunny <Return>

  Robot Type Selections
  ---------------------
   1) NONE - Not Robotic
   2) ACS - Automated Cartridge System
   3) TS8 - Tape Stacker 8MM
   4) ODL - Optical Disk Library
   5) TL8 - Tape Library 8MM
   6) TL4 - Tape Library 4MM
   7) TLD - Tape Library DLT
   8) TSD - Tape Stacker DLT
   9) TSH - Tape Library Half-inch
  10) TLH - Tape Library Half-inch
  11) TLM - Tape Library Multimedia
  12) LMF - Library Management Facility
  13) RSM - Removable Storage Manager
Enter Choice [1-13]: 7 <Return>

Enter this device's robot number: 2 <Return>

Enter this device's robot number: 2 <Return>
  Density Selections
  ------------------
   1) 8mm - 8mm Cartridge
   2) 8mm2 - 8mm Cartridge 2
```

```
   3) 8mm3 - 8mm Cartridge 3
   4) dlt - DLT Cartridge
   5) dlt2 - DLT Cartridge 2
   6) dlt3 - DLT Cartridge 3
   7) dtf - DTF Cartridge
   8) hcart - 1/2 Inch Cartridge
   9) hcart2 - 1/2 Inch Cartridge 2
  10) hcart3 - 1/2 Inch Cartridge 3
  11) qscsi - 1/4 Inch Cartridge
Enter Choice [1-11]: 4 <Return>

Determine the number of drives you wish to use for
backups and archives.  The number you use must be
less than or equal to the number of drives installed.
Enter number of drives: 1 <Return>

Use this storage unit only if required
by a policy or schedule? (y/n) (n):<Return>

What maximum multiplexing factor should be used per drive?
A value of 1 indicates to not do multiplexing)
Enter value [1-32]:  (1) <Return>

Maximum fragment size for backup images is configurable.
Allowable values are in the range of 50 MB to 1048576 MB (1024GB).
Enter maximum fragment size (in MB):  (1048576) <Return>

Add storage unit? (y/n): y

Adding storage unit ...
```

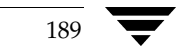
▼ To add a removable or robotic storage unit

1. Provide a unique label for the storage unit (no spaces are allowed in the label). This is the label you use to associate the unit with a policy or schedule. Select a label that is descriptive of the type of storage you are defining.

2. Provide the name of the host that is controlling the storage unit. This must correspond to the host to which the drives attach. The default host appears in parentheses. Either press **Return** to accept the default or specify a new name.

3. Provide the storage unit type. Press **2** for Media Manager. This brings up a list of choices for robot types.

4. Specify the storage unit's robot type.



- Pressing **1** (`NONE - Not Robotic`) brings up the list of density choices.

  Specify the density according to the value configured in Media Manager, then specify the number of drives of this density that to use. All nonrobotic drives of a given density must belong to the same storage unit. Specifying more than one drive can make it possible for the storage unit to handle more than one job at a time.

- Selecting a robot brings up a prompt for the device's robot number. This number must match the number you configured in Media Manager.

  If you are prompted for density, set it according to the configuration in Media Manager. Then, specify how many of the robot's drives that to use for NetBackup operations. This number must be less than or equal to the number of drives that are installed in the robot.

5. Decide whether to use the storage unit only when a policy or schedule specifies it, or to make it available for any schedule.

   - **y** reserves the unit for use only by policies or schedules that specify it.
   - **n** makes the storage unit available for any policy or schedule. This is the default.

6. Specify the maximum image multiplexing (MPX) factor to use.

   Image multiplexing sends concurrent, multiple backups from one or several clients to a single disk storage unit and multiplexes the images onto the media.

   Provide a value from 1 to 32. A value of 1 (the default) disables multiplexing by allowing only one backup job at a time to go to any given drive.

7. Provide a value, in megabytes, for the maximum fragment size.

   This is the largest size fragment that you want NetBackup to create when fragmenting images, and can range from 50 MB to 1048576 MB (1024GB) for a Media Manager storage unit

   Press **y** to confirm the addition or **n** to cancel.

8. Review the addition by pressing **1** (`List/Display Storage Units`). To change attributes, press **m** (`Modify Storage Unit`), or else delete the storage unit and add it again.

   If you are configuring NetBackup for the first time and are satisfied with your storage unit configuration, go to "Adding a Policy" on page 199.

Adding a Disk Type Storage Unit

To add a disk type storage unit, press **a** (`Add Storage Unit`) while viewing the `Storage Unit Management` menu, and follow the prompts, as in the following example.

```
Adding Storage Unit (<ESC> to abort)
------------------------------------
  Enter storage unit label: disk <Return>

Storage Unit Type
-----------------
   1) Disk
   2) Media Manager
  Enter Choice [1-2]: 1 <Return>

Disk Type
---------
   1) Basic
   2) NearStore
   3) SnapVault
Enter Choice [1-3]: 1 <Return>

Enter host name: (bunny) <Return>

Enter full path to image directory: /opt/NBSTU <Return>

Ok to create on ROOT if path Does Not Exist? (y/n) (n): y

Enter maximum number of concurrent jobs:  (1) <Return>

Use this storage unit only if required
by a policy or schedule? (y/n) (y): <Return>

What maximum multiplexing factor should be used?
(A value of 1 indicates to not do multiplexing)
Enter value [1-32]:  (1) <Return>

Maximum fragment size for backup images is configurable.
Allowable values are in the range of 20 MB to 524288 MB (512GB).
Enter maximum fragment size (in MB):  (524288) <Return>

High water mark percentage for disk is configurable.
Allowable values are in the range of 0 to 100 percent.
Enter high water mark percentage):  (98) <Return>
```


```
Schedule staging? (y/n) (n): y

Low water mark percentage for disk staging is configurable.
Allowable values are in the range of 0 to 100 percent.
Enter low water mark percentage):  (80)

Configuring staging schedule for 'disk'
(<ESC> to abort)
-----------------------------------
Frequency scheduling(f) or Calendar scheduling(c) :(f) <Return>

Enter Exclude date (mm/dd/yyyy): <Return>

Backup Frequency can be specified in hours(h), days(d), or weeks(w).
Enter the unit to be used in specifying backup frequency (h/d/w): (d)
d <Return>

Enter Backup Frequency (in days) [1-3500]:  (7) <Return>

Multiple copies? (y/n) (n): <Return>

Require images to be written to a specific storage unit? (y/n) (n):
<Return>

Enter the volume pool label:  (NetBackup) <Return>

Enter priority to be used for relocation jobs [0-99999]:  (0) <Return>

Use an alternate read server to read original backups using a media
server that is different from the one that wrote the backups.
[Note: this may send data over the network.]
Use alternate read server? (y/n) (n): <Return>

Backup windows can be specified for each day of the week.
Should the backup window be the same every day of the week? (y/n) (y):
<Return>
     Enter time to open windows: (20:00:00)
     Enter duration in hours:  (10)

Schedule Summary
-----------------------------------------------
Schedule:       disk
Frequency=1 weeks
Required storage unit not specified
Schedule overriding volume pool with NetBackup
Relocation job priority is 0
Alternate read server not specified
```

```
Daily Windows
Sunday      20:00:00  -->  Monday      06:00:00
Monday      20:00:00  -->  Tuesday     06:00:00
Tuesday     20:00:00  -->  Wednesday   06:00:00
Wednesday   20:00:00  -->  Thursday    06:00:00
Thursday    20:00:00  -->  Friday      06:00:00
Friday      20:00:00  -->  Saturday    06:00:00
Saturday    20:00:00  -->  Sunday      06:00:00
-------------------------------------------
Do you accept this staging schedule for 'disk' (y/n)? <Return>

Add storage unit? (y/n): y
```

▼ To add a disk type storage unit

1. Provide a unique label for the storage unit (no spaces are allowed in the label). This is the label you use to associate the unit with a policy or schedule. Specify a label that is descriptive of the type of storage you are defining. The label `unixdisk_1` in the example is used for a storage unit on UNIX disk.

2. Provide the name of the server that is controlling the disk. This is the network name of the server as returned by the UNIX `hostname` command.

3. Provide the storage unit type. Press **1** for Disk and specify the pathname.

4. Specify the directory path for the backup and archive images. This can be anywhere on your disk that you have room.

5. Specify the number of concurrent jobs that you are going to allow. This number depends on your server's ability to comfortably execute multiple backup processes.

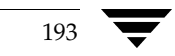
6. Decide whether to use the storage unit only when a policy or schedule specifies it, or to make it available for any policy or schedule.

   - Press **y** to reserve the unit for use only by policies or schedules that specify it. This is the default.
   - Press **n** to make the storage unit available to any policy or schedule.

7. Specify the maximum image multiplexing (MPX) factor to use.

   Image multiplexing sends concurrent, multiple backups from one or several clients to a single drive and multiplexes the images onto the media.

   Provide a value from 1 to 32. A value of 1 (default) disables multiplexing by allowing only one backup job at a time to go to any given drive.



8. Provide a value, in megabytes, for the maximum fragment size.

   This is the largest size fragment that you want NetBackup to create when fragmenting images, and can range from 20 to 2000 (default) for a disk type storage unit.

9. Press **y** to confirm the addition or **n** to cancel. This returns you to the `Storage Unit Management` menu.

10. To review the addition, press **l** (`List/Display Storage Units`). To change attributes, press **m** (`Modify Storage Unit`), or else delete the storage unit and add it again.

    If you are configuring NetBackup for the first time and are satisfied with your storage unit configuration, go to "Adding a Policy" on page 199.

Displaying and Changing Storage Unit Configurations

The `Storage Unit Management` menu has options for viewing the attributes of currently configured storage units or writing the list to a file. It also has options for modifying the configuration by either deleting storage units or changing their attributes.

▼ To use the Storage Unit Management menu

1. Once in a storage management menu, press **b** (`Browse Storage Units Forward`) until the `Label` line at the top of the screen shows the name you want. The next two lines show the host to which the storage unit connects and the type of storage unit.

2. Select the desired option:

   - To modify, press **m** (`Modify Storage Unit`) and follow the prompts (existing values are in parentheses).
   - To delete a storage unit, press **d** (`Delete Storage Unit`). At the prompt, check to ensure that you are deleting the correct storage unit and press **y** to delete it. Deleting a storage unit from the NetBackup configuration does not prevent you from restoring files that are stored on that unit. A restore requires only that the same type of storage unit is available (in Media Manager for a removable or robotic type storage unit).
   - To view the attributes for the storage unit, press **l** (`List/Display Storage Units`). Use the controls at the bottom of the screen to move within the list.
   - To direct the list of attributes to a file, press **o** (`Output Destination`) and specify the desired file path at the prompt. Press **l** to write the list to the file.

Defining and Managing Storage Unit Groups

A *storage unit group* is a list of storage units, ordered by priority. Use the storage unit group to define sets of storage units and to assign priorities to one or more storage units. The `Storage Unit Group Management` menu has options for defining and managing storage unit groups. To display this menu, press **t** while viewing the `bpadm` main menu.

```
Storage Unit Group Label: <ALL>
Output Destination: SCREEN

Storage Unit Group Management
-----------------------------
a) Add Storage Unit Group...
m) Modify Storage Unit Group...
d) Delete Storage Unit Group

b) Browse Storage Unit Groups Forward
r) Browse Storage Unit Groups Reverse
e) Enter Storage Unit Group
l) List/Display Storage Unit Groups
o) Output Destination  (SCREEN or FILE)
h) Help
q) Quit Menu

   ENTER CHOICE:
```

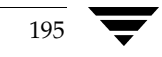
Adding a Storage Unit Group

To add a storage unit group, press **a** (`Add Storage Unit Group`) from the `Storage Unit Group Management` menu and follow the prompts. The following is an example of creating a group of 2 robots. User responses are in bold.

```
Enter Storage Unit Group Name: robot_group <Return>

   Selection Methods
----------------------
   1) Prioritized
   2) Least Recently Assigned
   3) Fail Over
Enter Choice [1-3] (1) 1

Enter the storage unit names, 1 per line in order of desired priority.
<CR> with no name to end entry.
<ESC> quit without adding a group
   Enter Name of stunit: TSD_1 <Return>
   Enter Name of stunit: TSD_2 <Return>
   Enter Name of stunit: <Return>
```

```
Adding group name: robot_group
       Selection method: Least Recently Assigned
Precedence   Storage unit name
----------   ------------------
    1        TSD_1
    2        TSD_2

Add the storage unit group list now? (y/n) (y): y
```

▼ To add a storage unit group

1. Provide a unique label for the storage unit group. This is the label you use to associate the group with a policy or schedule.

2. Provide the names of the storage units that are part of the group. List the storage units in priority order: that is, first provide the name of the storage unit that you want NetBackup to use first. Next, provide the name of the storage unit that you want NetBackup to use second, and so on.

   To end the list of storage units, press **`Return`**. You will see the definition displayed.

3. Press **`y`** to confirm the addition or **`n`** to cancel. This returns you to the `Storage Unit Group Management` menu.

4. To review the addition, press **`l`** (`List/Display Storage Unit Groups`). To change attributes, press **`m`** (`Modify Storage Unit Group`), or else delete the group and add it again.

If you are configuring NetBackup for the first time and are satisfied with your configuration, go to "Adding a Policy" on page 199.

Displaying and Changing Storage Unit Group Configurations

The Storage Unit Group Management menu has options for viewing the attributes for currently configured storage units or directing the list of attributes to a file. This menu also has options for modifying the configuration by either deleting storage unit groups or changing their attributes.

▼ To view or change storage unit group configurations

1. Once in a storage unit menu, press **b** (`Browse Storage Units Groups Forward`) until the `Label` line at the top of the screen shows the name you want.

2. Select the desired option:

   - To add or delete a storage unit from a group, to change the name of a storage unit in a group, or to change the precedence of a storage unit in a group, press **m** (`Modify Storage Unit Group`) and follow the prompts (existing values are in parentheses). To modify other attributes, you must delete and then re-add the group.
   - To delete a storage unit group, press **d** (`Delete Storage Unit Group`). At the prompt, check to ensure that you are deleting the correct group and press **y** to delete it.
   - To view the members of a storage unit group, press **l** (`List/Display Storage Unit Groups`).
   - To direct the list of attributes to a file, press **o** (`Output Destination`) and specify the desired file path at the prompt. Press **1** to write the list to the file.

Defining and Managing Policies

The procedures in this section explain how to define and manage NetBackup policies. To display the `Policy Management` menu, press **p** (`Policy Management`) at the `bpadm` main menu.

```
            Policy: <ALL>
           Clients: <ALL>
         Schedules: <ALL>
Output Destination: SCREEN

Policy Management
-------------------------
a) Add Policy...
```

(For information, see "Adding a Policy" on page 199)

```
m) Modify Policy Attributes...
```

(For information, see "Displaying and Changing Policy Configurations" on page 203)

```
d) Delete Policy
```

(For information, see "Displaying and Changing Policy Configurations" on page 203)

```
s) Schedule Management...
```

(For information, see "Defining and Managing Schedules for a Policy" on page 209)

```
c) Client List Management...
```

(For information, see "Defining and Managing the Client List for a Policy" on page 204)

```
f) File List Management...
```

(For information, see "Defining and Managing the Selections List for a Policy" on page 207)

```
t) Catalog Backup Disaster Recovery...
```

(For information, see "Configuring an Online Catalog Backup" on page 238)

```
b) Browse Policies Forward
r) Browse Policies Reverse
e) Enter Policy
l) List/Display Policies
o) Output Destination  (SCREEN or FILE)
h) Help
q) Quit Menu

   ENTER CHOICE:
```

Adding a Policy

▼ To add a policy

1. Press **a** while viewing the `Policy Management` menu to start a series of prompts for adding a policy. Some choices, such as `Cross Mount Points`, have default values in parentheses. In the following example, user responses are in **bold**.

   Additional options may be presented based on the licenses and optional software installed.

```
Adding Policy (<ESC> to abort)
------------------------------
```

2. Provide a name for the policy. The name must be unique to the configuration and cannot contain any spaces.

```
Enter Unique Policy Name: W2 <Return>
```

3. If there are already configured policies, you're prompted to specify whether to use an existing policy as a template. This is convenient if another policy has many of the same attributes that you want to retain. The new policy can be changed later. If you use another policy for a template, NetBackup duplicates the following:

   - Policy attributes
   - Selections list
   - Client list
   - All schedules

```
Use an existing policy as a template; if yes, all
attributes and schedules will be duplicated: (y/n)?n
```

4. Configure the policy by selecting the policy attribute choice from the list and pressing **Return**:

```
Policy:         W2

        Modify Policy Attributes (<ESC> to quit)
        ----------------------------------------
1) Policy Type                              : Standard
2) Active                                   : Yes
3) Collect True Image Recovery Information  : No
4) Cross mount points                       : No
5) Follow NFS mounts                        : No
6) Client Compression                       : No
--) Client encryption                       : No
```


```
8) Allow multiple data streams              : No
--) Collect disaster recovery information   : No
10) Collect BMR information:                : No
11) Maximum number of jobs per policy       : Unlimited
12) Required storage unit                   :
13) Volume pool                             : NetBackup
14) Keyword                                 :
15) Priority as compared to other policies  : 0
16) Take checkpoints                        : No
17) Set Policy Attributes for Advanced Client.

Enter Choice (choices marked "--" are unavailable) [1-16]: 1 <Return>
```

Policies contain the following attributes:

1) **Policy Type**

Select the policy type from the list:

```
Policy Type
-----------
 1)  Standard
 2)  NetWare
 3)  MS-Windows-NT
 4)  OS/2
 5)  NDMP
 6)  FlashBackup
 7)  AFS
 8)  FlashBackup-Windows
 9)  Vault
10)  NBU-Catalog
Enter Choice [1-8]:  (1)
```

2) **Active**

Specify whether to activate the policy. A policy must be active for NetBackup to run any of the automatic or user-directed schedules). Specifying **y** sets the policy to active.

Provide the date for the policy to go into effect. Specifying **n** makes the policy immediately effective:

```
Active? (y/n) (y): y
Enter effective date: (04/04/2004 11:01:11 or (n)ow)
```

3) **Collect True Image Recovery Information**

Specify whether to collect True Image Recovery Information or True Image Recovery Information with move detection. (See "Collect True Image Restore Information" on page 88 in *NetBackup System Administrator's Guide, Volume I*.) Default: 0 (do not collect True Image Recovery Information).

```
Collect True Image Recovery information
           0 = No
           1 = Yes
           2 = Yes with move detection
        Enter Choice [0-2]:  (0)
```

4) **Cross mount points**

Specify whether to cross mount points when doing backups and archives. (Default: n.)

5) Follow NFS mounts

Specify whether NetBackup is allowed to back up and archive NFS-mounted files and directories. (Default: n.)

6) **Client compression**

Specify whether to compress the files that you archive or back up from that client. (Default: n.)

7) **Client encryption**

The Client Encryption policy attribute is selectable only if the NetBackup Encryption option is installed and configured. When using client encryption, the server encrypts the backup for the clients listed in the policy. For more details on client encryption, refer to the *NetBackup Encryption System Administrator's Guide* for more information.

8) **Allow multiple data streams**

Specify whether to allow multiple data streams. (Default: n.)

9) **Collect disaster recovery information**

Specify whether or not you want NetBackup to collect the information required for intelligent disaster recovery during backups of Windows clients using this policy. (See "Configuring NetBackup Policies for IDR" on page 287.)

10) **Collect BMR information**

Specify whether or not you want NetBackup to collect the information required for Bare Metal Restore during backups using this policy. (Refer to the *NetBackup Bare Metal Restore System Administrator's Guide* for a complete description of the Bare Metal Restore option.)

11) **Maximum number of jobs per policy**

Specify whether to limit the number of jobs per policy. If you elect to limit the number of jobs per policy, specify the maximum number of jobs that this policy can perform concurrently. (See "Limit Jobs Per Policy" on page 77 in *NetBackup System Administrator's Guide, Volume I*.)

12) **Required storage unit**

Determine whether to specify a default storage unit for the policy. For example, indicating **TS8_1** means that NetBackup directs backups and archives for this policy to TS8_1, except for schedules that specify a storage unit.

13) **Volume pool**

Determine whether to specify a default volume pool for the policy. If you do not specify a volume pool for either the policy or the schedule, the NetBackup volume pool is used.

14) **Keyword**

Determine whether to use a keyword phrase. (See "Keyword Phrase" on page 95 in the *NetBackup System Administrator's Guide, Volume I*.) (Default: n.)

15) **Priority as compared to other policies**

Provide the priority for this policy relative to other policies. Any non-negative integer is valid. The policy with the highest value has highest priority. (Default: 0.)

16) **Take checkpoints**

Specify whether checkpoints should be taken during the backup. (See "Checkpoint Frequency" on page 75 in the *NetBackup System Administrator's Guide, Volume I*.) If you indicate **y**, you'll be asked how frequently checkpoints should be taken:

```
Take checkpoints? (y/n) (n): y <Return>
Enter checkpoint interval (minutes) [5-180]:  (15) <Return>
```

17) **Advanced Client**

To specify an Advanced Client configuration, the Advanced Client option must be installed and licensed. For more details on offhost backup, refer to the *NetBackup Advanced Client System Administrator's Guide*.

The Advanced Client configuration contains the following options:

```
Policy:         name
Modify Policy Attributes for Advanced Client (<ESC> to quit)
------------------------------------------------------------
```

```
 1) Perform block level incremental backups : No
 2) Perform snapshot backups                : No
--) Retain snapshots for Instant Recovery   : No
--) Perform offhost backup                  : No
--) Use alternate client                    : No
--) Alternate client name                   :
--) Use data mover                          : No
--) Data mover type                         :
--) Snapshot method                         :
--) Snapshot method arguments               :

11) Return to main Policy Attributes menu.
Enter Choice (choices marked "--" are unavailable) [1-11]:
```

5. Press **<ESC>**, then:

   ```
   Press y to add the policy or n to cancel.
   ```

6. To review the addition, press **l** (`List/Display Policies`). To change attributes, press **m** (`Modify Policy Attributes`).

   If you are configuring NetBackup for the first time and are satisfied with your policy configuration, go to "Adding Clients to a Policy" on page 204.

Displaying and Changing Policy Configurations

The `Policy Management` menu has options for viewing the attributes for currently configured policies or directing the list of attributes to a file. This menu also has options for modifying the configuration by either deleting policies or changing their attributes.

▼ To view or change policy configurations

1. Select the desired policy by browsing with the **b** and **r** options until the name of that policy appears on the Policy line at the top of the screen. You can also use the **e** option to specify the policy name.

2. Select the desired option:

   - To modify the attributes, press **m** (`Modify Policy Attributes`). At the prompt, check the top line on the screen to ensure you are modifying the correct policy. Provide new values at the prompts or simply press **Return** to accept the existing values (shown in parentheses).

- To delete a policy, press **d** (`Delete Policy`). At the prompt, check to ensure that you are deleting the correct policy and press **y** to delete it. Deleting a policy from the NetBackup configuration does not prevent you from restoring files that were backed up or archived by clients in that policy.
- To list the attributes for the policy, press **l** (`List/Display Policies`). Use the controls at the bottom of the screen to move within the list.
- To direct the list of attributes to a file, press **o** (`Output Destination`) and specify the desired file path at the prompt. Press **l** to write the list to the file.

Defining and Managing the Client List for a Policy

The procedures in this section explain how to define and manage client lists for policies.

Adding Clients to a Policy

▼ **To add clients to a policy**

1. From the `Policy Management Menu`, press **b** (`Browse Policies Forward`) until the `Policy` line at the top of the screen shows the name you want.

2. Press **c** to bring up the `Client List Management` menu. This menu has options for managing your client list. The policy you selected in the previous step appears on the Policy line at the top of the screen. The example below shows policy `W2`.

