VERITAS™

VERITAS NetBackup™ 6.0

System Administrator’s Guide, Volume II

for Windows

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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 Windows and applies to all supported platforms and operating systems. See the *NetBackup Release Notes* for a list of the hardware and operating system levels that NetBackup supports.

To determine the version of installed software, check the `install_path\NetBackup\Version.txt` file. Where *install_path* is the directory where NetBackup is installed (`C:\Program Files\VERITAS` by default).

This guide is intended for system administrators and assumes that the reader has a good working knowledge of the Windows operating system on the platform where the product is used. In this guide, a system administrator is defined as a person with system administrator privileges and responsibilities. A client user is defined as anyone that uses the client interfaces to back up, archive, or restore files.

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.

Please include the following information with your comment:

- The title and product version of the manual on which you are commenting
- The topic (if relevant) on which you are commenting
- Your comment
- Your name

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.

Note In order for the NetBackup-Java Administration Console to function, the user must have permission to log in to the system remotely.

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 service which, in turn, validates your identity with the operating system.

  For more information on authentication or the authentication service (`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 service 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 service (`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 and "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

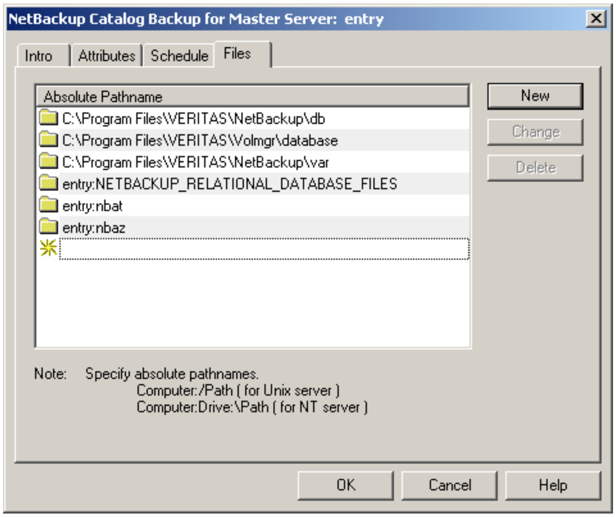
In NetBackup environments which use the online, hot catalog backup method, no additional configuration is needed in order to include the VxSS Authorization and Authentication databases in the catalog backup.

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



C:\Program Files\VERITAS\NetBackup\db
C:\Program Files\VERITAS\Volmgr\database
C:\Program Files\VERITAS\NetBackup\var
entry:NETBACKUP_RELATIONAL_DATABASE_FILES
entry:nbat
entry:nbaz

Note: Specify absolute pathnames.
Computer:/Path (for Unix server)
Computer:Drive:\Path (for NT server)

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

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). (To install these on a Windows system, a custom installation is required.)

   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 *`Install_path`*`\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 *`Install_path`*`\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.