```
            Policy: W2
           Clients: <none>
         Schedules: <none>
Output Destination: SCREEN

Client List Management
----------------------
a) Add Clients
d) Delete Clients

l) List/Display Policy
o) Output Destination (SCREEN or FILE)
h) Help
q) Quit Menu

Enter Choice:
```

3. Press **a** at the `Client List Management` menu. This brings up the list of client types currently installed at your site. In the following example, responses are in bold.

```
Policy:  W2
Adding Clients (<ESC> to abort)
 ------------------------------
   1)  NDMP, NDMP
   2)  Novell, NetWare
   3)  PC, Windows2000
   4)  PC, WindowsNET
   5)  PC, WindowsXP
   6)  PC-IA64, WindowsNET
   7)  PC-IA64, WindowsXP
   8)  Solaris, Solaris10
   9)  Solaris, Solaris8
   10)  Solaris, Solaris9
   11)  Solaris, Solaris_x86_10
   12)  Solaris, Solaris_x86_8
   13)  Solaris, Solaris_x86_9

Enter Selection (or 'q' to quit): 10 <Return>
Enter clients of Solaris, Solaris8 type: (blank line to end)
     Enter Client Name: hagar <Return>
     Enter Client Name: <Return>

Adding clients to policy W2 ...
     hagar
Install client software (y/n) n

[Menu of choices reappears]
```

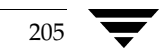
4. Provide the number corresponding to the type of client you are adding.

5. Specify the names of the clients of this type (one per line). When selecting client host names, always observe the following rules:

   - Use the same name if you put the client in multiple policies.
   - Use a name by which the server knows the client. This name should be one that you can use on the server to `ping` or `telnet` to the client.
   - If the network configuration has multiple domains, use a more qualified name. For example, use `hagar.bdev.null.com` or `hagar.bdev` rather than just `hagar`.

   When you finish naming the clients, leave a blank line and press **`Return`**. You see a message informing you that the client is being added.

   You are prompted as to whether you want to install client software.



Note The prompt appears only if client software was loaded on the master server during NetBackup installation and is therefore available for installation on clients.

- If you added trusting clients and want to install software now, press **y** to have `bpadm` immediately push client software from the server to the client. A *trusting client* is one that *does* have an `/.rhosts` file with an entry for the NetBackup server. This software installation occurs after the clients are added to the policy. If the software installation fails on any of the clients, NetBackup notifies you, but still keeps the client in the policy. Note that client software installation can take a minute or more per client.
- If you added secure clients, you should press **n** and then install them later as explained under "Installing Software on Secure UNIX Clients" on page 152 in *NetBackup System Administrator's Guide, Volume I*. A *secure client* is one that does *not* have an entry for the NetBackup server in its `/.rhosts` file.
- If you added trusting clients but want to install software later, press **n** at the installing software prompt. You can install the software later by selecting `Install All Clients` from the `Special Actions` menu. (See "Installing NetBackup Software on All Trusting Client Hosts" on page 220).

If you press **n** at the prompt or if software installation is complete, `bpadm` returns you to the list of choices so you can add another type of client.

6. Repeat step 4 and step 5 until your list is complete, then press **q** to return to the `Client List Management` menu.

7. To review the addition, press **l** (`List/Display Policy`).

   If you are configuring NetBackup for the first time and are satisfied with your client list for this policy, go to "Adding to a Selections List" on page 207.

Displaying Client Lists and Deleting Clients from a Policy

The `Client List Management` menu has options for viewing a client list for a currently configured policy or directing the list to a file. This menu also has an option for deleting clients from a policy.

▼ To view client lists or delete clients from a policy

1. From the `Policy Management Menu`, press **b** (`Browse Policies Forward`) until the `Policy` line at the top of the screen shows the name you want.

2. Press **c** to bring up the `Client List Management` menu. The policy you selected in the previous step appears at the top of the screen.

3. Select the desired option:
   - To delete clients, press **d** (`Delete Clients`). Check to ensure that you are deleting clients from the correct policy and follow the prompts. Deleting a client does not delete any backups or archives that belong to the client.
   - To list the attributes for the policy (including the clients), press **l** (`List/Display Policy`). Use the controls at the bottom of the screen to move within the list.
   - To direct the list of policy attributes (including the clients) to a file, press **o** (`Output Destination`). Provide the desired file path at the prompt, then press **l** (`List/Display Policy`).

Defining and Managing the Selections List for a Policy

The selection list for a policy applies to all full and incremental backups for the clients in that policy. The procedures in this section explain how to define and manage the list of files.

Adding to a Selections List

▼ **To add entries to a selections list**

1. From the `Policy Management Menu`, press **b** (`Browse Policies Forward`) until the `Policy` line at the top of the screen shows the name you want.

2. Press **f** to bring up the `File List Management` menu. This menu has options for managing your client list. The policy you selected in the previous step appears on the `Policy` line at the top of the screen. The example below is for policy `W2`.

```
          Policy:  W2
            Clients:  mars saturn ...
          Schedules:  <none>
 Output Destination:  SCREEN

 File List Management
 --------------------
 a)  Add Files
 d)  Delete Files
 m)  Modify Files List

 l)  List/Display Policy
 o)  Output Destination  (SCREEN or FILE)
 h)  Help
 q)  Quit Menu
```


```
 ENTER CHOICE: a
```

3. Press **a** to bring up the `Add Files` menu:

```
Policy: W2
Clients:  mars jupiter ...
Schedules:  <none>
File Paths: <none>

Adding File Paths (<ESC> to Abort, Blank line to end)
(NOTE: Spaces, ' ', are significant in pathnames)
------------------------------------------------
Enter File Path: /usr <Return>
Enter File Path: /home <Return>
Enter File Path: /var <Return>
Enter File Path: <Return>

Adding file paths . . .
getting policy list . . .
```

4. Provide the file paths at the prompts. Specify one path per line; each line must be full (absolute) file paths. When finished, leave a blank line and press **Return**. This returns you to the `File List Management` menu (pressing **Escape** aborts the operation without altering the configuration).

   Metacharacters or wildcard characters are allowed when specifying file lists.

   To back up a raw partition, specify the path to the block or character device file, as in the following example:

   ```
   /dev/rdsk/isc0d2s6
   ```

   The character device is preferred as it generally is faster than the block device.

   For some database extension policy types, such as Oracle, specify the scripts that control the backup. For a Vault policy, specify the vault command line. (See the *NetBackup Vault System Administrator's Guide* for more information.)

5. To review the additions, press **l** (`List/Display Policy`). To make changes, press **m** (`Modify Files List`) or **a** (`Add Files`) or **d** (`Delete Files`).

   If you are configuring NetBackup for the first time and are satisfied with your file list, go to "Adding a Schedule" on page 209.

Displaying and Changing a File List

The `File List Management` menu has options for viewing the file list for currently configured policies or directing the list to a file. This menu also has options for deleting or modifying files from a policy.

▼ **To view file lists or delete files from a policy**

1. From the `Policy Management` menu, press **`b`** (`Browse Policies Forward`) until the `Policy` line at the top of the screen shows the name you want.

2. To bring up the `File List Management` menu, press **`f`**. The policy you selected in the previous step appears at the top of the screen.

3. Select the desired option:

   - To modify files, press **`m`** (`Modify Files List`). You can insert, delete, or modify the file list.
   - To delete files, press **`d`** (`Delete Files`). Check to ensure that you are deleting files from the correct policy and follow the prompts. Deleting a file from the file list does not prevent you from recovering any backups or archives for that file.
   - To list the attributes for the policy (including the files), press **`l`** (`List/Display Policy`). Use the controls at the bottom of the screen to move within the list.
   - To direct the list of policy attributes (including the file list) to a file, press **`o`** (`Output Destination`). Provide the desired file path at the prompt, then press **`l`** (`List/Display Policy`) to write the attributes to the file.

Defining and Managing Schedules for a Policy

Each policy must have a set of schedules to control its backup and archive operations. The procedures in this section explain how to define and manage those schedules with `bpadm`.

Adding a Schedule

▼ **To add either an automatic or user-directed schedule**

1. From the `Policy Management` menu, press **`b`** (`Browse Policies Forward`) until the `Policy` line at the top of the screen shows the name you want.

2. To manage schedules, press **`s`** (`Schedule Management`). The policy you selected in step 1 appears on the `Policy` line at the top of the screen.

```
Policy: W2
```


```
          Schedule: <none>
           Clients: mars jupiter ...
Output Destination: SCREEN

Schedule Management
-------------------------------
a) Add Schedule...
d) Delete Schedule
m) Modify Schedule...

b) Browse Schedules
l) List/Display Schedule
o) Output Destination  (SCREEN or FILE)
h) Help
q) Quit Menu
```

3. To add a schedule, press **a** (`Add Schedule`). All choices except `Schedule Label` have default values in parentheses. Press **Return** to accept default values.

```
Policy:           W2
Add Schedule (<ESC> to abort)
-----------------------------

Enter Schedule Label: W2_daily_differential <Return>

Schedule Type
-------------
  0) Full Backup
  1) Differential Incremental Backup
  2) Cumulative Incremental Backup
  3) User Backup
  4) User Archive
Enter Choice [0-4]:  (0) 1 <Return>

 Frequency scheduling(f) or Calendar scheduling(c) :(f)  <Return>

 Enter Exclude date (mm/dd/yyyy): 07/18/2005 <Return>

   Exclude dates entered so far:
    0 - 07/18/2005
     enter c to clear all, d-# to delete 1 <Return>

 Enter Exclude date (mm/dd/yyyy): <Return>

Backup Frequency can be specified in hours(h), days(d), or
weeks(w).
```

```
Enter the unit to be used in specifying backup frequency (h/d/w): (d)
<Return>

Enter Backup Frequency (in days) [1-3500]:  (7) 1

Synthetic Backup? (y/n) (n): <Return>

Multiple copies? (y/n) (n): <Return>

Retention Levels
----------------
  0) 1 week
  1) 2 weeks
  2) 3 weeks
  3) 1 month
  4) 2 months
  5) 3 months
  6) 6 months
  7) 9 months
  8) 1 year
  9) infinite
     .
     .
     .
 23) infinite
 24) infinite

  Enter Choice [0-24]:  (1) 0 <Return>

Require images to be written to a specific storage unit? (y/n) (n): n
<Return>

Do you want to override the policy volume pool? (y/n) (n): n <Return>

Use multiplexing if able? (y/n) (n): y <Return>
What maximum multiplexing factor should be used?
(A value of 1 indicates to not do multiplexing)
Enter value [1-32]:  (1) 2 <Return>

Backup windows can be specified for each day of the week.
Should the backup window be the same every day of the week? (y/n) y): n
  Enter daily windows (start time and duration in hours)
     Sunday    (20:00:00 10): 22 0
     Monday    (22:00:00  0): 22 8
     Tuesday   (22:00:00  8): 22 8
     Wednesday (22:00:00  8): 22 8
     Thursday  (22:00:00  8): 22 8
```


```
     Friday    (22:00:00  8): 22 8
     Saturday  (22:00:00  8): 22 0

Schedule Summary
------------------------------------------
       Policy:         W2
       Schedule:       W2_daily_differential
       Differential Incremental Backup
         EXCLUDE DATE 0 - 02/02/2003
       Frequency=1 days
       Retention Level=0 (1 week)
       Required storage unit not specified
       Schedule not overriding volume pool
       Multiplexing=2
       Daily Windows
         Monday     22:00:00  -->  Tuesday    06:00:00
         Tuesday    22:00:00  -->  Wednesday  06:00:00
         Wednesday  22:00:00  -->  Thursday   06:00:00
         Thursday   22:00:00  -->  Friday     06:00:00
         Friday     22:00:00  -->  Saturday   06:00:00
------------------------------------------
       Add schedule W2_daily_differential now(y/n/c-hange) y
```

4. Specify a unique label for the schedule (no spaces are allowed in the label). This name appears on screens and messages from NetBackup, so select a name with a meaning you can remember.

5. Specify the schedule type. Choices `0`, `1`, and `2` select automatically scheduled backups. Choices `3` and `4` are user-directed. The example specifies `1` for Differential Incremental backup.

   If the policy type is for database backups, such as an Oracle-Obackup policy, you see a set of choices similar to the following:

   ```
   Schedule Type
   1. Scheduled Obackup script
   2. Obackup initiated script
   ```

   Choice `1` is for an automatically scheduled database backup that is started per a NetBackup schedule. Choice `2` is started by the `obackup` process on the client. See the installation guide for the respective products for more information.

6. Specify frequency scheduling (`f`) or calendar scheduling (`c`).

7. Enter one or more exclude dates. Exclude dates are dates when the schedule will not run. Press **`Return`** to terminate entering exclude dates.

8. Specify the units for the backup frequency you will specify in step 9 (does not apply to user-directed backups and archives). In the example, pressing **`Return`** selects the default, which is days.

9. Specify the backup frequency (does not apply to user-directed backups and archives). This is the time that should occur between successful backups and is expressed in terms of the units selected in step 8. The example selects 1 day.

10. Specify the retention level for the backups or archives that this schedule creates. (See "Retention" on page 115 in *NetBackup System Administrator's Guide, Volume I*.)

11. Specify whether to direct the backup images for this schedule to a specific storage unit.

    - Pressing **`y`** brings up a prompt for the name of the storage unit.
    - Pressing **`n`** accepts the storage unit as specified at the policy level.

    If you did not specify one at the policy level, NetBackup uses the next storage unit available.

12. Specify whether to specify a volume pool for the schedule.

    - If you provide a volume pool name, this choice overrides the policy level volume pool.
    - If you do not provide a volume pool name, NetBackup uses the volume pool specified at the policy level. If you do not specify one at either the schedule or policy level, NetBackup uses a default of `NetBackup`.

13. Specify whether to use multiplexing.

    Multiplexing sends concurrent, multiple backups from one or several clients to a single drive and multiplexes the images onto the media.

    If you answer **`y`** to this prompt, you are asked to specify the multiplexing factor. The *multiplexing factor* is the maximum number of jobs from this schedule that you want to multiplex on any one drive. The number can range from 1 to 32; `1` specifies no multiplexing.

14. Specify the start times and durations for the backup window:

    - Pressing **`y`** (that is, accepting the default) specifies that the backup window opens on each day of the week. NetBackup can attempt backups each day and during the same time frame. The prompts ask you to define when the window opens and how long it remains open each day.

- Pressing **n** brings up prompts for specifying a different window for each day of the week. Specify time in terms of the 24-hour clock. For example, 00:00:00 is 12 am, 12:00:00 is 12 pm, and 23:30:00 is 11:30 pm. The duration is in hours.

You can specify the time in *hours*, *hours:minutes*, or *hours:minutes:seconds*. For example, if you specify just the hours or hours and minutes, `bpadm` completes the entry. Specifying 22 results in a time of 22:00:00 and specifying 22:30 results in a time of 22:30:00.

When completing the daily windows, remember to leave a blank space between the hours and the duration. Specifying 22 8 results in a time of 22:00:00 and duration of 8 hours. Specifying 2 8 results in a time of 02:00:00 and a duration of 8 hours. Specifying 0 for the duration results in no backup window. Specifying 0 for the time results in a start time of 00:00:00.

15. Press **y** to add the schedule to this policy, **n** to cancel, or **c** to change some aspect of it.

    If you press **c**, you see the same prompts just described. The values provided are the values you previously entered.

If you are configuring NetBackup for the first time and are satisfied with the schedules for this policy, return to "Adding a Policy" on page 199 and repeat the procedures in this chapter as necessary for the next policy.

Displaying and Modifying a Schedule

The `Schedule Management` menu (see "Adding a Schedule" on page 209) has options for modifying the list of schedules for currently configured policies or directing the list to a file. This menu also has options for modifying schedules or deleting them from a policy.

▼ To view or modify schedules

1. From the `Policy Management` menu, press **b** (`Browse Policies Forward`) until the `Policy` line at the top of the screen shows the name you want.

2. To bring up the `Schedule Management` menu, press **s**. The policy you selected in the previous step appears at the top of the screen.

3. Press **b** (`Browse Schedules`) until the `Schedule` line at the top of the screen shows the name you want.

4. Select the desired option:

   - To modify a schedule, press **m** (`Modify Schedule`). Check the top line on the screen to ensure that you are modifying the correct schedule. Provide new values at the prompts or press **Return** to accept existing values (shown in parentheses).

- To delete a schedule, press **d** (`Delete Schedule`). At the prompt, check to ensure that you are deleting the desired schedule. Press **y** to delete it.
- To list the attributes for the schedule selected in step 3, press **l** (`List/Display Schedule`). Use the controls at the bottom of the screen to move within the list.
- To direct the list of policy attributes for the schedule selected in step 3 to a file, press **o** (`Output Destination`). Provide the desired file path at the prompt, and press **l** (`List/Display Schedule`) to write the attributes to the file.

Defining NetBackup Global Attributes

The Global Configuration attributes (option **g** from the main `bpadm` Administration menu) define aspects of NetBackup operation not defined elsewhere in the configuration. In the following example, possible user responses are in bold.

```
                Keep Logs:  2 days
      Admin Mail Address:  <none>
         Job Retry Delay:  10 minutes
  Policy Update Interval:  10 minutes
     Preprocess Interval:  4 hours (default)
            Backup Tries:  2 times in 12 hours
   Maximum Backup Copies:  2
      Output Destination:  SCREEN

Global Configuration
   --------------------
m)  Modify Configuration Parameters...
l)  List/Display All Configuration Parameters
o)  Output Destination (SCREEN or FILE)
h)  Help
q)  Quit Menu

ENTER CHOICE:  m

Modify Configuration
--------------------
m)  Mail Address:  <none>
w)  Job Retry Delay:  10 minutes
p)  Policy Update Interval:  10 minutes
j)  Max Jobs/Client:  1
b)  Backup Tries:  2 times in 12 hours
k)  Keep Logs:  2 days
i)  Keep TIR Info:  1 days
t)  Media Mount Timeout:  0 minutes
h)  Display Reports:  24 hours ago
c)  Compress Image DB Files:  (not enabled)
x)  Preprocess time interval:  4 hours (default)
l)  Shared media mount timeout:  0 minutes
e)  Max drives this master:  0
d)  Notify Request Daemon of Changes
n)  Maximum Number of Backup Copies:  2
u)  Image DB Cleanup Interval:  12 hours
q)  Quit Menu

ENTER CHOICE: k
```

```
  Enter the number of days to keep logs:  (2)  21 <Return>
Changing global attribute....
```

▼ To list or modify Global attributes

1. From the `bpadm` main menu, press **g** (`Global Attributes`) to bring up the `Global Configuration` menu.

2. To list the current values, press **l** (`List/Display All Configuration Parameters`). See Chapter 7, "Configuring Host Properties" in the *NetBackup System Administrator's Guide, Volume I* for more information about the Global host properties.

   Global attributes consist of the following properties:

   `m)` **Mail Address**

   Address to which NetBackup sends notifications on results of failed automatic backups, administrator-directed manual backup operations, and automatic database backups. Provide the administrator's address. Default: no address.

   `w)` **Job Retry Delay**

   Specifies the minimum time (minutes) between subsequent tries of a failed job. Default: 10 minutes; maximum: 60 minutes; minimum: 1 minute.

   `p)` **Policy Update Interval**

   Specifies how often `nbpem` processes policy change requests for scheduled jobs. This allows the NetBackup administrator time to make multiple changes to the policy.

   Changes to policies are queued and processed after this interval has expired. However, if a manual job is submitted for the policy for which a change is queued, `nbpem` rereads the policy before submitting the manual backup job. Default: 10 minutes; maximum: 1440 minutes; minimum: 1 minute.

   `j)` **Max Jobs/Client**

   Maximum number of jobs that NetBackup clients can perform concurrently. Default: 1 job.

   `b)` **Backup Tries**

   Number of times that NetBackup tries a backup job for a client/policy/schedule combination during the specified time period. Ensure that the time period and the number of tries are greater than 0. You can specify 0 for the number of tries, but it stops all scheduled backups. Default: 2 tries in 12 hours. Note that this attribute does not apply to user-directed backups and archives.

   `k)` **Keep Logs**

Length of time, in days, that the NetBackup server keeps its error database, job database, and debug logs. NetBackup derives its Backup Status, Problems, All Log Entries, and Media Log Entries reports from the error database. Therefore, Keep Logs limits the time period that these reports can cover. Default: 28 days.

i) **Keep TIR Info**

Length of time to keep true image recovery information for those policies that use it.

t) **Media Mount Timeout**

Length of time, in minutes, that NetBackup waits for the requested media to be mounted. This timeout will eliminate excessive waits for operations with nonrobotic devices (operator must mount media) or for media that is outside the robot or off site. Default: 0 (unlimited).

h) **Display Reports**

Default time period that NetBackup uses as it searches for information to put into a report. For example, a value of 8 provides a report covering the previous 8-hour period. Default: 24 hours; minimum: 1 hour.

c) **Compress Image DB Files**

Number of days that must elapse (since the image was created) before NetBackup compresses its image database files (also called image catalog files). The image database has information about client backups and archives. A value of 0 means that no compression should be done.

x) **Preprocess time interval**

Minimum time that can elapse between client queries to discover new paths if NetBackup is using auto-discover streaming mode.

l) **Media mount timeout**

Specifies the number of minutes that NetBackup waits for the requested media to be mounted, positioned, and ready on backups, restores, and duplications.

e) **Max drives this master**

Maximum number of drives (on this master and its media servers) that the master server should consider available when scheduling backups. Limits the total number of drives that NetBackup will use, regardless of the number of drives configured.

d) **Notify Request Daemon of Changes**

Signals bprd that the configuration parameters have changed. Choosing this parameter puts the changes into effect without restarting bprd.

n) **Maximum Number of Backup Copies**

Maximum number of copies of a backup that can be stored in the NetBackup database.

u) **Image DB Cleanup Interval**

Specifies in hours the interval between image database cleanup.

Installing NetBackup Software on All Trusting Client Hosts

To install software on trusting clients, press **c** (`Install All Clients`) while viewing the `Special Actions` menu. A *trusting* client is one that has an `/.rhosts` file with an entry for the NetBackup server.

The **c** option pushes client software from the server to the client. You can install software on all clients at one time or when you add them to a policy

1. From the `bpadm` main menu, press **x** (`Special Actions`) to bring up the `Special Actions` menu.

```
Special Actions
--------------------
c) Install All Clients...
b) Offline Catalog Backup...
r) View and Change Retention Levels

i) Initiate Request Daemon
t) Terminate Request Daemon

h) Help
q) Quit Menu

ENTER CHOICE:
```

2. To start the installation of software on all clients, press **c**. Note that client software installation takes a minute or more per client.

Displaying Reports

The Reports menu lets you view problem or status reports from one or more NetBackup servers or clients. To use this menu, press **r** while viewing the bpadm main menu.

```
                Server:  ALL
                Client:  ALL
            Start Date:  01/22/2003 13:58:27
              End Date:  01/23/2003 23:59:59
    Output Destination:  SCREEN

    Reports
    -------
    b)  Backup Status
    l)  List Client Backups
    p)  Problems
    a)  All Log Entries
    m)  Media...

    d)  Change Dates
    c)  Change Client
    s)  Change Server
    o)  Output Destination  (SCREEN or FILE)
    h)  Help
    q)  Quit Menu

    ENTER CHOICE:
```

▼ To view reports or change report parameters

1. To select the server that has the reports you want to view, press **s** (Change Server).

   The Server Name line at the top of the menu displays your choice. Specifying ALL (the default) provides a report for all servers (except when viewing Media reports).

2. To select the client, press **c** (Change Client).

   The Client Name line at the top of the menu displays your choice. Specifying ALL provides reports for all clients and the selected server.

3. To specify the time period that you want the reports to cover, press **d** (Change Dates) and follow the prompts.

   The Start Date and End Date lines at the top of the screen display your choices. The resulting report shows information ranging from the start date to the end date.

NetBackup derives the `Backup Status`, `Problems`, `All Log Entries`, and `Media Log Entries` reports from the error database. Therefore, the `Keep Logs` attribute sets the maximum time period that these reports can cover. The maximum time limit for other Media reports and the `List Client Backups` report depends on the retention period for the associated backup images.

4. Select from among the following options. See "NetBackup Report Types" on page 295 in *NetBackup System Administrator's Guide, Volume I* for detailed information about each report.

   - Press **b** (`Backup Status`) to obtain status and error information on backups completed successfully or failed within the specified time period.
   - Press **l** (`List Client Backups`) to see detailed information on successful backups completed within the specified time period.
   - Press **p** (`Problems`) to see the problems that the server has logged during the specified time period. The information is a subset of the information you get from the `All Log Entries` option.
   - Press **a** (`All Log Entries`) to list all the log entries for the specified time period.
   - Press **m** (`Media`) to bring up the `Media Reports` menu. Prior to executing a media report option, you can select the servers (and clients, if necessary) for which you want the report. For `Media Log` entries, you also can select the range of dates that you want the report to cover.

```
                          Server:  ALL
                          Client:  ALL
                  Media ID/Path:  ALL
                     Start Date:  01/22/2003 13:58:27
                       End Date:  01/23/2003 23:59:59
              Output Destination:  SCREEN

 Media Reports                    Change Parameters
 -------------                    -----------------
l)  Media List              s)  Change Server
u)  Media Summary           c)  Change Client
m)  Media Contents           p)  Change Media ID/Path
i)  Images on Media          d)  Change Dates
e)  Media Log Entries        o)  Output Destination (SCREEN or FILE)
w)  Media Written

h)  Help
q)  Quit Menu

                     ENTER CHOICE:
```

▼ To view media reports or change report parameters

1. From the `Reports` menu, to select the server for which you want to show reports, press **`s`** (`Change Server`) option.

   The `Server` line at the top of the menu displays your choice. Specifying `ALL` provides a report for all servers (except when viewing `Media reports`).

   When changing the server, the server initiating the request (the server on which you are running `bpadm`) must be able to access the server you select. Otherwise, you receive the message: "`access is not allowed`" or "`no entity was found.`" Access to a server is controlled by the `SERVER` entry in its `bp.conf` file. (See "NetBackup Configuration Options" on page 117.)

Note If you fail to connect to a server, the server to which you had previously connected, and any previously displayed report information, will persist.

2. For `Images on Media` reports, select the client by pressing **`c`** (`Change Client Name`). The name specified with this option appears on the `Client` line at the top of the menu. Specifying `ALL` provides reports for all clients and the selected server.

3. For `Media Log` entries, specify the time period that you want the reports to cover by pressing **`d`** (`Change Dates`). Follow the prompts. The dates you specify appear on the Start Date and End Date lines at the top of the screen. The resulting report shows information ranging from the start date to the end date.

4. From the Reports menu, select **`m`** (Media) to bring up the `Media Reports` menu. Choose from among the following report options:

   - Press **`l`** (`Media List`) shows information for volumes that have been allocated for backups. This report does not show media for disk type storage units or for offline backups of the NetBackup catalog. To view information for images on those storage units, use the **`i`** (Images on Media) option.
   - Press **`u`** (`Media Summary`) to list all media in the specified server's catalog, according to whether it is active. The report also shows the expiration date for the media and shows the number of media that are at each retention level.
   - Press **`m`** (`Media Contents`) to list the contents of a single media ID. You must select only one media ID to use this option. The resulting report shows the contents of the media header and backup headers that are recorded on the media. You cannot use this option for disk type storage units.

     The media contents report is useful for determining the backup IDs that are on a specific media ID by reading them from the media itself rather than the catalog. Because it requires a media mount, this option involves a greater delay for tape than for optical disk.

- Press **i** (Images on Media) to list the contents of media as recorded in the NetBackup catalog. bpadm queries only the NetBackup database on the master server it is running on. You can use this option to list the contents of any type of media (including disk). You can select by client, media ID, or path.
- Press **e** (Media Log Entries) to list the media errors or informational messages relating to media that are recorded in the NetBackup error database. You can use the **d** (Change Dates) option to select errors by date.
- Press **w** (Media Written) to list the media in the specified server's catalog that has been used for backups within the specified time period. This report does not show media used for image duplication if the original image was created prior to the specified time period.

Managing bprd (NetBackup Request Daemon)

To manage the NetBackup request daemon (bprd), press **x** (Special Actions) while viewing the bpadm main menu. bprd daemon functions include starting automatic backups and starting the NetBackup database daemon (bpdbm).

```
Special Actions
    ---------------
c)  Install All Clients...
b)  Offline Catalog Backup...
r)  View and Display Retention Levels

i)  Initiate Request Daemon
t)  Terminate Request Daemon

h)  Help
q)  Quit Menu

   ENTER CHOICE:
```

▼ To manage the request daemon

1. Press **i** to start bprd, if it is not running. Normally, bprd is started at boot time. You use this option when you stop the daemon to alter the configuration. Starting bprd also starts bpdbm if bpdbm is not already executing.

2. Press **t** to stop bprd. If the daemon has started any activities, they are allowed to complete. With bprd stopped, NetBackup is unable to perform any backup, archive, or restore operations. Note that terminating bprd does not terminate bpdbm. To stop bpdbm, enter bpdbm -terminate (see bpdbm(1M)).

Always stop the NetBackup request daemon (bprd) before making any changes to policies or schedules. This eliminates the possibility of a previously scheduled backup or archive operation from starting and reading the configuration while you are making changes.

Use the /usr/openv/netbackup/bin/bpps script to verify that bprd has terminated.

Redefining Retention Levels

To change the retention period associated with any retention level, press **x** (Special Actions) from the main menu and press **r** (View and Display Retention Levels).

```
Level   Period            level   Period
----- -----------         ----- -----------
*  0   1 week             *  1   2 weeks
*  2   3 weeks            *  3   1 month
   4   2 months              5   3 months
   6   6 months              7   9 months
*  8   1 year             *  9   infinity
   10  infinity              11  infinity
   12  infinity              13  infinity
   14  infinity              15  infinity
   16  infinity              17  infinity
   18  infinity              19  infinity
   20  infinity              21  infinity
   22  infinity              23  infinity
   24  infinity

Enter 'r' to restore defaults.

'*' indicates the retention is used in a current schedule.

Select the retention level you wish to change. (0-8, 10-24, r, q=quit,
s=save)>
```

Note If an asterisk appears in front of a retention level, it indicates that the retention level is referenced in a currently defined schedule and that changing it could have adverse effects on the schedules using it.

▼ To redefine retention levels

1. From the Special Actions menu, select **r** (View and Change Retention Levels).

2. Select the retention level. A prompt appears for you to specify the units.

The retention level can be any number listed. You cannot change Level 9. It must remain as infinite (infinite for this application is defined to be 30 years).

3. Specify the units to be used (for example, days).

4. After selecting the units, you are prompted for the period. Specify a period and press **Return**.

   The period may be either infinite (which for this application is defined to be 30 years) or a value from 0 (no retention) up to 30 years.

   When you press **Return**, the screen is updated with the new definition and the following prompt appears (the new definition is not saved yet however).

   ```
   Select the retention level you wish to change. (0-8, 10-24, r,
   q=quit, s=save)>
   ```

   - To edit another retention level, specify a number.
   - To restore all the levels to their default values, press **r**.

5. When you are finished changing retention levels, press **q**.

   You will see the following prompt:

   ```
   You have made changes without saving. Do you want to:
   q) quit without saving
   i) see impact report
   r) resume editing

      ENTER CHOICE:
   ```

   Press **i**.

   You will see a `Building Schedule Report` message. After a short wait, a report appears that summarizes the retention period changes and any possible problems that these changes could cause.

   Press **f** to move forward through the report, then press **q** again to receive the following prompt:

   ```
   Do you want to save this definition? (y/n/r=resume editing)>
   ```

   - Press **y** to save the changes and exit the menu.
   - Press **n** to discard the changes and return to the Special Actions menu.
   - Press **r** to make further changes to retention levels.

Performing Manual Backups

To perform a manual backup of the files associated with any policy, client, and schedule press **m** (`Manual Backups`) on the `bpadm` main menu.

```
  Policy: W2
  Client:<ALL>
Schedule:w2_daily_incr (Incremental)

Manual Backups
--------------
i) Initiate Backup
b) Browse Policies Forward
r) Browse Policies Reverse
s) Browse Schedules
c) Browse Client Workstations
e) Enter Policy/Client/Schedule...
h) Help
q) Quit Menu

   ENTER CHOICE:
```

▼ To perform manual backups

Choose the method in step 1 or 2 to select the policy, client, and schedule for a manual backup; then complete step 3.

1. Press **e** (`Enter Policy/Client/Schedule`) and specify your policy, client, and schedule.

2. Press **b** (`Browse Policies Forward`) until the `Policy` line at the top of the screen shows the name you want.

   a. To select either a single client or all clients, press **c** (`Browse Client Workstations`) until the name of the desired client (or `ALL` for all clients) appears on the `Client` line at the top of the screen.

   b. To select the schedule or schedules, press **s** (`Browse Schedules`) until the name of the schedule appears on the `Schedule` line at the top of the screen (you cannot do manual backups of user-directed schedules).

3. To start the backup, press **i** (`Initiate Backup`).

Backing Up the NetBackup Catalog Files

To modify or delete an existing offline catalog backup, or to perform an immediate offline catalog backup, press **b** (`Offline Catalog Backup`) while viewing the `Special Actions` menu.

Note There is no need to create an *offline, cold catalog backup*, since it exists by default. However, in order for the offline catalog backup to run, it must be configured to run (the default is *Never*). Use option **m** from the `Offline Catalog Backup` menu.

An *online, hot catalog backup* is created using the `Policy Management` menu. For a description of the process, see "Configuring an Online Catalog Backup" on page 238.

The following menu options appear:

```
       Backup When: never - must be manually initiated
Output Destination: SCREEN

Offline Catalog Backup
----------------------
m)  Modify Offline Catalog Backup Settings...
d)  Delete Offline Catalog Backup Media ID...
b)  Perform Offline Catalog Backup Now...

a)  Add Offline Catalog Backup File Path...
r)  Remove Offline Catalog Backup File Path...

l)  List/Display Offline Catalog Backup Settings
o)  Output Destination  (SCREEN or FILE)
h)  Help
q)  Quit Menu
```

There are two information lines above the menu:

- `Backup When`: Displays the current setting for how often the catalog is to be backed up offline. The three possible values follow:
  - `never - must be manually initiated`
  - `after each backup schedule`
  - `after any successful backup/archive`

  "Modifying Offline Catalog Backup Settings" on page 232 explains these settings.

- `Output Destination`: Determines where `bpadm` sends the output of a `List/Display Offline Catalog Backup Settings` selection. If the word `SCREEN` appears on this line, the output appears on your terminal screen. If a file path appears (for example, `/tmp/bp_db_backup`), the output goes to that file. You can change the output setting by using the **o** option.

The following procedures explain how to use the options available from the `Offline Catalog Backup` menu.

Listing Catalog Backup Settings

To list the current settings for the NetBackup offline catalog, press **1** from the `Offline Catalog Backup` menu. See the table below for field definitions.

```
Frequency of Offline Catalog Backup:  after each successful backup
session

Server: bunny
Sequence # 1      Last Media Used: AA0018

Written                 Allocated            Type   Density  Media
-------------------     -------------------  ----   -------  -----
1  11/23/2005 18:30:15  11/11/2005 09:33:45  RMedia odiskwm  AA0016
2  11/24/2005 13:06:33  11/11/2005 09:33:45  RMedia odiskwm  AA0018

Paths Included:
bunny:/usr/openv/netbackup/db
bunny:/usr/openv/volmgr/database
bunny:/usr/openv/var
bunny:bunny:NETBACKUP_RELATIONAL_DATABASE_FILE
```

Catalog Backup Fields

Field	Description
`Frequency`	How often the current offline catalog backup settings cause NetBackup to automatically back up the catalog files. The paths to these databases are listed under `Paths Included`. The three possibilities follow: - `never - must be manually initiated` - `after each successful backup schedule` - `after any successful backup/archive` See "Modifying Offline Catalog Backup Settings" on page 232 for option descriptions.

Catalog Backup Fields (continued)

Field	Description
Server	The name of the media server to which catalog backups will be sent. This defaults to the master server where you are running the NetBackup Administration Console.
Sequence #	This value currently cannot be changed and is always 1.
Last Media Used	Path (for disk) or media id (for removable or robotic media) that was used to store the last offline catalog backup. This path or media ID is one of the two listed, unless the media was changed since the last backup. For example, assume AA0018 has been used many times and you want to use a different tape. Press **m** (Modify DB Backup Settings) to set the media ID to another value, such as AA0019. The change erases AA0018 from line 2 and replaces it with AA0019. The Last Media Used field shows AA0018 until after the next offline catalog backup.
1 and 2	The two media IDs that you assign for use in offline catalog backups. If you assign both IDs, NetBackup alternates between them, always using the one that was not used for the previous backup (based on the time in the Written column). If 1 or 2 are removable or robotic type media (see Type below), they must be in the *NetBackup* media pool in Media Manager's volume database. Their media IDs, however, cannot be among those that NetBackup uses for backup or archive images.
Written	Date and time the media was last used and is *never* if it has not been written.
Allocated	If the Type column indicates that the media is removable or robotic (RMedia), the Allocated column shows the date and time the media was assigned as a NetBackup catalog backup tape. If the Type column indicates that the media is disk, the Allocated column shows *n/a* because an assignment is not done for disk.
Type	Type of media that this media ID represents and is either RMedia (removable or robotic) or Disk.
Density	Empty if the media type is disk. Otherwise, it shows the density of the media for this ID.
Media	Media ID (if removable or robotic media) or path (if disk) of the assigned media.

Catalog Backup Fields (continued)

Field	Description
Paths Included	Paths to the catalog files to be backed up. The NETBACKUP_RELATIONAL_DATABASE_FILES directive automatically includes the database files in the /usr/openv/db/data/ directory, as well as vxdbms.conf, server.conf, and databases.conf. (Assuming that the files haven't been relocated to different directories.)

Modifying Offline Catalog Backup Settings

To modify an offline catalog backup that has already been created, press **m** while viewing the `Offline Catalog Backup` menu and follow the prompts.

Caution If you modify any information regarding a media ID previously used for backups, the `Written` date and time for this media ID is overwritten in the NetBackup database.The contents of the media itself is not destroyed unless it is used again.

For example, assume you change to a different media ID in order to make an extra copy of the catalog files. When you change to the new media ID, NetBackup replaces the old ID with the new ID and no longer tracks the old ID in its database. This results in the media associated with old ID being made available for reassignment by Media Manager.

1. From the `Offline Catalog Backup` menu, select **m** to specify when the offline catalog backup should occur:

   - `1) never - must be manually initiated`: NetBackup will *never* automatically back up its catalog files. You must initiate the backup using the `Perform Offline Catalog Backup Now` option.
   - `2) after each successful backup schedule`: NetBackup will back up the catalog files after any regularly scheduled backup sessions that result in the creation of at least one successful backup image. A catalog backup *does not* occur after a manual or user-directed backup or archive. This is the recommended method.
   - `3) after any successful backup/archive`: NetBackup will perform an offline catalog backup after any backup session that results in the creation of at least one backup or archive image. This includes scheduled, manual, and user-directed, backups and archives.

   The following example configures a NetBackup offline catalog backup after any successful backup or archive image.

```
Enter Selection [1-3]:  (1) 2 <Return>

Enter Server name:  (bunny.vrt.ov.com) <Return>

Modify ID 1? (y/n): y

   Storage Unit Type Selections:
     1) Disk
     2) Media Manager
   Enter Type [1-2]:  (1) <Return>
```

```
    Enter ID (path): (path_other_than_local_drive) <Return>

Modify ID 2? (y/n): y

    Storage Unit Type Selections:
      1) Disk
      2) Media Manager
    Enter Type [1-2]: 2 <Return>

            Density Selections
                1) 4mm - 4mm Cartridge
                2) 8mm - 8mm Cartridge
                3) 8mm2 - 8mm Cartridge 2
                4) 8mm3 - 8mm Cartridge 3
                5) dlt - DLT Cartridge
                6) dlt2 - DLT Cartridge 2
                7) dlt3 - DLT Cartridge 3
                8) dtf - DTF Cartridge
                9) hcart - 1/2 Inch Cartridge
               10) hcart2 - 1/2 Inch Cartridge 2
               11) hcart3 - 1/2 Inch Cartridge 3
               12) odiskwm - Optical Disk Write-Many
               13) odiskwo - Optical Disk Write-Once
               14) qscsi - 1/4 Inch Cartridge
            Enter Selection [1-14]: 5 <Return>

            Enter ID (media ID): RR1005 <Return>

     Make change now? (y/n): y
```

2. Specify the server to which these backups will be sent.

   The default is the current value shown in parentheses after the `Enter Server Name` prompt. During initial configuration, the default is always the master server.

   If you are changing the destination to a media server, ensure that the server has been previously configured (that is, named in the `bp.conf` file on the master server when you started `bprd` and `bpdbm`).

   Also, if you are backing up to a media server, do not forget to modify the backup paths for the master server as explained in step 7.

3. Specify whether to modify the first of the two available media IDs (`ID 1`).

   - Press **n** to leave the media ID unchanged, then go to step 5.
   - Press **y** to change the ID, then go to step 4.

Caution An offline catalog backup does not span tape volumes. All the backup data must fit on one tape. Therefore, it is ***extremely*** important for the administrator to select a media type that can hold all the data to be backed up. The size requirement is dependent on the size of the databases. NetBackup sends a notification if the backup fails.

4. Select the storage unit type (the number in parentheses shows the current type).
   - Press **1** for Disk type and specify the path to which you want to write the offline catalog backup. This should be to a subdirectory. NetBackup creates the path if it does not exist and produces an error if the path exists and is a file rather than a directory.

Note If the path already exists, the error NetBackup reports occurs when the backup is done, *not* when you specify the path.

   - Press **2** for a Removable or Robotic type storage unit and select the density (5 in the example).

     Specify the media ID (volume serial number) of the media to use.

5. Specify whether to modify the second media ID (`ID 2`). If you answer **y**, you are prompted as shown for media `ID 1` in step 3.

6. Specify whether to make the changes:
   - Press **y** to change the configuration.
   - Press **n** to abort the operation and leave the configuration unchanged.

   Either choice returns you to the `Offline Catalog Backup` menu.

7. If you are backing up the offline catalog to a media server (see step 2), modify the offline catalog backup paths for the master server as follows:

   a. Remove each backup path for the master server by using the `Remove Offline Catalog Backup File Path` option on the `Offline Catalog Backup` menu.

   b. To add each backup path for the master server again, press **a** (`Add Offline Catalog Backup File Path`) while viewing the `Offline Catalog Backup` menu.

      When you add the paths again, be certain to specify the paths in the following format:

      ```
      master_name:database_backup_path
      ```

For example, if the platform is named *bunny*, the paths are as follows:

```
bunny:/usr/openv/netbackup/db
bunny:/usr/openv/volmgr/database
```

Deleting Offline Catalog Backup Media ID

To delete a media ID from those used for backing up the NetBackup offline catalog, press **d** at the `Offline Catalog Backup` menu and follow the prompts, as follows:

```
Delete ID 1 (AA0016)? (y/n): n

Delete ID 2 (AA0018)? (y/n): y

Are you sure you want to delete ID 2? (y/n): y
```

Performing Manual Offline Catalog Backups

To start an immediate offline catalog backup, press **b** (`Perform Offline Catalog Backup Now`) from the `Offline Catalog Backup` menu.

If you specify this selection, the following prompt appears:

```
WARNING: Backing up the catalog may take a while.
Are you sure you want to continue? (y/n):
```

Note If the media ID used for the offline catalog backup is not in a robot, a mount request for that media ID is sent. If the mount request is not honored, a manual offline catalog backup must wait for the mount before proceeding. A schedule-driven catalog backup must also wait for the mount and, because the schedule is waiting, all other backups and archives must also wait until the catalog backup is complete.

- Press **y** to start the offline catalog backup. NetBackup uses the least recently used of the two media IDs you have assigned for backups. You must wait for completion of the backup to regain control of the terminal session.
- Press **n** to abort the operation.

Adding Backup File Paths to an Offline Catalog Backup

To add a backup path to an offline catalog backup, press **a** from the `Offline Catalog Backup` menu. Use this option to make changes to the existing paths as well. For example, if you back up the catalog to a media server, use this option to add the new path specifications for the master server.

```
Adding new offline catalog backup file paths (<ESC> to abort, Blank
Line to End)
------------------------------------------------------
Enter File Path: elk:/usr/openv/netbackup/db
Enter File Path: elk:/usr/openv/volmgr/database
Enter File Path: elk:/usr/openv/var
Enter File Path: <Return>

Proceed with the change? (y/n): y
```

▼ To add an offline catalog backup path

1. Provide the file paths at the `Enter File Path` prompt using one of the following formats:
   - For catalog files backed up to the master server, provide the file path, as in `/usr/openv/netbackup/db` or `/usr/openv/volmgr/database`
   - For catalog files backed up to a media server, use *master_name:file_path*, as in the following example for a master server named *bunny*:

     ```
     bunny:/usr/openv/netbackup/db
     bunny:/usr/openv/volmgr/database
     ```

   - For media server catalog files, use *server_name:file_path*, as in the following example for a media server named *elk* that does not have a volume database:

     ```
     elk:/usr/openv/netbackup/db
     elk:/usr/openv/volmgr/database
     elk:/usr/openv/var
     ```

2. To end your list of absolute or full file path entries, press **Return**. The following prompt displays:

   ```
   Proceed with the change? (y/n):
   ```

3. To confirm the entries, press **y**. To abort the operation and leave the configuration unchanged, press **n**.

Removing Offline Catalog Backup File Paths

To remove offline catalog file paths, press **r** from the `Offline Catalog Backup` menu. The follow example shows how to delete the media server `elk`:

```
Removing offline catalog backup file paths (<ESC> to abort)

Do you want to remove /usr/openv/netbackup/db? (y/n): n
Do you want to remove /usr/openv/volmgr/database? (y/n): n
Do you want to remove elk:/usr/openv/var: y
Deleting elk:/usr/openv/var.....

Proceed with the change? (y/n): y
```

This option allows you to delete catalog files from the list of files to be backed up. In some cases, the removal will be permanent and in other cases it will be part of a change. For example, if you back up the catalog files to a media server, you use this option to delete the old path specifications for the master server and then add the new path by using the `Add Offline Catalog Backup File Path` option.

Configuring an Online Catalog Backup

An online, hot catalog backup differs from the offline, cold catalog backup in previous releases in that it is policy-based, which means that it has all of the scheduling flexibility of a regular backup policy. The online catalog backup is designed for use in highly active NetBackup environments where there is usually backup activity taking place and the catalog size is large.

Create an online catalog backup as you would create a policy, from the `Policy Management` menu.

▼ To create an online catalog backup

1. From the `NetBackup Administration` menu, press **`p`** (`Policy Management`).
2. From the `Policy Management` menu, press **`a`** (`Add Policy`).
3. Provide a name for the policy. The name must be unique to the configuration and cannot contain any spaces.
4. Specify whether to use an existing policy as a template. The new policy can be changed later. In this procedure, assume no policy will be used as a template. `[1]`
5. Select policy attribute `1) Policy Type`, then enter policy type selection `10) NBU-Catalog`.
6. The NBU-Catalog policy type presents the following policy configuration options:

```
Modify Policy Attributes (<ESC> to quit)
        ----------------------------------------
  1) Policy Type                              : NBU-Catalog
  2) Active                                   : Yes
 --) Collect True Image Recovery Information  : Yes with move
                                                detection
 --) Cross mount points                       : Yes
 --) Follow NFS mounts                        : Yes
 --) Client Compression                       : No
 --) Client encryption                        : No
 --) Allow multiple data streams              : No
 --) Collect disaster recovery information    : No
 --) Collect BMR information                  : No
 --) Maximum number of jobs per policy        : 1
 12) Required storage unit                    :
 13) Volume pool                              : CatalogBackup
 14) Keyword                                  :
 15) Priority as compared to other policies   : 0
```

```
--) Take checkpoints                          : No
17) Set Policy Attributes for Advanced Client.
```

Note NBU-Catalog policy types write to the `CatalogBackup` volume pool by default.

7. Configure the policy by selecting the policy attribute choice from the list and pressing **`Return`**.

8. Press **`<ESC>`** to add the policy, then press `y` to add the policy or `n` to cancel.

9. To create a schedule for the policy, from the `Policy Management` menu, press **`s`** (`Schedule Management`).

10. From the `Schedule Management` menu, press **`a`** (`Add Schedule`). NBU-Catalog policy types allow the following schedule types:

```
Add Schedule (<ESC> to abort)
-----------------------------
Enter Schedule Label: full
Schedule Type
-------------
  0) Full Backup
  1) Differential Incremental Backup
  2) Cumulative Incremental Backup
  3) Vault Catalog Backup
Enter Choice [0-3]:  (0)
```

See "Adding a Schedule" on page 209 for the detailed process of adding a schedule to a policy.

11. Disaster recovery information should be configured for NBU-Catalog policies.

From the `Policy Management` menu, press **`t`** (`Catalog Backup Disaster Recovery`). Disaster recovery information can only be configured for NBU-Catalog policies:

```
      Policy:         catalog-backup
      Modify Catalog Backup Disaster Recovery (<ESC> to quit)
      ------------------------------------------------------
1) Disaster Recovery Email Address         :
2) Disaster Recovery File Location         :
3) User Name to Access File Location       :
4) Password to Access File Location        :

Enter Choice (choices marked "--" are unavailable) [1-4]:
```


The Modify Catalog Backup Disaster Recovery menu contains the following options:

1) **Disaster Recovery Email Address**

Prompts user to:

```
Enter Email Address:
```

VERITAS strongly recommends configuring your NetBackup environment to send the disaster recovery information to a NetBackup administrator. This backup-specific information is sent after every catalog backup.

To send the information to more than one administrator, separate multiple e-mail addresses using a comma: `email1,email2`

Make sure that e-mail notification is enabled in your environment.

2) **Disaster Recovery File Location**

Prompts user to:

```
Enter DR Path:
```

Enter the path to the directory where the disaster recovery information will be saved. Specify a NFS share.

Note VERITAS recommends saving the image file to a network share or a removeable device. Do not save the disaster recovery information to the local machine.

---

3) **User Name to Access File Location**

Prompts user to:

```
Enter User Name:
```

Enter the logon name, if necessary, used to access the NFS share.

4) **Password to Access File Location**

Prompts user to:

```
Enter Password:
```

Enter the password information, if necessary, to access the NFS share. As it is entered, the password is viewable on the screen. Once **Return** is pressed, the password appears as eight asterisks.

12. Press **<ESC>**, then: press **y** to modify the policy or **n** to cancel.

Reference Topics 5

The topics in this chapter provide additional information about various aspects of NetBackup configuration and management:

Rules for Using Host Names in NetBackup

NetBackup uses host names to identify, communicate with, and initiate processes on NetBackup client and server computers. The correct use of host names during configuration is essential to the proper operation of NetBackup. (See "Dynamic Host Name and IP Addressing" on page 167.)

Qualifying Host Names

A major consideration when configuring host names is the extent to which you qualify them. In many cases, using the short host name of a computer is adequate. If the network environment is or will eventually be multi-domain, qualify host names to the extent that servers and clients can identify each other in a multi-domain environment.

For example, use a name such as `mercury.bdev.null.com` or `mercury.bdev` rather than just `mercury`.

The following two discussions provide more information by explaining:

- How NetBackup uses host names
- How to update NetBackup for client host name changes

How NetBackup Uses Host Names

The following discussions explain where NetBackup stores host names and how it uses them. These discussions also mention factors to consider when choosing host names.

Server and Client Name on UNIX Servers and Clients

On both UNIX servers and clients, the `SERVER` entries in the `bp.conf` file define the NetBackup servers that are allowed access. The first `SERVER` entry identifies the master server and it is to this server that client requests are made. For this reason, the `SERVER` name must be one by which all clients can connect to the server.

If more than one `SERVER` entry exists, the additional entries identify other NetBackup servers that can initiate scheduled backups on the client. The `bp.conf` file must have multiple `SERVER` entries if any remote media servers are configured. The NetBackup Request daemon (`bprd`) and NetBackup Database Manager daemon (`bpdbm`) do not run on any server other than a master.

When a client makes a list or restore request to the server, the NetBackup client name, as specified on the client, is used to determine whether to allow the operation. The client name used is usually the `CLIENT_NAME` from the `bp.conf` file of the client, or the actual

host name of the client if not in the `bp.conf` file. In the case of alternate client restores, however, the name can also be a name specified through the user interface or with a parameter on the `bprestore` command.

For a list or restore request to be successful, the NetBackup client name must match the name that is specified for the client in the NetBackup configuration on the server. The only exception to this rule is if the server is configured to allow alternate client restores.

Host Names on Windows Servers and PC Clients

Windows NetBackup servers and clients also have `SERVER` and `CLIENT_NAME` settings. On these systems, specify this through the NetBackup Administration Console.

Policy Configuration

The host name that you specify for a client when adding it to a policy is called the *configured name* of the client, and is the client's host name as it appears in the NetBackup configuration. NetBackup also adds a `CLIENT_NAME` entry to a UNIX client's `bp.conf` file when software is first installed on the client and sets the entry to match the configured name.

The server uses the client's configured name to connect to the client and start the processes that satisfy client requests. When adding clients to a policy always use host names that are qualified to the extent that all NetBackup servers can connect to the clients.

When a client makes a user backup, archive, or restore request to the NetBackup server, the server uses the peername of the client (identified from its TCP connection) to determine the client's configured name.

If you add a client to more than one policy, always use the same configured name in all cases. Otherwise, the client cannot view all files backed up on its behalf and file restores are complicated because both user and administrator action is required to restore from some of the backups.

Image Catalog

A subdirectory in the image catalog is created for a client when a backup is first created for that client. The subdirectory's name is the client's configured name.

Every backup for a client has a separate file in this subdirectory. Each of these backup records contains the host name of the server on which the backup was written.

Error Catalog

NetBackup uses entries in the error catalog for generating reports. These entries contain the host name of the server generating the entry and the client's configured name, if applicable. The server host name is normally the server's short host name. (For example, shark instead of shark.null.com.)

Catalog Backup Information

Applies to NetBackup Enterprise Server only.

If you configure media servers and include catalog files from the media server in your NetBackup catalog backups, qualify the host name portion of the media server's catalog file path to the extent necessary to allow the master server to make a connection to the media server.

How to Update NetBackup After a Host Name Changes

Note Do not change the host name of a NetBackup server. This practice is not recommended because it can be necessary to import all previously used media to the server before you can use it under the new host name.

Follow these steps to update the NetBackup configuration if a client's host name is changed.

1. On the master server:
   - Delete the client's old name from all policies in which it exists and add the client's new name to those policies. You do not have to reinstall NetBackup software on the client. The client also still has access to all previous backups.
   - Create a symbolic link from the client's old image directory to its new image directory. For example,

     ```
     cd /usr/openv/netbackup/db/images
     ln -s old_client_name new_client_name
     ```

2. On the client:
   - On PC clients, you can change the client name setting either through the user interface or in a configuration file. (See the online help in the Backup, Archive, and Restore client interface.)
   - On UNIX clients, change the `CLIENT_NAME` value in the `bp.conf` file to the new name.

Note If users on UNIX clients have a `bp.conf` file in their `$HOME` directory, they must change `CLIENT_NAME` in that file to the new name.

Special Considerations For Domain Name Service (DNS)

In some requests to the master server, client software sends the name that it obtains through its `gethostname(2)` library function. If this (possibly unqualified) name is unknown to the Domain Name Service (DNS) on the master server, it is possible that the master server cannot reply to client requests.

Whether this situation exists, depends on how the client and the server are configured. If `gethostname(2)` on the client returns host names that are not qualified to the extent that DNS on the master server can resolve them, you will encounter problems.

A possible solution is to reconfigure the client or the master server DNS hosts file. However, because this is not always desirable, NetBackup allows you to create a special file in the altnames directory on the master server in order to force the desired translation of NetBackup client host names.

`/usr/openv/netbackup/db/altnames/host.xlate`

Each line in the `host.xlate` file has three elements, a numeric key and two host names. Each line is left-justified, and each element of the line is separated by a space character.

`key hostname_from_ client client_as_known_by_server`

Where

- *key* is a numeric value used by NetBackup to specify the cases where translation is to be done. Currently this value must always be 0, indicating a configured name translation.
- *hostname_from_client* is the value to translate. This must correspond to the name obtained by the client's `gethostname(2)` and be sent to the server in the request.
- *client_as_known_by_server* is the name to substitute for *hostname_from_client* when responding to requests. This name must be the name configured in the NetBackup configuration on the master server and must also be known to the master server's network services.

For example, the line

```
0 danr danr.eng.aaa.com
```

specifies that when the master server receives a request for a configured client name (numeric key 0), the name *danr* is always replaced by the name `danr.eng.aaa.com`. This resolves the problem mentioned above, assuming that:

- The client's `gethostname(2)` returned `danr`.

- The master server's network services `gethostbyname(2)` library function did not recognize the name *danr*.
- The client was configured and named in the NetBackup configuration as `danr.eng.aaa.com` and this name is also known to network services on the master server.

Reading Backup Images with tar

NetBackup uses a modified GNU `tar` for reading backup images. The modified `tar` is located in `/usr/openv/netbackup/bin/tar`. By using the modified `tar`, NetBackup can understand compressed files, sparse files, long pathnames, ACL information. It offers features similar to those in `cpio`.

Although non-NetBackup versions of `tar` can be used to restore files, they provide only limited restore capabilities.

Note It is not possible to use the NetBackup modified-GNU `tar` on UNIX, or `tar32.exe` on Windows, to directly extract files from a NetBackup for Windows backup image.

Effects of Using a Non-NetBackup tar

Non-NetBackup versions of `tar` do not supply all of the restore capabilities that the NetBackup `/usr/openv/netbackup/bin/tar` provides, resulting in possible problems.

The following is a list of some effects that a non-NetBackup `tar` may encounter in certain situations:

- Compressed backups cannot be recovered.
- Multiplexed backups cannot be recovered.
- Image files greater than 2 gigabytes cannot be restored. Image files of this size must be restored from a NetBackup media server.
- Solaris 9 extended attributes cannot be restored to a client.
- VxFS 4.0 named data streams cannot be restored to a client.
- Backups containing raw partitions cannot be recovered. (Includes FlashBackup images.)
- NDMP client backup images cannot be restored, though NDMP vendors may have tools or utilities which could perform a restore directly from the media.
- Non-NetBackup versions of `tar` may have trouble with sparse files and often skip sparse files.
- HP CDFs are restored with non-NetBackup versions of tar, but the directory is no longer hidden and the name of the directory has a + appended to it.
- If the backup spans more than one piece of media, you must read the fragments from the media and concatenate the fragments to give to `tar`. To accomplish this, the system's `dd` command may be useful.

Another possibility is to use `tar` on the fragments. This may allow recovery of any file in the backup other than the one that spanned the media.

Some versions of the HP9000-800 `/bin/tar` command are known to give a *directory checksum error* for the second fragment of a backup that crossed media.

- Some versions of Solaris `tar` will combine the `atime`, `mtime`, and `ctime` strings with the file name and create file paths that are not desirable.

Restoring Files Using a Non-NetBackup tar

The following process explains how to use a non-NetBackup `tar` to read a backup from a NetBackup tape. Most versions of `tar` can read NetBackup-created tapes after using the `mt` command to position to the proper tape location. See the notes following the procedure as well as "Effects of Using a Non-NetBackup tar" on page 247 for possible limitations before starting the procedure.

This sequence assumes that the media is known to Media Manager and that the tape drive is under the control of Media Manager's.

Before starting, obtain the following information:

- Media id of the tape containing the required backup
- Tape file number of the backup on the tape (see the NetBackup Images on Media report for this tape)
- Tape type/density
- Tape pool

▼ To restore files using a non-NetBackup tar

1. `tpreq -m` *`media_id`* `-a r -d` *`density`* `-p` *`poolname`* `-f /tmp/tape`

   Where:

   `media_id` is the media id of tape containing the backup.

   `density` is the density of the tape.

   `poolname` is the volume pool to which the tape belongs

2. `mt -f /tmp/tape rew`

3. `mt -f /tmp/tape fsf` *`file_#`*

   Where:

   file_# is the tape file number of the backup on tape. Determine the tape file number by checking the NetBackup Images on Media report for the tape.

4. `mt -f /tmp/tape fsr`

5. `/bin/tar -tvfb /tmp/tape` *`blocksize`*

   Where:

   - *`blocksize`* is 64 (assuming that the tape is written with 32K blocks)

6. `tpunmount /tmp/tape`

Notes on the procedure, "To restore files using a non-NetBackup tar" on page 248:

1. This procedure does not work for optical platters.

2. This procedure does not work if the backups were encrypted by NetBackup Encryption. Encrypted backups are recoverable, however, the backups cannot be decrypted.

   To determine if a backup is encrypted, run `tar -t` prior to the recovery. The output for an encrypted backup will be similar to the following:

   ```
   erw-r--r-- root/other Nov 14 15:59 2004 .EnCryYpTiOn.388
   -rw-r--r-- root/other Oct 30 11:14 2004 /etc/group.10-30
   ```

   Where the e at the beginning of line one indicates that the backup is encrypted. There will also be other messages if you attempt the recovery.

3. This procedure will not work on the Solaris platform. You cannot use `/usr/sbin/tar` on Solaris to read NetBackup's because that `tar` command uses the `ctime` and `atime` fields differently than other `tar` commands.

   When trying to restore using `/usr/sbin/tar`, you will see directories with large numbers being created at the top level. These directories are from the `ctime` and `atime` fields being read as pathnames.

   You can, however, use `/usr/openv/netbackup/bin/tar` or GNU `tar` to read the backups on Solaris platforms.

4. Steps 1 and 6 are optional in a standalone environment. If step 1 is skipped, DOWN the drive, then substitute the `/dev` path of the drive in place of `/tmp/tape` in the other steps. Remember to UP the drive when you are done.

   Example

   The following example was successful on an HP9000-800 using a DOWNed 4mm standalone drive and the NetBackup `tar`.

   ```
   mt -t /dev/rmt/0hncb rew
   mt -t /dev/rmt/0hncb fsf 1
   ```


```
mt -t /dev/rmt/0hncb fsr 1
/usr/openv/netbackup/bin/tar tvfb /dev/rmt/0hncb 64
```

Some platforms require other options on the `tar` command. The following is required on Solaris 2.4:

```
/usr/openv/netbackup/bin/tar -t -v -f /dev/rmt/0hncb -b 64
```

Note For additional limitations see, "Effects of Using a Non-NetBackup tar" on page 247.

Possible Files Generated By tar

Using any version of tar (including NetBackup-modified `tar`), can generate a number of specially-named files depending on the circumstances of the recovery:

- `@@MaNgLeD.`*`nnnn`*

  For backups containing pathnames longer than 100 characters, `tar` generates files named `@@MaNgLeD.`*`nnnn`* that contain the actual file.

- `@@MaNgLeD.`*`nnnn`*`_Rename`

  `tar` generates another file (`@@MaNgLeD.`*`nnnn`*`_Rename`) that explains how to rename the `@@MaNgLeD.`*`nnnn`* files in order to return the files to the correct location.

- `@@MaNgLeD.`*`nnnn`*`_Symlink`

  For long names of symbolic links, `tar` generates files named `@@MaNgLeD.`*`nnnn`*`_Symlink`. These files contain descriptions of the symbolic links that need to be made in order to return a link to the correct file.

- For cross-platform ACLs restores, `tar` creates and stores the ACLs in `.SeCuRiTy.`*`nnnn`* files in the `root` directory. The files can either be deleted or read and the ACLs regenerated by hand to the corresponding files. (See "Restoring Files and Access Control Lists" on page 512.)

- For cross-platform VxFS extent attribute restores, `tar` creates and stores extent attributes in `.ExTeNt.`*`nnnn`* files in the `root` directory. The files can either be deleted or read and the extent attributes regenerated by hand to the corresponding files.

Factors Affecting Backup Time

The time NetBackup requires to complete a backup is an important factor in scheduling. This is particularly true for sites that deal with large amounts of data. For example, the total backup time can exceed the time allotted to complete backups and interfere with

normal network operations. Longer backup times also increase the possibility of a problem disrupting the backup. The time to back up files can also give you an indication of how long it takes to recover them.

The following formula shows the major factors that affect backup time:

$$\text{Backup time} = \frac{\text{Total data}}{\text{Transfer rate}} \times \text{Compression factor (optional)} + \text{Device delays}$$

Total Data

The amount of data you must back up depends on the size of the files for each client in the policy you are backing up. It also depends on whether it is a full or incremental backup.

- Full backups involve all the data. Therefore, a full backup usually takes longer than an incremental.
- Differential incremental backups include only the data that has changed since the last full or intervening incremental.
- Cumulative incremental backups include all the data that has changed since the last full backup.

With both differential and cumulative incremental backups, the amount of data in the backups depends on the frequency with which files change. If a large number of files change frequently, incremental backups are larger.

Transfer Rate

Transfer rate depends on factors such as the following:

- Speed of the backup device. For example, sending backups to a tape having a maximum transfer rate of 800 kilobytes per second normally takes less time than to a tape that transfers at only 400 kilobytes per second (assuming other factors allow taking advantage of the faster transfer rate).
- Available network bandwidth. The available bandwidth is less than the theoretical network bandwidth and depends on how much other network traffic is present. For example, multiple backups occurring on the same network compete for bandwidth.
- Speed with which the client can process the data. This varies with the hardware platform and depends on the other applications running on the platform. File size is also an important factor. Clients can process larger files faster than smaller ones. You can back up 20 files that are 1 megabyte in size faster than 20,000 files that are 1 kilobyte in size.

- Speed with which the server can process the data. Like client speed, server speed also varies with the hardware platform and depends on the other applications running on the platform. The number of concurrent backups being performed also affects server speed.
- Network configuration can affect performance. For example, in an Ethernet environment, having some machines running full-duplex and some running half-duplex will significantly reduce throughput.

See "Determining NetBackup Transfer Rate" on page 252 for methods to compute the transfer rate for your clients.

Compression

Software compression often multiplies the backup time by a factor of two or three for a given set of data.

Device Delays

Device delays are due to factors such as the device being busy, loading the media, and finding the place on the media at which to start writing the backup. These delays depend on the devices and computing environments and can vary widely.

Determining NetBackup Transfer Rate

Calculate three variations of the backup transfer rate by using the data provided in NetBackup reports. The three rates and calculation methods are as follows:

- "Network Transfer Rate" (see below)
- "Network Transfer Plus End-of-Backup-Processing Rate" on page 253
- "Network Transfer Plus End-of-Backup-Processing Rate" on page 253

Network Transfer Rate

The network transfer rate considers only the time required to transfer data over the network from client to server. This rate ignores the following:

- Time to load and position media before a backup.
- Time to gracefully close the tape file and write an additional NetBackup information record to the tape.

The network transfer rate is the rate provided in the All Log Entries report.

Network Transfer Plus End-of-Backup-Processing Rate

This rate ignores the time it takes to load and position media before a backup, but includes the end-of-backup processing that is ignored in the network transfer rate. To determine this rate, use the All Log Entries report and calculate the time from the message:

```
begin writing backup id xxx
```

to the message

```
successfully wrote backup id xxx
```

Then, divide this time (in seconds) into the total bytes transferred (as recorded in the All Log Entries report) to calculate the transfer rate.

Total Transfer Rate

This transfer rate includes the time for loading and positioning the media as well as the end-of-backup processing. Using the List Client Backups report, calculate the transfer rate by dividing Kilobytes by Elapsed Time (converted to seconds).

Examples

Assume that the reports provide the following data.

All Log Entries Report

```
TIME              SERVER/CLIENT   TEXT
04/28/05 23:10:37 windows giskard begin writing backup
                  id giskard_0767592458, fragment 1 to
                  media id TL8033 on device 1 . . .
04/29/05 00:35:07 windows giskard successfully wrote
                  backup id giskard_0767592458,
                  fragment 1, 1161824 Kbytes at
                  230.325 Kbytes/sec
```

List Client Backups Report

```
Client:                     giskard
Backup ID:                  giskard_0767592458
Policy:                      production_servers
Client Type:                Standard
Sched Label:                testing_add_files
Schedule Type:              Full
Backup Retention Level:     one week (0)
Backup Time:                04/28/05 23:07:38
Elapsed Time:               001:27:32
Expiration Time:            05/05/05 23:07:38
```


```
Compressed:                no
Kilobytes:                 1161824
Number of Files:           78210
```

The following three rates were compiled using the backup data from the example reports above:

Network transfer rate:

1161824 Kbytes at 230.325 Kbytes per second

Network transfer plus end-of-backup processing rate:

23:10:30 - 00:35:07 = 01:24:30 = 5070 seconds

1161824 Kbytes/5070 = 229.157 Kbytes per second

Total transfer rate:

Elapsed time = 01:27:32 = 5252 seconds

1161824 Kbytes/5252 = 221.216 Kbytes per second

How NetBackup Builds a Worklist

The following topics explain how NetBackup determines the order in which automatic backups occur for each client. This information is for reference only but is useful in evaluating problems with schedules.

Building the Worklist (Queue)

NetBackup builds an internal worklist that contains all scheduled, active jobs. NetBackup calculates the *due time* for each job, then sorts all the jobs in the worklist in the order that the jobs are due:

a. NetBackup builds a worklist consisting of jobs for every client in every policy.

b. NetBackup evaluates each job and determines when it is due, based on the following factors:

- When did the job last run?
- How often is the job scheduled to run (the frequency of the job)?
- How long until the next scheduled window is open for the job (if the window is not currently open)?

c. NetBackup sorts the worklist based on the due time of each job.

While a job is waiting for resources (devices) to become available, the job is considered *Queued*, and appears on the Jobs tab of the Activity Monitor.

Once a job receives the resources it needs, the job becomes *Active* and begins. When the job completes, NetBackup computes the next due time for the job, thus perpetually calculating and reordering the worklist.

The order of the jobs on the worklist is dynamic, taking into account many factors. The following items are examples of factors that could effect the order of jobs on the worklist:

- Whether the job finished successfully or whether it failed and is *Waiting for Retry*. (The time NetBackup waits before trying the job again is a configurable master server property found under **Host Properties > Global Attributes** > **Job Retry Delay**.)

  A job that is retried will retain its original job ID. If the job does not succeed after the configured number of attempts allowed, the job is considered *Done*. The status of the job indicates that the job was not successful. The number of attempts counts toward the **Schedule Backup Attempts** limit. (Found under **Host Properties > Global Attributes** > **Schedule Backup Attempts**.)

- Whether attempts to run the job have exceeded the number allowed by the **Schedule Backup Attempts** host property.

- Whether the job is a child job. When a parent job is *Active,* all of the children from that parent job have precedence over other jobs, including the children of another parent job.

Prioritizing Queued Jobs

The worklist typically contains jobs from different policies and schedules. NetBackup checks for the following items when determining the order in which to run the backups that are in the worklist:

1. If multiplexing is enabled, a job will join an existing multiplexed group if allowed, even if a job of higher priority is on the worklist.

2. Highest priority backup as determined by the policy **Job Priority** setting.

   Backup jobs from the policy with the highest priority run first.

   For example, assume that clients *ant* and *beetle* are in different policies and that ant is in the policy with the highest priority. Here, the jobs for client *ant* always run before the client *beetle* jobs.

3. Backup with a retention level that is the same as a tape that is currently mounted.

   If policy priorities are equal, NetBackup tries to start a backup job that has the same retention period as a tape that is currently mounted. This reduces delays in waiting for tape mounts.

   For example, assume that clients *ant* and *beetle* are in the same policy but their schedules have different retention periods. Also, assume that the *ant* job is the most overdue. However, a tape is mounted that has the same retention level as client *beetle*.

   Here, the client *beetle* job runs first because it can be stored on a tape that is already mounted, thus making the most efficient use of resources. If there is another drive of the correct type available, a tape will be mounted on that drive for the client *ant* job.

4. Most overdue backup job.

   If the priorities and retention level are equal, NetBackup prioritizes backups according to how long they are overdue. The clients that are the most overdue have the highest priority.

   NetBackup determines how long a backup is overdue by subtracting the backup frequency (on the schedule) from the length of time since the last successful backup for that client.

   For example, assume that clients *ant* and *beetle* have backup jobs that are in the same policy and have the same retention level. Also assume that the schedules for these backup jobs both have a frequency of 1 day. If the last backup for client *ant* ran 25

hours ago and the last backup for client *beetle* ran 26 hours ago, then both clients are overdue for a backup. However, the client *beetle* job is the most overdue and will run first.

This approach ensures that a backup that was not successful during its previous backup window has priority over backups that were successful. This is important on a busy system where the backup window can sometimes close before all backups can begin.

Determining Backup Media Requirements

To assist you in determining how much media is available, NetBackup provides:

- The NetBackup Media Summary report, which lists the active and nonactive media that is available to a server.
- The `available_media` script in the `/usr/openv/netbackup/bin/goodies` directory, which lists all the media IDs that are available on the server where you run the script.

To efficiently manage your backup environment, you must know the amount of media that is required for both daily and long-term use. The daily requirement must be known to ensure that enough tape volumes and disk space are available for each backup session. The long-term requirements are necessary to assess costs for acquisition of new media, storage devices, and offsite storage (if required).

For daily requirements, you must first determine the approximate amount of data in the files that you will back up to each type of media each day. Then, you can check the Media Summary report and the results from running the `available_media` script to verify that enough media IDs and disk space are available.

For long term planning, review the following considerations:

- How long you want to retain the data. A related consideration is that all backups on a given tape or optical disk have the same retention level unless the **Allow Multiple Retentions per Media** property is enabled. If not enabled, additional media is required for each different retention level.
- Duplicates for offsite storage or extra security.
- New software releases and other special backups.
- Replacing worn out media.
- Changes in disk usage patterns over the time period under consideration. If your disk usage and capacity increase, your backup needs will also probably increase.

- Number of backups that are on a tape. Because tape marks are created between backups, a tape with many small backups (as with incremental backups) contains less real data than if it contains fewer large backups. The size of the tape marks vary depending on the media type. A large number of small files will also have a higher percentage of overhead in the backup because each file requires an extra 512 bytes for catalog information on the tape or disk.
- If you have many different volume pools, ensure that enough media is defined in each one to accommodate the data.

NetBackup Notify Scripts

Note Before using the notify scripts, ensure that they are executable by *other*. Do this by running `chmod 755` *script_name*, where *script_name* is the name of the script.

NetBackup uses the following scripts or batch files for collecting information and providing notification of events.

The following scripts are active on the master server:

`/usr/openv/netbackup/bin/backup_notify`

`/usr/openv/netbackup/bin/backup_exit_notify`

`/usr/openv/netbackup/bin/dbbackup_notify`

`/usr/openv/netbackup/bin/diskfull_notify`

`/usr/openv/netbackup/bin/mail_dr_info.sh` (must be created)

`/usr/openv/netbackup/bin/restore_notify`

`/usr/openv/netbackup/bin/session_notify`

`/usr/openv/netbackup/bin/session_start_notify`

`/usr/openv/netbackup/bin/userreq_notify`

Scripts that run on clients:

`/usr/openv/netbackup/bin/goodies/bpstart_notify`

`/usr/openv/netbackup/bin/goodies/bpend_notify`

`/usr/openv/netbackup/bin/parent_end_notify`

`/usr/openv/netbackup/bin/parent_start_notify`

In order to use the client scripts, the scripts must first be created on the client. Use the procedures described in "bpstart_notify.bat (Microsoft Windows clients only)" on page 262 and "bpend_notify.bat (Microsoft Windows clients only)" on page 267

For further information, refer to the comments in the scripts.

Caution *Applies to NetBackup Enterprise Server only.*
If you use either the `bpstart_notify` or `bpend_notify` scripts, do not include commands that write to `stdout`. If written to `stdout`, NetBackup sends this output to the server as part of the backup and the resulting backup can abort with an error message pertaining to block sizes. Also, ensure that all commands in the scripts are appropriate to the client platform. For example, the `-s` parameter is invalid for the UNIX `mail` command on some UNIX platforms and its use can cause data to be written to stdout or stderr, resulting in the same problem noted above.

backup_notify

The `backup_notify` script runs on the NetBackup server where the storage unit is located and is called each time a backup is successfully written to media. The parameters that NetBackup passes to this script are:

- The name of the program doing the backup
- The backup-image name or path

For example:

```
backup_notify bptm bilbo_0695316589
```

Note *Applies to NetBackup Enterprise Server only.*
If NetBackup backed up files to a UNIX disk storage unit that is being managed by Storage Migrator, the `backup_notify` script notifies Storage Migrator to perform migration as quickly as possible. The released script does not, however, have commands to force a backup of the managed file system after NetBackup has stored its backups. To back up the managed file system, modify the script as necessary to meet site requirements for backup.

backup_exit_notify

The `backup_exit_notify` script runs on the master server. The NetBackup master server calls this script to do site specific processing when an individual backup has completed.

NetBackup passes the following parameters to the script:

Parameter	Description
`clientname`	Name of the client from the NetBackup catalog.
`policyname`	Policy name from the NetBackup catalog.
`schedname`	Schedule name from the NetBackup catalog.
`schedtype`	One of the following: `FULL`, `INCR` (differential incremental), `CINC` (cumulative incremental), `UBAK`, `UARC`
`exitstatus`	Exit code for the entire backup job.

For example:

```
backup_exit_notify freddie production fulls FULL 0
backup_exit_notify danr production incrementals INCR 73
```

bpstart_notify (UNIX clients only)

Note Before using this script, ensure that it is executable by *other* on the client. Do this by running `chmod 755` *script_name*. Where *script_name* is the name of the script.

On UNIX clients, NetBackup calls the `bpstart_notify` script each time the client starts a backup or archive operation. To use this script, copy

```
/usr/openv/netbackup/bin/goodies/bpstart_notify
```

from the server to

```
/usr/openv/netbackup/bin/
```

on the UNIX client. Then, modify the script as desired and ensure that you have permission to run the script.

The `bpstart_notify` script runs each time a backup or archive starts and initialization is completed (but before the tape positioning). This script must exit with a status of 0 for the calling program to continue and for the backup or archive to proceed. A nonzero status causes the client backup or archive to exit with a status of `bpstart_notify failed`.

If the `/usr/openv/netbackup/bin/bpstart_notify` script exists, it runs in the foreground and the `bpbkar` process on the client waits for it to complete before continuing. Any commands in the script that do not end with an & character run serially.

The server expects the client to respond with a `continue` message within the period of time specified by the NetBackup `BPSTART_TIMEOUT` option on the server.

The default for `BPSTART_TIMEOUT` is 300. If the script needs more time than 300 seconds, increase the value to allow more time.

NetBackup passes the following parameters to the script:

Parameter	Description
`clientname`	Name of the client from the NetBackup catalog.
`policyname`	Policy name from the NetBackup catalog.
`schedname`	Schedule name from the NetBackup catalog.
`schedtype`	One of the following: `FULL`, `INCR` (differential incremental), `CINC` (cumulative incremental), `UBAK`, `UARC`

Caution The `bpstart_notify` script also runs for NetBackup catalog backups if a `.policyname[.schedule]` is not specified.

For example:

```
bpstart_notify freddie cd4000s fulls FULL
bpstart_notify danr cd4000s incrementals INCR
bpstart_notify hare cd4000s fulls FULL
bpstart_notify freddie cd4000s user_backups UBAK
bpstart_notify danr cd4000s user_archive UARC
```

To create a `bpstart_notify` script for a specific policy or policy and schedule combination, create script files with a *.policyname* or *.policyname.schedulename* suffix. The following are two examples of script names for a policy named *production* that has a schedule named *fulls*:

```
/usr/openv/netbackup/bin/bpstart_notify.production
/usr/openv/netbackup/bin/bpstart_notify.production.fulls
```

The first script affects all scheduled backups in the policy named production. The second script affects scheduled backups in the policy named production only when the schedule is named fulls.

Note For a given backup, NetBackup uses only one bpstart_notify script and that is the one with the most specific name. For example, if there are both bpstart_notify.production and bpstart_notify.production.fulls scripts, NetBackup uses only bpstart_notify.production.fulls.

The bpstart_notify script can use the following environment variables:

```
BACKUPID

UNIXBACKUPTIME

BACKUPTIME
```

The NetBackup bpbkar process creates these variables. The following are examples of strings that are available to the script for use in recording information about a backup:

```
BACKUPID=freddie_0857340526

UNIXBACKUPTIME=0857340526

BACKUPTIME=Sun Mar 2 16:08:46 2004
```

In addition to the above, the following environment variables can be used for the support of multiple data streams:

STREAM_NUMBER indicates the stream number. The first stream started from a policy, client, and schedule will be 1. A value of 0 indicates that multiple data streams is not enabled.

STREAM_COUNT specifies the total number of streams to be generated from this policy, client, and schedule.

STREAM_PID is the pid (process ID) number of bpbkar.

RESTARTED can be used for checkpointed restarts or checkpointed backup jobs. A value of 0 indicates that the job was not resumed. (For example, upon first initiation.) A value of 1 indicates that the job was resumed.

bpstart_notify.bat (Microsoft Windows clients only)

For all Windows clients, you can create batch scripts that provide notification whenever the client starts a backup or archive. To use this script, copy:

```
/usr/openv/netbackup/bin/goodies/bpstart_notify.bat
```

from the server to the client, in the same directory as the NetBackup client binaries:

```
Install_path\NetBackup\bin\
```

Where *Install_path* is the directory where NetBackup is installed.

You can create bpstart_notify scripts that provide notification for all backups or just for backups of a specific policy or schedule.

To create a script that applies to all backups, name the script bpstart_notify.bat

To create a bpstart_notify script that applies only to a specific policy or policy and schedule combination, add a *.policyname* or *.policyname.schedulename* suffix to the script name.

- The following script applies only to a policy named *days*:

  install_path\netbackup\bin\bpstart_notify.days.bat

- The following script applies only to a schedule named *fulls* that is in a policy named *days*:

  install_path\netbackup\bin\bpstart_notify.days.fulls.bat

Caution The bpstart_notify script also runs for NetBackup catalog backups if a .policyname[.schedule] is not specified.

The first script affects all scheduled backups in the policy named days. The second script affects scheduled backups in the policy named days only when the schedule is named fulls.

For a given backup, NetBackup calls only one bpstart_notify script and checks for them in the following order:

bpstart_notify.*policy.schedule*.bat

bpstart_notify.*policy*.bat

bpstart_notify.bat

For example, if there are both bpstart_notify.policy.bat and bpstart_notify.policy.schedule.bat scripts, NetBackup uses only the bpstart_notify.policy.schedule.bat script.

Note If you are also using bpend_notify scripts, they can provide a different level of notification than the bpstart_notify scripts. For example, if you had one of each, they could be bpstart_notify.policy.bat and bpend_notify.policy.schedule.bat.

When the backup starts, NetBackup passes the following parameters to the script:

Parameter	Description
%1	Name of the client from the NetBackup catalog.

Parameter	Description
%2	Policy name from the NetBackup catalog.
%3	Schedule name from the NetBackup catalog.
%4	One of the following: FULL, INCR, CINC, UBAK, UARC
%5	Status of the operation is always 0 for bpstart_notify.
%6	Results file that NetBackup checks for a return code from the script. NetBackup uses %6 to pass the file name and then expects the script to create the file in the same directory as the script. If the script applies to a specific policy and schedule, the results file must be named *install_path*\netbackup\bin\BPSTART_RES.*policy.schedule* If the script applies to a specific policy, the results file must be named *install_path*\netbackup\bin\BPSTART_RES.*policy* If the script applies to all backups, the results file must be named *install_path*\netbackup\bin\BPSTART_RES An echo 0> %6 statement is one way for the script to create the file. NetBackup deletes the existing results file before calling the script. After the script runs, NetBackup checks the new results file for the status. The status must be 0 for the script to be considered successful. If the results file does not exist, NetBackup assumes that the script was successful.

The server expects the client to respond with a continue message within the period of time specified by the NetBackup BPSTART_TIMEOUT option on the server. The default for BPSTART_TIMEOUT is 300. If the script needs more than 300 seconds, increase the value to allow more time.

For Windows 2000 clients, the bpstart_notify script can use the following environment variables for the support of multiple data streams:

STREAM_NUMBER indicates the stream number. The first stream started from a policy, client, and schedule will be 1. A value of 0, indicates that multiple data streams is not enabled.

STREAM_COUNT specifies the total number of streams to be generated from this policy, client, and schedule.

STREAM_PID is the pid (process ID) number of bpbkar.

bpend_notify (UNIX clients only)

Caution The bpend_notify script is run when the client is finished sending data, but the server has not yet completed writing to media.

For a UNIX client, if you need notification whenever the client completes a backup or archive operation, copy

```
/usr/openv/netbackup/bin/goodies/bpend_notify
```

from the server to

```
/usr/openv/netbackup/bin/bpend_notify
```

on the UNIX client. Then, modify the script as desired, and ensure that you have permission to run the script.

The bpend_notify script runs each time a backup or archive completes. For archives, it runs after the backup but before the files are removed.

If bpend_notify exists, it runs in the foreground and bpbkar on the client waits until it completes. Any commands that do not end with an & character run serially.

The server expects the client to respond within the period of time specified by the BPEND_TIMEOUT NetBackup configuration option on the server. The default for BPEND_TIMEOUT is 300.

If the script needs more than 300 seconds, set BPEND_TIMEOUT to a larger value. Avoid too large a value or you will delay the server from servicing other clients.

NetBackup passes the following parameters to the bpend_notify script:

Parameter	Description
clientname	Name of the client from the NetBackup catalog.
policyname	Policy name from the NetBackup catalog.
schedname	Schedule name from the NetBackup catalog.
schedtype	One of the following: FULL, INCR (differential incremental), CINC (cumulative incremental), UBAK, UARC
exitstatus	Exit code from bpbkar. This is only client status and does not mean that the backup is complete and successful. For example, the client can show a status 0 when, due to a failure on the server, the All Log Entries report shows a status 84.

Caution The bpend_notify script also runs for NetBackup catalog backups if a .policyname[.schedule] is not specified.

For example:

```
bpend_notify freddie pol_1 fulls FULL 0

bpend_notify danr pol_1 incrementals INCR 73
```

To create a bpend_notify script for a specific policy or policy and schedule combination, create script files with a *.policyname* or *.policyname.schedulename* suffix. The following are two examples of script names for a policy named *production* that has a schedule named *fulls*:

```
/usr/openv/netbackup/bin/bpend_notify.production

/usr/openv/netbackup/bin/bpend_notify.production.fulls
```

The first script affects all scheduled backups in the policy named production. The second script affects scheduled backups in the policy named production only when the schedule is named fulls.

Note For a given backup, NetBackup uses only one bpend_notify script and that is the one with the most specific name. For example, if there are both bpend_notify.production and bpend_notify.production.fulls scripts, NetBackup uses only bpend_notify.production.fulls.

If the UNIX client is running NetBackup 3.0 or later software, the bpend_notify script can use the following environment variables:

```
BACKUPID

UNIXBACKUPTIME

BACKUPTIME
```

The NetBackup bpbkar process creates these variables. The following are examples of strings that are available to the script for use in recording information about a backup:

```
BACKUPID=freddie_0857340526

UNIXBACKUPTIME=0857340526

BACKUPTIME=Sun Mar 2 16:08:46 2005
```

In addition to the above, the following environment variables can be used for the support of multiple data streams:

STREAM_NUMBER indicates the stream number. The first stream started from a policy, client, and schedule will be 1. A value of 0, indicates that multiple data streams is not enabled.

STREAM_COUNT specifies the total number of streams to be generated from this policy, client, and schedule.

STREAM_PID is the pid (process ID) number of bpbkar.

FINISHED can be used for checkpointed restarts of backup jobs. A value of 0 indicates that the client was not finished sending all of the data. A value of 1 indicates that the client was finished sending all the of data.

bpend_notify.bat (Microsoft Windows clients only)

For Windows clients, you can create batch scripts that provide notification whenever the client completes a backup or archive. These scripts must reside on the client and in the same directory as the NetBackup client binaries:

Install_path\NetBackup\bin\bpend_notify.bat

Where *Install_path* is the directory where NetBackup is installed.

You can create bpend_notify scripts that provide notification for all backups or just for backups of a specific policy or schedule.

To create a bpend_notify script that applies to all backups, name the script bpend_notify.bat

To create a script that applies only to a specific policy or policy and schedule combination, add a *.policyname* or *.policyname.schedulename* suffix to the script name.

- The following script applies only to a policy named *days*:

  Install_path\netbackup\bin\bpend_notify.days.bat

- The following script applies only to a schedule named *fulls* that is in a policy named *days*:

  Install_path\netbackup\bin\bpend_notify.days.fulls.bat

Caution The bpend_notify script also runs for NetBackup catalog backups if a .policyname[.schedule] is not specified.

The first script affects all scheduled backups in the policy named days. The second script affects scheduled backups in the policy named days only when the schedule is named fulls.

For a given backup, NetBackup calls only one bpend_notify script and checks for them in the following order:

bpend_notify.*policy.schedule*.bat

bpend_notify.*policy*.bat

bpend_notify.bat

For example, if there are both `bpend_notify.policy.bat` and `bpend_notify.policy.schedule.bat` scripts, NetBackup uses only `bpend_notify.policy.schedule.bat`.

Note If you are also using `bpstart_notify` scripts, they can provide a different level of notification than the `bpend_notify` scripts. For example, if you had one of each, they could be `bpstart_notify.policy.bat` and `bpend_notify.policy.schedule.bat`.

When the backup completes, NetBackup passes the following parameters to the script:

Parameter	Description
`%1`	Name of the client from the NetBackup catalog.
`%2`	Policy name from the NetBackup catalog.
`%3`	Schedule name from the NetBackup catalog.
`%4`	One of the following: `FULL`, `INCR`, `CINC`, `UBAK`, `UARC`
`%5`	Status of the operation and is same as sent to the NetBackup server. This is 0 for successful backups and 1 for partially successful backups. If an error occurs, the status is the value associated with that error.
`%6`	Results file that NetBackup checks for a return code from the script. NetBackup uses `%6` to pass the file name and then expects the script to create the file in the same directory as the script. If the script applies to a specific policy and schedule, the results file must be named *Install_path*`\netbackup\bin\BPEND_RES.`*policy*`.`*schedule* If the script applies to a specific policy, the results file must be named *Install_path*`\netbackup\bin\BPEND_RES.`*policy* If the script applies to all backups, the results file must be named *Install_path*`\netbackup\bin\BPEND_RES` An `echo 0> %6` statement is one way for the script to create the file. NetBackup deletes the existing results file before calling the script. After the script runs, NetBackup checks the new results file for the status. The status must be 0 for the script to be considered successful. If the results file does not exist, NetBackup assumes that the script was successful.

The server expects the client to respond with a *continue* message within the period of time specified by the NetBackup BPEND_TIMEOUT option on the server. The default for BPEND_TIMEOUT is 300. If the script needs more than 300 seconds, increase the value to allow more time.

For Windows 2000 clients, the bpend_notify script can use the following environment variables for the support of multiple data streams:

STREAM_NUMBER indicates the stream number. The first stream started from a policy, client, and schedule will be 1. A value of 0, indicates that multiple data streams is not enabled.

STREAM_COUNT specifies the total number of streams to be generated from this policy, client, and schedule.

STREAM_PID is the pid (process ID) number of bpbkar.

dbbackup_notify

The dbbackup_notify script is called each time NetBackup completes an offline, cold catalog backup. The script runs on the server which receives the data for the offline catalog backup. NetBackup passes the following parameters to this script:

Parameter	Description
device	Device type the backup was written to.
vsn_or_path	Volume serial number (for tape) or path (for disk) used for the backup.
status	Specifies whether the backup was successful and must have a value of either SUCCESS or FAIL.

For example:

```
dbbackup_notify DISK /disk1/bpsync1 SUCCESS

dbbackup_notify OPTICAL AA0001 FAIL

dbbackup_notify TAPE XYZ047 SUCCESS
```

You must be able to identify the most recent catalog backup. Therefore, consider modifying this script to produce a printed copy of the media ID to which the catalog backup was done.

Note *Applies to NetBackup Enterprise Server only.*
If the NetBackup catalog files are backed up to a UNIX disk storage unit that is being managed by Storage Migrator, the dbbackup_notify script notifies

Storage Migrator to perform migration as quickly as possible. The script does not, however, have commands to force Storage Migrator to back up its own catalog after a backup of the NetBackup catalog. You must modify the script to meet site requirements for backup of the Storage Migrator catalog.

diskfull_notify

The `diskfull_notify` script runs on the NetBackup server containing the storage unit. The disk media manager (`bpdm`) calls this script if it encounters a disk full condition when writing a backup to a disk storage unit. The default action is to report the condition and immediately try to write the data again. (The file being written is kept open by the active `bpdm`).

The script can be modified to send a notification to an email address or modified to perform actions such as removing other files in the affected directory or file system. NetBackup passes the following parameters to this script:

Parameter	Description
`programname`	Name of the program (always `bpdm`).
`pathname`	Path to the file being written.

For example:

```
diskfull_notify bpdm /disk1/images/host_08193531_c1_F1
```

Note

In previous releases, the `diskfull_notify` script default condition was to sleep for five minutes when a disk storage unit became full. To retain this behavior upon upgrade, either:

- Copy the `netbackup/bin/diskfull_notify.`*`old_revision_number`* script to `netbackup/bin/diskfull_notify`, or
- Modify the script, changing `sleep 0` to:

  ```
  sleep 300
  ```

mail_dr_info.sh

Use `mail_dr_info.sh` to send NetBackup disaster recovery information to specified recipients after running an online, hot catalog backup.

To create the script, touch `/usr/openv/netbackup/bin/mail_dr_info.sh`.

Update the script using the following exit parameters:

Parameter	Description
`%1`	The recipient's address. For multiple addresses, enter *`email1,email2`*
`%2`	The subject line.
`%3`	The message file name.
`%4`	The attached file name.

NetBackup checks to see if `mail_dr_info.sh` is present in `/usr/openv/netbackup/bin`. If `mail_dr_info.cmd` exists, NetBackup passes the parameters to the script.

`mail_dr_info.sh` is not an installed file. Users who wish to use this functionality must create the script and script the desired action.

parent_end_notify

NetBackup calls the `parent_end_notify` script each time a parent job ends.

To create the script, copy `/usr/openv/netbackup/bin/goodies/parent_end_notify` from the master server into `/usr/openv/netbackup/bin/` on the client.

Update the script using the following parameters:

Parameter	Description
`clientname`	Name of the client from the NetBackup catalog.
`policyname`	Policy name from the NetBackup catalog.
`schedname`	Schedule name from the NetBackup catalog.
`schedtype`	One of the following: `FULL`, `INCR` (differential incremental), `CINC` (cumulative incremental), `UBAK`, `UARC`
`status`	Exit code for the entire backup job.
`streamnumber`	The stream number for a parent job is always `-1`.

parent_start_notify

NetBackup calls the `parent_start_notify` script each time a parent job starts.

To create the script, copy `/usr/openv/netbackup/bin/goodies/parent_start_notify` from the master server into `/usr/openv/netbackup/bin/` on the client.

Update the script using the following parameters:

Parameter	Description
`clientname`	Name of the client from the NetBackup catalog.
`policyname`	Policy name from the NetBackup catalog.
`schedname`	Schedule name from the NetBackup catalog.
`schedtype`	One of the following: `FULL`, `INCR` (differential incremental), `CINC` (cumulative incremental), `UBAK`, `UARC`
`status`	Exit code for the entire backup job.
`streamnumber`	The stream number for a parent job is always `-1`.

restore_notify

Note *Applies to NetBackup Enterprise Server only.*
If the files are restored to a UNIX disk storage unit that is being managed by Storage Migrator, the `restore_notify` script notifies Storage Migrator to perform migration as quickly as possible after the restore is complete.

The `restore_notify` script runs on the server that has the storage unit. The NetBackup tape or disk manager (`bptm` or `bpdm`) calls the script when it is finished sending data to the client during a restore (regardless of whether data is actually sent). NetBackup passes the following parameters to this script:

Parameter	Description
`programname`	Name of the program doing the restore or other read operation.
`pathname`	Path to the backup name or path.

Parameter	Description
operation	One of the following: restore, verify, duplication, import

For example:

```
restore_notify bptm bilbo_0695316589 duplication
```

session_notify

The session_notify script runs on the master server and is called at the end of a backup session if at least one scheduled backup has succeeded. NetBackup passes no parameters to this script. Scheduling is suspended until this script completes, thus no other backups can start until that time.

session_start_notify

The session_start_notify script runs on the master server. When a set of backups is due to run, NetBackup calls this script to do any site specific processing prior to starting the first backup. NetBackup passes no parameters to this script.

userreq_notify

The userreq_notify script runs on the master server and is called by NetBackup each time a request is made to:

- List files that are in backups or archives
- Start a backup, archive, or restore

You can alter this script to gather information about user requests to NetBackup. NetBackup passes the following parameters to this script.

Parameter	Description
action	Defines the action and can have the following values: backup, archive, manual_backup, restore, list
clientname	Defines the client name.
userid	Defines the user ID.

For example:

```
userreq_notif backup mercury jdoe
userreq_notify archive mercury jdoe
userreq_notify manual_backup mercury jdoe
userreq_notify restore mercury jdoe
userreq_notify list mercury jdoe
```

Using NetBackup With AFS 6

This chapter explains how to install, configure, and use NetBackup to back up AFS file servers. (AFS is an acronym for Andrew File System.)

Note AFS is no longer available from IBM and IBM has announced that AFS support will end on April 30, 2006. AFS was not tested with NetBackup 6.0 clients and will not be supported. AFS will continue to be supported with NetBackup 5.x clients running under 5.x or 6.0 servers.

Installation

System Requirements

- AFS file servers that can be NetBackup AFS clients:
  - Solaris 7 and HP-UX 11.0, or IBM AIX 4.3.3 platforms
  - NetBackup 5.0 or 5.1 clients
  - AFS level 3.6 or later installed

Server and Client Installation

The NetBackup software needed to support AFS is automatically installed with the server and client.

Configuration

To configure backups for NetBackup AFS clients, add an AFS policy to the NetBackup configuration on the master server. Except for the differences mentioned here, the requirements are the same as for other NetBackup policies. To back up files and directories that are not in AFS volumes, create separate policies.

General Policy Attributes

When selecting the general attributes for the policy, specify AFS as the policy type.

Client List

In the client list, specify the names of the AFS file servers to be backed up. These systems must have the NetBackup client installed.

Backup Selections

In the backup selection list for the AFS policy, specify the AFS volumes and (or) vice partitions to be backed up by the schedules in this policy. The following example shows both volumes and vice partitions:

```
user.abc
/vicepb
/vicepc/user.*
```

In this instance, NetBackup backs up the following:

- The volume `user.abc`
- All volumes in vice partition `vicepb`
- All volumes in `vicepc` that begin with *user*.

  When the list includes a vice partition, all the volumes in the partition are backed up one at a time.

Note NetBackup supports the maximum AFS 3.6 volume size of 8 GB.

Backup Selection List Directives

The following directives can be in the backup selection list in an AFS policy:

- `CREATE_BACKUP_VOLUMES`

  This directive causes NetBackup to create `.backup` volumes prior to performing the backup. If a `.backup` volume already exists, NetBackup overwrites it, thus creating a more recent copy.

  Because NetBackup backs up only the `.backup` copy of AFS volumes, this directive is useful if an automated mechanism is not in place to create `.backup` copies. Creating `.backup` copies also ensures that the backups include the latest changes.

Caution If an automated mechanism is not in place to create `.backup` copies, include the `CREATE_BACKUP_VOLUMES` directive in the backup selection list or AFS volumes are not backed up.

- `REMOVE_BACKUP_VOLUMES`

  This directive causes NetBackup to remove `.backup` volumes after performing the backup. The directive removes `.backup` volumes created using the `CREATE_BACKUP_VOLUMES` directive or created by another mechanism.

- `SKIP_SMALL_VOLUMES`

  This directive allows skipping small or empty volumes during backups. For example:

  ```
  SKIP_SMALL_VOLUMES=5
  ```

  (do not include spaces on either side of the = sign)

  In this example, NetBackup skips volumes ≤ 5 KB. Specify any number for the volume size.

  If no number is specified, the size defaults to 2 KB. For example:

  ```
  SKIP_SMALL_VOLUMES
  ```

The following rules also apply to the directives:

- Directives must be all upper case.
- Directives can be anywhere in the backup selection list but it is best to place directives at the top. For example:

  ```
  CREATE_BACKUP_VOLUMES
  SKIP_SMALL_VOLUMES
  /user.abc
  /vicepb
  ```

Regular Expressions

NetBackup supports regular expressions in backup selection list entries. These are useful in order to perform the following actions:

- Add or move volumes without having to change the backup selection list.
- Add vice partitions without having to change the backup selection list.
- Split volumes and (or) vice partitions on AFS file servers into groups that can be backed up by separate policies. This allows concurrent backups or multiplexing.

  The following examples use regular expressions:

```
user.[a-m]*
/vicep[a-c]
```

Exclude and Include Lists

Exclude lists can be created on the client in order to exclude certain specific volumes from automatic backups. An exclude list cannot contain vice partitions but it can contain individual volumes within a vice partition.

An include list adds back volumes specified in the exclude list. For example, if a range of volumes is excluded, the include list can add back specific volumes within the range.

Backups and Restores

Backups

Note User backups or archives of AFS volumes are not allowed.

Automatic Backup

The most convenient way to back up NetBackup for AFS clients is to configure an AFS policy and set up schedules for automatic, unattended backups.

Manual Backup

The administrator on the master server can use the NetBackup Administration Console to manually run a backup for an AFS policy. For information about manual backups, see Chapter 3 of the *NetBackup System Administrator's Guide, Volume I*.

Restores

All restores must be performed by the administrator either on the NetBackup AFS client or the master server. Restores are performed on the basis of volumes. To restore a vice partition, the administrator must select all the volumes in that partition.

Caution If the **Overwrite Existing Files** option is selected, the volumes are overwritten and all changes or files created since the last backup are lost.

Restore From the NetBackup for AFS Client

An administrator on a NetBackup AFS client (AFS file server) can use the NetBackup Backup, Archive, and Restore interface to restore volumes to that client. It is also possible to perform a redirected restore. A redirected restore will restore a volume to another volume or vice partition.

Restore From the NetBackup Master Server

The administrator can use the NetBackup Backup, Archive, and Restore interface on the master server to restore volumes to the same NetBackup AFS client (AFS file server), or do a redirected restore. This is called a server-directed restore. For instructions, see the online help in the Backup, Archive, and Restore interface.

Notes About Restores

- On UNIX, the NetBackup Backup, Archive, and Restore client interface (`jbpSA`), provides a convenient mechanism for specifying an alternate name for a volume and (or) vice partition. Specifying an alternate volume name prevents an existing volume from being overwritten by the restore.
- If the administrator does not specify **Overwrite Existing Files** or an alternate name for the volume, then NetBackup adds an *R* to the name of the restored volume as follows:
  - If the volume name is less than 22 characters long, NetBackup adds a leading *R* to the name of the restored volume. For example:

    If the volume name is:

    ```
    /AFS/shark/vicepa/user.abc
    ```

    The restored name is:

    ```
    /AFS/shark/vicepa/Ruser.abc
    ```

  - If the volume name is 22 characters long (maximum allowable length for a volume name), the first character of the original volume name is replaced with an *R*. For example:

    If the volume name is:

    ```
    /AFS/shark/vicepa/engineering.documents1
    ```

    The restored name is:

    ```
    /AFS/shark/vicepa/Rngineering.documents1
    ```


- If restoring to an alternate path and specify an existing volume, select the **Overwrite Existing Files** option for the restore to succeed. In this case, the entire volume is overwritten. If **Overwrite Existing Files** option is not selected, the restore fails.
- When restoring a volume to an alternate vice partition, the vice partition must exist or the restore fails.

Troubleshooting

The following sections provide tips and information for troubleshooting problems with NetBackup for AFS. See the *NetBackup Troubleshooting Guide for UNIX and Windows* for overall troubleshooting information.

Troubleshooting Backups

To increase the level of detail in the logs:

- Add the `VERBOSE` option to the `/usr/openv/netbackup/bp.conf` file on the NetBackup for AFS client.
- Create the following debug log directory on the NetBackup for AFS client:

  ```
  /usr/openv/netbackup/logs/bpbkar
  ```

  If the AFS backup terminates with a status code of 9 (an extension package is needed, but was not installed), it means that NetBackup AFS client software was not properly installed on the client.

  If the AFS backup terminates with a status code of 78 (`afs/dfs` command failed), it indicates an AFS `vos` command failure. The NetBackup Problems Report provides additional information on why the command failed. The `bpbkar` debug log shows the command that was run. Run the `vos` command manually to attempt to duplicate the problem.

  Also, examine the `/usr/openv/netbackup/listvol` file on the NetBackup client for irregularities. The `vos listvol` command can be very demanding on system resources so NetBackup caches the output of the `vos listvol` command in this file. If the cached `listvol` file was created less than four hours prior to the backup, NetBackup uses it to obtain the list of volumes instead of running another `vos listvol` command.

Troubleshooting Restores

If the restore of an AFS volume fails, check the restore process log for additional information. If a `vos restore` command failure is indicated, create a `/usr/openv/netbackup/logs/tar` debug log directory, retry the operation, and check the resulting log to see that the `vos restore` command was run.

Intelligent Disaster Recovery 7

Intelligent Disaster Recovery (IDR) for Windows is a fully-automated disaster recovery solution that allows you to recover your Windows computers quickly and efficiently after a disaster. The IDR wizards guide you in preparing for disaster recovery and in recovering your computer to its pre-disaster state.

This chapter contains the following sections:

- "Changes for NetBackup 6.0" on page 284 explains the limited supported for IDR in NetBackup 6.0.
- "Supported Windows Editions" on page 284 documents the Windows versions supported by IDR.
- "Overview of IDR Use" on page 285 explains the main steps involved in using the disaster recovery software.
- "About the DR Files" on page 286 introduces the DR (Disaster Recovery) files and explains their importance in disaster recovery.
- "Configuring NetBackup Policies for IDR" on page 287 explains how to configure policies that contain clients that are using IDR.
- "Backing Up the System to be Protected" on page 288 explains that you must backup the system before you create the bootable media used in recovery.
- "Creating IDR Media" on page 288 explains how to use this wizard to prepare the bootable media that is used to recover your data.
- "Updating IDR Media" on page 294 explains how and when to update the IDR media so it is always ready when you need it.
- "Recovering Your Computer" on page 297 explains how to perform disaster recovery.
- "Notes on Recovering Specific Platforms" on page 304 provide information on recovering data on specific types of platforms.
- "IDR Frequently Asked Questions" on page 305 answers questions that are frequently asked about IDR.

Changes for NetBackup 6.0

Bare Metal Restore replaces Intelligent Disaster Recovery for NetBackup 6.0. To protect NetBackup 6.0 clients, use the Bare Metal Restore option for NetBackup.

Intelligent Disaster Recovery cannot be used to protect or recover NetBackup 6.0 client systems. However, you can use Intelligent Disaster Recovery on NetBackup 6.0 master servers as follows:

- To protect NetBackup 5.1, 5.0, and 4.5 clients.
- To generate bootable media (except for NetBackup 4.5 clients).

If policies on NetBackup 6.0 master servers are configured to collect disaster recovery information and those policies protect NetBackup 6.0 clients, the jobs of those clients will complete with a status of 1 (partially successful) because the NetBackup server will attempt to collect disaster recovery information from those clients and will not be able to do so.

If you use IDR with NetBackup 6.0 to protect NetBackup 5.1, 5.0 and 4.5 clients, the NetBackup master server must be licensed for IDR.

Supported Windows Editions

IDR allows you to protect and recover the following Windows systems:

- Windows NT 4.0 Enterprise Server, Small Business Server, and Workstation editions with Service Pack 3 or later
- Windows 2000 Server, Advanced Server, and Professional
- Windows XP 32-bit versions
- Windows Server 2003 (Standard Edition, Enterprise Edition, and Web Edition)

Requirements for IDR

The following are the requirements for IDR:

- NetBackup 5.1, 5.0, or 4.5 client software must be installed on the Windows systems that you want to protect. The IDR software is installed automatically when that client software is installed. IDR is not installed on NetBackup 6.0 client systems. The IDR software is not required (and cannot be installed) on UNIX systems.
- The NetBackup master server that collects the disaster recovery information must be licensed for IDR. The NetBackup master server that collects the disaster recovery information can reside on either a Windows or UNIX system.

- The IDR Preparation Wizard that runs on the client system can only be used to generate recovery media for systems that have the same version of IDR software installed.
- The machine to be protected must be an Intel system running a supported Windows operating system. See "Supported Windows Editions" on page 284.
- At least 40 MB of hard drive space to hold the minimal recovery system on the machine to be protected.
- Sufficient space on the machine to be protected for the data that is being restored.
- Sufficient swap space on the machine to be protected to support your system's RAM.

  For example, if you have 128 MB of RAM, the minimum swap used is 128 MB. For a 2 GB partition that stores 1.8 GB of data, the required hard drive space for that partition is 1.8 GB plus 128 MB plus 40 MB, for a total of 1.97 GB.
- The partition on the first physical drive on the machine to be protected must be the boot partition and must also be labeled `c:\`.
- A protected computer must use a network card that does not require a Windows service pack to be installed. For a list of cards that have passed Microsoft compatibility tests without service packs, see the "Network LAN Adapters" section of the "Hardware Compatibility List" that comes with the Microsoft Windows software.
- The driver required by the CD-ROM drive on a protected computer must be supported by Windows. *Windows NT systems*: If the IDR Preparation Wizard detects that the driver on the system being protected is different than the driver on the Windows NT installation CD, you can choose which driver to use. VERITAS recommends that you use the SCSI drivers currently installed on the computer being protected because the drivers on the Windows CD may not be up to date. If you have an IDE hard disk greater than 8 GBs you must use the SCSI driver currently installed on the system.

Overview of IDR Use

Using IDR involves the following steps:

- NetBackup 5.1, 5.0, or 4.5 client software must be installed on the Windows systems that you want to protect. The IDR software is installed automatically when that client software is installed. IDR is not installed on NetBackup 6.0 client systems. The IDR software is not required (and cannot be installed) on UNIX systems.
- Licensing. To activate IDR for backups, you must enter an IDR license key on the master server.

- Configuration. On the NetBackup master server, select the **Collect disaster recovery information** general attribute when setting up the policy configuration for protected clients. You can use a NetBackup master server on either a Windows or UNIX system to collect disaster recovery information.
- Backup. An initial full backup must be completed of a protected system before you create IDR media. Also, you should backup your computer frequently and update the DR files often.
- Preparing the IDR media. The IDR Preparation Wizard on the client system guides you through the preparation of media used to recover protected systems.
- Recovery. A Disaster Recovery Wizard guides you through the steps for rebuilding the protected system and then restoring data to that system. The systems to be protected should have their data backed up regularly by NetBackup.

The installation, configuration, backup, and media preparation steps are prerequisites for successfully recovering a Windows system through a network connection to a NetBackup server.

About the DR Files

The disaster recovery (DR) files are mentioned frequently in this chapter and in the screens that you see in the wizards. A DR file contains specific information about the computer you are protecting, including:

- Hard disk partition information.
- Network interface card information.
- NetBackup configuration information required to restore data files.

To fully automate the recovery of an IDR-protected computer, you need a copy of the DR file for that computer. If IDR software is installed on the server and client and the server is configured to collect disaster recovery information, NetBackup creates a DR file and stores a copy on the client and the master server after every:

- Full backup
- Incremental (differential or cumulative) backup
- User backup
- User archive

NetBackup stores the DR file for each client in the *`install_path`*`\NetBackup\Idr\data` directory on the client. The DR files generated after a backup are named in the format *`netbackup_client_name`*`.dr`. For example, if the client name is bison, the DR file is `bison.dr`.

Note IDR requires that the DR file name match the computer name of the client. That is, if the computer name is recognized by the network as bison, then the DR file must be named `bison.dr`. If the NetBackup client name is different for some reason, you must manually rename a DR file created after each backup to *`computer_name`*`.dr` before you can use it in a recovery.

On the NetBackup master server, the DR files for all clients are stored in the NetBackup catalog on the server.

Configuring NetBackup Policies for IDR

Set up the policy configuration on the NetBackup master server as follows:

- Ensure that each protected client is in an MS-Windows-NT type policy.
- Select the **Collect disaster recovery information** policy attribute for at least one of the MS-Windows-NT policies that are backing up protected clients.
  - The NetBackup master server that collects disaster recovery information must be licensed for IDR; otherwise, you cannot select the **Collect disaster recovery information** attribute.
  - Ensure that all the clients in this policy have IDR installed. If a client in a policy that is collecting disaster recovery information does not have IDR installed, backups performed for that client by this policy will never end with a status of 0. A successful backup in this instance shows a status of 1 (partially successful). This is a result of NetBackup not finding a DR file to store in its catalog after each backup.
  - NetBackup 6.0 will collect the DR information from clients that have versions of NetBackup earlier than 6.0. However, you must use the IDR software revision on the client to prepare the bootable media for that client (for example, if the client software is NetBackup 5.1, you must use that version of IDR to prepare the IDR media).
  - Ensure that the client names used in the NetBackup policy configuration match the client's computer name. If these names do not match, you must manually rename the DR file that is created after each backup to *`computer_name`*`.dr` before you can use it in a recovery.

Backing Up the System to be Protected

Before you prepare the IDR media, which includes the DR file used in recovery, you must perform at least one full backup of the system to be protected. The NetBackup master server that performs the backup must be configured to collect disaster recovery information. The backup information collected is used when creating the DR file.

You can prepare IDR bootable media if differential or incremental backups have occurred since the full backup.

Ensure that all local drives are backed up, and, for Windows 2000, ensure that System State is backed up.

Ensure that any utility partitions are backed up. Utility partitions are small partitions created on the hard drive, usually by the computer vendor, that may contain system configuration and diagnostic utilities.

Creating IDR Media

The IDR Preparation Wizard guides you in creating the IDR media used in recovery. A set of IDR media includes the following:

- Bootable media used to boot the computer and install and configure the operating system.
- System specific drivers and the Disaster Recovery Wizard.
- The disaster recovery (DR) file.
- For Windows XP and Windows Server 2003 systems, Windows Automated System Recovery files.

To create IDR media, you must have:

- At least one full backup of the system to be protected.
- The Windows installation CD for the version and language installed on the protected system.
- The license key for your Windows 2000, Windows XP, or Windows Server 2003 operating system.
- Administrative privileges for the protected system.
- A device capable of creating bootable media:
  - CD-R drive (CD Recordable CD-ROM)
  - CD-RW drive (CD Rewritable CD-ROM)

- Diskette drive (IDR does not support bootable diskette media for Windows XP or Windows Server 2003)

More information about media is provided later in this chapter.

You must prepare the media before a disaster. For CD-R or CD-RW, you should also try booting from the media before a disaster occurs to ensure that your hardware can boot from it. (See "Step 1: Boot Your Computer" on page 298.)

Choosing the Bootable Media

For Windows NT and Windows 2000, the IDR Preparation Wizard can create both bootable diskettes and bootable CD-Recordable (CR-R) or CD-Rewritable (CR-RW) media.

Note IDR does not support bootable diskette media for Windows XP or Windows Server 2003.

When choosing between diskettes and CD-ROM media, consider the following:

- Diskettes work on most systems but require more time for preparation and recovery than CDs.
- Diskettes require the Windows installation CD during recovery.
- Diskettes will hold SCSI driver information for only one computer (because of space limitations). If you want to use one set of diskettes to protect more than one computer, you must choose one computer that represents all the other computers and create bootable media for it. If you have computers with different SCSI drivers, you must create a set of diskettes for each computer with a different driver.
- CDs require less time for preparation and recovery than diskettes.
- CD media has enough space to store SCSI driver information for multiple systems, so you can use a single CD for multiple systems during disaster recovery.
- CD media requires that the computer being protected has BIOS that supports booting from a CD.
- CD media requires CD writing hardware. The computer to be protected does not have to have a CD writer; the IDR Preparation Wizard creates a bootable image that you can write to a CD on any computer that has a CD writer.
- For CD media, third party CD writing software is required if the computer being protected does not have a CD writer or if the IDR Preparation Wizard cannot detect the CD writer attached to the system being protected. The CD hardware and software must be able to write ISO 9660 CD images.

- With both diskettes and CDs, you must prepare separate media for each operating system level and language being protected.

Creating Bootable Diskettes

The IDR Preparation Wizard guides you through creating a full set of diskette media for booting a computer during recovery and running the Disaster Recovery Wizard. A full set of IDR diskette media includes the following:

- Windows Setup diskettes created by a utility that is on the Windows installation CD. IDR modifies these setup diskettes for use specifically with NetBackup for Windows.
- Intelligent Disaster Recovery diskettes that contain the computer specific information that is necessary to perform disaster recovery, including the DR file. (Alternatively, you can store the DR file on a diskette other than one of the IDR diskettes.)

If you select diskettes for the bootable media, you need five (for Windows NT) or six (for Windows 2000) blank, formatted 1.44 MB diskettes for each set of disaster recovery diskettes.

Note Windows XP and Windows Server 2003 do not support bootable diskettes.

Note The Windows installation CD is required both to prepare disaster recovery diskettes and for disaster recovery using those diskettes. You also need the Windows 2000 license key, either during bootable diskette preparation or during recovery.

▼ To create bootable diskettes

1. Format the diskettes that you are going to use.

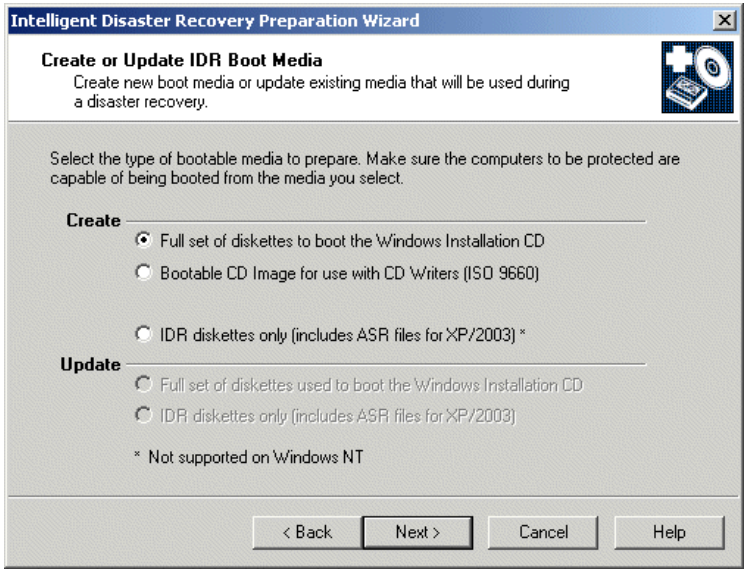
   Windows NT requires five diskettes and Windows 2000 requires six. Windows XP and Windows Server 2003 do not support bootable diskettes.

2. On the computer where you are going to prepare the diskettes, select **Start** > **Programs** > **VERITAS NetBackup** > **Intelligent Disaster Recovery PrepWizard**.

   The Welcome screen for the IDR Preparation Wizard appears.

3. Click **Next** to continue.

The Create or Update IDR Boot Media screen appears.



4. Select **Create - Full Set of Diskettes to boot the Windows Installation CD** and click **Next**.

   The Starting Bootable Diskettes Creation screen appears.

5. Follow the prompts until the IDR Preparation Wizard is completed.

   Windows 2000: If the **Let IDR Automatically Partition the Boot and System Drive** option is selected when recovery media is prepared, you must create a complete set of recovery diskettes for each Windows 2000 computer to be protected. However, if you do *not* select the **Let IDR Automatically Partition the Boot and System Drive** option, you can use the same diskettes 2 through 5 for all IDR-protected Windows 2000 computers — but you must reinstall any utility partitions by using the OEM-supplied installation media before recovery and then during recovery you must select the option to partition and format the drives manually. For details, see "Modifying Diskette Sets for Use with Multiple Windows 2000 Computers" on page 291.

Modifying Diskette Sets for Use with Multiple Windows 2000 Computers

If **Let IDR Automatically Partition the Boot and System Drive** option is *not* selected, you can use use the same diskettes 2 through 5 for all of the Windows 2000 computers that you want to protect. However, you have to create a different diskette 1 for each computer protected with IDR.

Diskette 1 contains a file named `winnt.sif`, which is the script used to automate the installation of Windows 2000 for disaster recovery when using the IDR option. This scripted installation of Windows 2000 requires that the name of the computer being recovered be listed in the `winnt.sif` file.

Therefore, for each Windows 2000 computer that will share diskettes 2 through 5, make a copy of diskette 1 (and its files). For each copy of diskette 1, edit the `winnt.sif` file and change the computer name to that of the machine to be protected. If the computer name is not modified, duplicate computer names on the network may occur and may prevent the recovered system from participating on the network.

Creating a Bootable CD Image

The IDR Preparation Wizard guides you through creating a bootable CD image. You then can write that image to a CD using the IDR Preparation Wizard or other writing software. If the system on which you are running the IDR Preparation Wizard does not have a CD-R or CD-RW drive, you can write the image onto a CD on a different machine using third-party CD writing software.

The CD image contains all the necessary IDR files unless you choose to store the Windows Server 2003 Automated System Recovery files on a diskette. If stored on the CD, the ASR files will always be read from the CD even if a more recent version is on an IDR diskette. For example, if you create IDR diskettes after you create the bootable CD, the ASR files will be read from the CD during recovery even though more recent versions may be on the IDR diskettes.

The Windows installation CD is required only during media preparation.

The license key for your Windows 2000, Windows XP, or Windows Server 2003 operating system is required. If you do not enter the license key while creating the bootable CD, you must enter it during recovery.

Note On Windows NT 4.0 systems, the IDR software cannot write to a CD; therefore, you must use other CD writing software to create the CD.

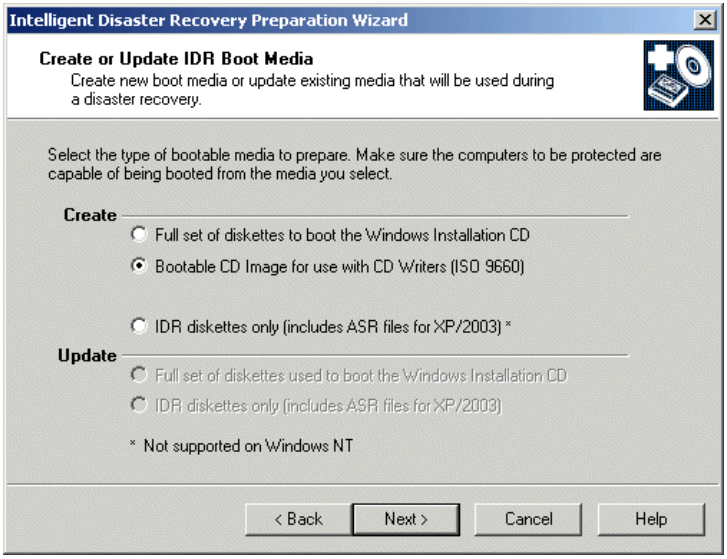
▼ To create a bootable CD image

1. On the computer where you are going to prepare the bootable CD image, select **Start** > **Programs** > **VERITAS NetBackup** > **Intelligent Disaster Recovery PrepWizard**.

   The Welcome screen for the IDR Preparation Wizard appears.

2. Click **Next** to continue.

The Create or Update IDR Boot Media screen appears.



3. Select **Create - Bootable CD Image for Use with CD Writers (ISO 9660)** and click **Next**.

   The Starting CD Image Creation screen appears.

4. Follow the prompts until the IDR Preparation Wizard is completed.

   Windows 2000: If you do *not* select **Let IDR Automatically Partition the Boot and System Drive**, before recovery you must reinstall any utility partitions by using the OEM-supplied installation media and then during recovery you must select the option to partition and format the drives manually. For details, see "Modifying Diskette Sets for Use with Multiple Windows 2000 Computers" on page 291.

Caution Test your bootable CD to ensure that your system can boot from it. (See "Step 1: Boot Your Computer" on page 298.)

Creating IDR Diskettes

Two formatted, 1.44 MB floppy diskettes are required to create IDR diskettes.

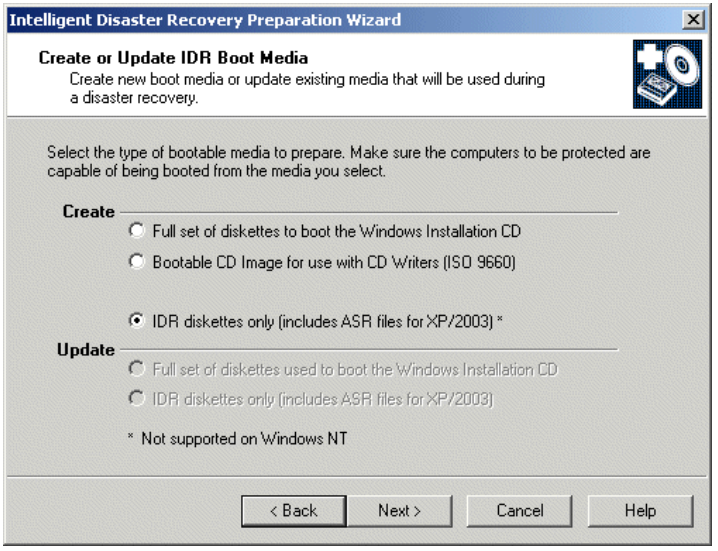
▼ To create IDR diskettes

1. On the computer where you are going to prepare the IDR diskettes, select **Start** > **Programs** > **VERITAS NetBackup** > **Intelligent Disaster Recovery PrepWizard**.

   The Welcome screen for the IDR preparation wizard appears.

2. Click **Next** to continue.

   The Create or Update IDR Boot Media screen appears.



3. Select **Create - IDR Diskettes Only (Includes ASR Files for XP/2003)** and click **Next**.

   The Creating the IDR Diskettes screen appears.

4. Follow the prompts until the IDR Preparation Wizard is completed.

Updating IDR Media

You should update your IDR media if your hardware configuration changes, if SCSI drivers were updated, or if other system drivers were updated.

Also, VERITAS recommends that you update the IDR diskettes periodically so they contain the latest DR files.

Updating a Bootable CD

You cannot update a bootable CD, you must create a new bootable CD image and then burn a new CD. If you install new hardware or change components on a protected system (such as a new SCSI card that is not supported by the Windows installation CD), create a new bootable CD as explained in "Creating a Bootable CD Image" on page 292.

Updating Bootable Diskettes

You can update the bootable diskette set by using the IDR Preparation Wizard. Use this option if you changed hardware, updated SCSI drivers, or updated other system drivers, and you already have a full set of bootable diskettes that you want to update.

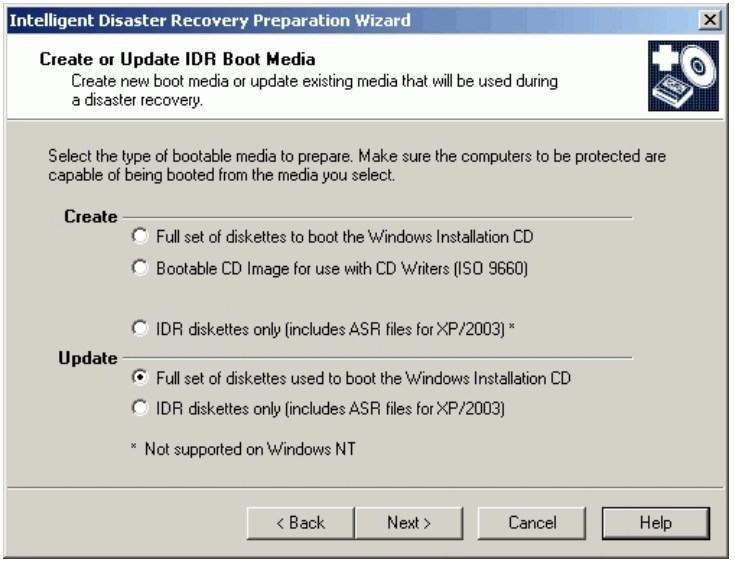
▼ To update IDR bootable diskettes

1. On the computer where you are going to prepare the IDR diskettes, select **Start** > **Programs** > **VERITAS NetBackup** > **Intelligent Disaster Recovery PrepWizard**.

   The Welcome screen for the IDR preparation wizard appears.

2. Click **Next** to continue.

   The Create or Update IDR Boot Media screen appears.



3. Select **Update - Full Set of Diskettes Used to Boot the Windows Installation CD** and click **Next**.

4. Follow the prompts until the IDR Preparation Wizard is completed.

Updating IDR Diskettes Only

You can update the IDR diskettes with the latest DR file (and ASR files for Windows XP and Windows Server 2003 systems) by using the IDR Preparation Wizard.

Alternatively, to update the DR file only, you can run the `drfile.exe` file from a command prompt, which creates a new DR file, and then copy the DR file to the diskette. (See "Using drfile.exe to Create or Update a DR File" on page 297.)

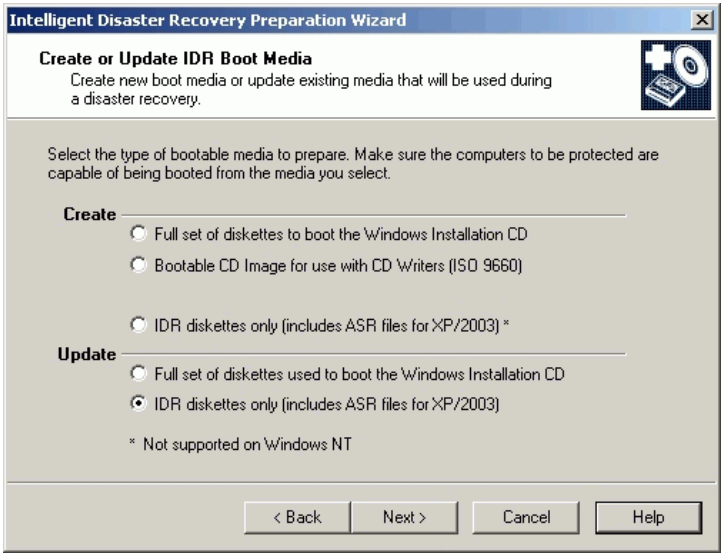
▼ To update IDR diskettes using IDR Preparation Wizard

1. On the computer where you are going to prepare the IDR diskettes, select **Start** > **Programs** > **VERITAS NetBackup** > **Intelligent Disaster Recovery PrepWizard**.

   The Welcome screen for the IDR Preparation Wizard appears.

2. Click **Next** to continue.

   The Create or Update IDR Boot Media screen appears.



3. Select **IDR Diskettes Only (Includes ASR Files for XP/2003)** and click **Next**.

4. Follow the prompts until the IDR Preparation Wizard is completed.

Using drfile.exe to Create or Update a DR File

If IDR diskettes have already been created, you can update the DR file only by running the `drfile.exe` program on the client and then copying the DR file to the diskette that contains the DR file. The name of the DR file should always match the computer name of the client (which is the name required by IDR), even if this name happens to be different than the one used in the NetBackup policy configuration.

1. Go to the *`install_path`*`\NetBackup\bin` folder and double-click `drfile.exe` (*`install_path`* is `C:\Program Files\VERITAS` by default). This creates (or updates) the DR file that is located in the *`install_path`*`\NetBackup\Idr\Data` directory on your computer.

   The DR file name is of the form *`computer_name`*`.dr`, as in `bison.dr`. The name of the DR file will match the computer name of the client, which is the name required by IDR, even if the name is different from the one used in the NetBackup policy configuration.

2. Insert the diskette that contains the DR file into your drive and copy the DR file to it.

   The diskette can be one of the IDR diskettes or a separate diskette. If using a separate diskette, insert the other diskette when prompted for the DR file during disaster recovery.

Recovering Your Computer

Restoring the computer to its pre-disaster status with IDR includes the following steps:

- Step 1: Boot Your Computer. Use the previously prepared IDR bootable media to boot the computer being recovered.
- Step 2: Windows Setup in IDR Recovery. Use the Windows Setup program to partition and format the system drive on the computer being recovered. The IDR bootstrap process loads and runs the Windows Setup program from the Windows installation CD.
- Step 3: Disaster Recovery Wizard. Use the NetBackup IDR Disaster Recovery wizard to restore your system to its pre-disaster state and restore your data files.

Automating the recovery with the Disaster Recovery wizard requires the following:

- A NetBackup server that can restore the latest backups to the computer being recovered.
- The latest DR file for the machine being recovered.

  If you have not updated the DR file since the last backup, it may contain out-of-date hard disk partition, network-interface-card driver, or backup set information.

- Bootable IDR CD media or the original Windows installation CD.
- The license key for your Windows operating system (if you did not enter the license key during preparation of the IDR bootable media).
- For Windows XP and Windows Server 2003 systems, the ASR files for the machine being recovered.
- If your network adapter requires special driver software, you need the installation media provided by the CD manufacturer. Special drivers are ones that are not on the operating system installation media, such as a driver for a network interface card (NIC) supplied by the manufacturer.

Note For Windows 2000 systems, if **Let IDR Automatically Partition the Boot and System Drives** was *not* selected during IDR preparation, before beginning the recovery process you must reinstall any utility partitions by using the OEM-supplied installation media. Then, during recovery, you must select the option to partition and format the drives manually.

Step 1: Boot Your Computer

You can recover a Windows system by using the bootable diskettes or CD created during disaster preparation. The computer being recovered must have a device capable of booting from the bootable media.

Caution Disconnect any storage area network or cluster systems that are attached to the computer being recovered; if you do not, the hard drives on those computers may also be repartitioned and reformatted.

▼ To boot a computer using a bootable diskette

1. Insert the bootable diskette.
2. Start the computer.
3. Follow the boot process instructions on screen and continue with "Step 2: Windows Setup in IDR Recovery" on page 299.

▼ **To boot from a bootable CD**

1. Insert the bootable CD.
2. Start the computer and perform the tasks necessary to boot from the CD. For example, depending on the BIOS in the computer, you may have to press a function key to boot from the CD drive.

   The NetBackup Intelligent Disaster Recovery Bootstrap screen appears.
3. Do one of the following:
   - If you are testing the CD to determine if it can boot the computer, press Esc to exit and then remove the CD from the drive.
   - If you are performing disaster recovery, press Enter to continue with the boot process.
4. Depending on the system, do one of the following:
   - For Windows NT and Windows 2000, go to "Step 2: Windows Setup in IDR Recovery" on page 299.
   - For Windows XP and Windows Server 2003, press F2 to load the ASR files when prompted by the boot process. If you have an ASR diskette, place it in the floppy disk drive so the ASR files can be loaded.
5. Continue by going to "Step 2: Windows Setup in IDR Recovery" on page 299.

Step 2: Windows Setup in IDR Recovery

During the recovery process, the DR boot process uses the Windows Setup program to partition and format the system drive on the computer being recovered. If you booted from the IDR bootable CD, Windows Setup is started from that CD; if you booted from diskette, you will be prompted to insert the Windows installation CD so the Windows Setup can be started.

▼ **To use Windows setup in IDR recovery**

1. Follow the instructions on screen to continue the boot process.

   If you booted from diskette, you will be prompted to insert the Windows installation CD.

   At this point of the recovery, the Windows Setup program is loaded and performs the tasks necessary to partition and format drives and install a limited version of the operating system.

2. During Windows Setup, you may have to make choices about the following:
   - For Windows NT, **Express Setup** or **Custom Setup**. Usually, **Express Setup** is the best choice. Use **Custom Setup** if SCSI drivers are not present on the boot media or if you have RAID hardware that needs to be reconfigured.
   - For Windows NT, FAT or NTFS file system. If a new hard drive is detected on your system, you will be asked which file system format to use. Select FAT format for the C drive. IDR cannot repartition to the old layout if you build the partition as NTFS.
3. When prompted to reboot, ensure that no diskettes or CDs are in the drives and press **Enter** to reboot the system.

   After the reboot, the Disaster Recovery Wizard starts automatically.
4. Go to "Step 3: Disaster Recovery Wizard" on page 300.

Step 3: Disaster Recovery Wizard

After Windows Setup finishes its tasks, the Disaster Recovery Wizard is started as part of the recovery process. Follow the instructions to recover the computer; although these instructions do not provide a step-by-step procedure because different conditions affect the process, the process will be similar to the following.

▼ To use the Disaster Recovery Wizard

1. If you have a DR file, when prompted select the DR file for the computer you are recovering and click **Next.**

   The name of a DR file matches the computer for which it was created. For example, if the computer is named carrot look for a file named `carrot.dr`.

Note If you do not have a DR file, click **Next** to proceed. A message stating that the recovery file was not selected appears. Click **Yes** to continue in manual mode.

2. One or more screens about hard disk layout may appear:
   - You may be prompted about replacing the current hard drive partition with the partition information contained in the DR file or to keep the current hard drive partitions.

- You may to prompted to run the Windows Disk Administrator (or Disk Manager) program, which allows you to make additional changes to your partition information. To make partition changes, click **Run Disk Administrator** (or **Run Disk Manager)**. (See "Notes on Altering Hard Drive Partition Sizes" on page 304.) Otherwise, click **Next** to continue the recovery process.

  For more information about Disk Administrator and fault tolerant configurations, see the operating system documentation.

3. For Windows 2000, a Completed IDR Phase 1 dialog appears. Do one of the following:

   - If your network adapter requires special driver software, click **Pre-install Custom Network Driver** and then follow the prompts to find and install the appropriate driver software. Special drivers are ones that are not on the operating system installation media, such as a driver for a network interface card (NIC) supplied by the NIC manufacturer.
   - To continue, click **Next** and go to step 5 to continue the recovery.

4. For Windows NT only, you will be asked to select either **Automatic Restore** or **Manual Restore** for network installation. Do one of the following:

   - If your network adapters use the drivers and software included with the operating system, select **Automatic Restore**, click **Finish** to complete the network installation, and then go to step 5 to continue the recovery.
   - If your network adapters require special drivers and software, select **Manual Restore**, select **Wired to the Network**, click **Next**, and proceed to step a.

   a. To select your network adapter, do one of the following:

      - If your network adapter requires a manufacturer supplied setup diskette, click **Select from list**, then click **Have Disk**.
      - If your network adapter does not require a manufacturer supplied setup diskette, either click **Select from list** or **Start search**.

      A list of network adapters appears.

      Note If your network adapter is not listed on the screen that appears, click **Select from list**, then click **Have Disk add an adapter to the Network Adapter List**. For automatic network installation to succeed, the Windows NT setup program must be able to recognize the network interface card being used.

   b. The next screen lists the default network protocols. Select the networking protocols used on your network and click **Next**.

c. Windows NT is ready to install the networking components. Insert your Windows NT installation CD or the IDR bootable CD into the CD-ROM drive and click **Next** to continue. (If you created a bootable CD, it may include the appropriate network drivers if they were found during the IDR preparation process.)

Note If additional screens about setting up your network interface card appear, respond as appropriate.

d. If TCP/IP is selected as the network protocol, you are prompted to use DHCP. If you do not want to use DHCP, enter a TCP/IP number.

The Windows NT Networking Installation dialog appears.

e. Click **Next** to start the network and complete the installation of the networking components.

f. Enter the name of the workgroup or domain for your computer and click **Next**.

Note VERITAS recommends that you enter the name of a temporary workgroup rather than the name of a domain. When the recovery is complete, the system will be restored to its original workgroup or domain.

g. Click **Finish** to complete the network installation and continue with recovery.

5. Select either **Automatic** or **Manual**:

- If you selected **Automatic**, click **Next** and proceed to step 6.
- If you select **Manual**, click **Next** and proceed to step 8.

6. When recovering the registry, normally the restore process merges hardware information from the current *live* version of the registry into the *saved* version of the registry. (The saved version is the registry version that was backed up.) This ensures that the machine will reboot after the restore if the hardware changed.

If the hardware changed, select the server from which you want to restore files, then click **Start Restore** to submit the restore request to the selected server. By clicking **Start Restore**, the files will be restored and the hardware information from the current *live* version of the registry will be merged with the *saved* version of the registry. Go to step 7.

If the hardware on the machine that is being recovered has not changed, the live version and the saved version of the registry do not need to be merged because the hardware registry settings will be identical to what they were in the saved version of the registry. If you do not want to merge the registries, continue with step a:

a. Start a command window by pressing F1.

b. Navigate to the following directory (the default location; %SYSTEMROOT% is usually C:\Windows) :

```
%SYSTEMROOT%\System32\VERITAS\NetBackup\Bin
```

c. Type the following command, then press **Enter**.

```
W2KOption -restore -display -same_hardware 1
```

The following output appears:

```
NetBackup Restore Options
-----------------------------------------
            SYSVOL Restore: Primary
         Hard Link Restore: Perform secondary restore
     Same Hardware Restore: Assume different hardware

NetBackup Restore Options
-----------------------------------------
            SYSVOL Restore: Primary
         Hard Link Restore: Perform secondary restore
     Same Hardware Restore: Assume same hardware
```

d. Make sure that **Assume Same Hardware** is displayed in the `Same Hardware Restore` field, then continue with the restore process.

7. After the restore is complete, click **Next**. Go to step 10.

8. Select **Start NetBackup Interface** to start the NetBackup Backup, Archive, and Restore interface.

Using this interface, you can make changes to the NetBackup configuration and you also have more control over the restore. (See the *NetBackup Backup, Archive, and Restore Getting Started Guide* for more information on using the interface.)

When the restore is complete, close the Backup, Archive, and Restore interface and any other open NetBackup windows.

9. The **Next** button will be available when the restore is complete. Click **Next**.

10. Remove any diskettes from drive A and click **Finish** to reboot the computer.

Notes on Altering Hard Drive Partition Sizes

Note This section applies only to Windows NT and Windows NT 4.0. Reformatting and repartitioning is not supported on Windows 2000, Windows XP, or Windows Server 2003.

IDR defaults to restoring hard drive partitions to the same sizes they were before recovery. If the computer being recovered has a larger hard drive than before the recovery (for example, a larger hard drive was installed or the DR file is from a computer with a smaller hard drive), there will be unused and unallocated hard drive space. If so, you can run the Windows NT Disk Administrator program (during the IDR recovery process from within the Recovery Wizard) to alter the partition sizes to match the larger hard drive size. For information about fault tolerant configurations, please refer to the Windows NT Server 4.0 Resource Kit.

Notes on Recovering Specific Platforms

Recovering the Dell PowerEdge 6100/200 with RAID

Note Although this section discusses restoring a Dell system, the steps outlined can be used with any system that requires the use of third party drivers.

Recovering a Dell PowerEdge 6100/200 with RAID configuration is different than recovering a regular system with one hard drive.

In order to load Windows on this type of machine, you must load the PowerRaid II driver manually, which is not bundled with the Windows operating system.

After loading the PowerRaid II driver, you must load the Adaptec controller driver manually. Failure to follow these steps results in Windows not recognizing any hard drive partitions on the system.

▼ **Use the following steps with your IDR recovery diskette set**

1. When the Windows blue Setup screen appears after booting with the IDR boot diskette, press and hold down the **F6** key.

   Windows prompts for IDR diskette 2.

2. Insert IDR diskette 2 and press and hold the F6 key again.

   After loading additional drivers, a Setup screen appears that allows you to specify additional devices.

3. Release the F6 key and press the **S** key.

4. Follow the on-screen instructions to load the PowerEdge RAID II controller software.

5. After loading the PowerEdge RAID software, press **S** again to specify loading another device.

6. Follow the on-screen instructions to load the Adaptec controller software next.

7. After loading both pieces of third party software, press Enter and proceed as normal to recover your system.

Recovering IBM Computers

If you are using an IBM computer and the drive containing the system's configuration information fails, you must reconfigure the system using the IBM Reference Diskette before performing recovery.

Recovering Compaq Computers

If you are using a Compaq computer and the drive that contains the System Configuration Partition fails, Intelligent Disaster Recovery will recreate the partition on the new hard disk; however, you must use the Compaq SmartStart utilities to update the system partition.

IDR Frequently Asked Questions

Can I restore boot managers such as System Commander or OS/2 Boot Manager with Intelligent Disaster Recovery for Windows?

No, because boot managers usually are installed at a very low level that NetBackup cannot protect.

For example, the OS/2 boot manager resides in its own hard drive partition that NetBackup cannot access. In fact, because of the many different boot managers on the market, an Intelligent Disaster Recovery restore may render your system unbootable, even though your operating system has been restored. In this case, re-installing the boot manager should fix the problem.

I ran a full backup of my system but when I run the IDR Preparation Wizard again, I do not see a disaster recovery file. What happened?

For some reason, the DR file was not generated automatically. Generate it manually as explained in "Using drfile.exe to Create or Update a DR File" on page 297.

Why does the recovery wizard warn me that one or more of my hard drives are smaller than the originals?

If this is not actually the case, the reason may be because the minimal version of Windows that runs the recovery wizard has detected the hard drives in a different order than they were configured originally.

Be sure that your hard drive and controller configuration matches the original configuration before a disaster occurs.

If the original configuration does not match, you may be able to control the hard drive numbering. The following chart lists the normal order that Windows uses to assign disk drive numbers. Keep in mind that this chart can change if third party drivers are used.

Windows Hard Drive Numbering Scheme

Primary IDE	Master Server Media Server
Secondary IDE	Master Server Media Server
SCSI Adapter 0 (In order of the lowest I/O port address)	SCSI ID 0 SCSI ID 1 ... SCSI ID 7 (or 15 is wide SCSI)
SCSI Adapter 1	SCSI ID 0 SCSI ID 1 ... SCSI ID 7 (or 15 is Wide SCSI)
SCSI Adapter *n*	SCSI ID 0 SCSI ID 1 ... SCSI ID 7 (or 15 is Wide SCSI)

Other types of mass storage controllers are usually seen as SCSI controllers by Windows.

Note On Windows NT only: If you cannot get the IDR Recovery Wizard to properly detect the hard drive order, you can still set up hard drive partitions manually by using the Windows NT Disk Administrator option within the Disaster Recovery Wizard. Then, you can continue with automated restore of your backup media.

If you have drives greater than eight GBs and the recovery wizard reports them as being only eight GBs, you must create bootable diskettes with the option **Use SCSI drivers currently installed on this system**.

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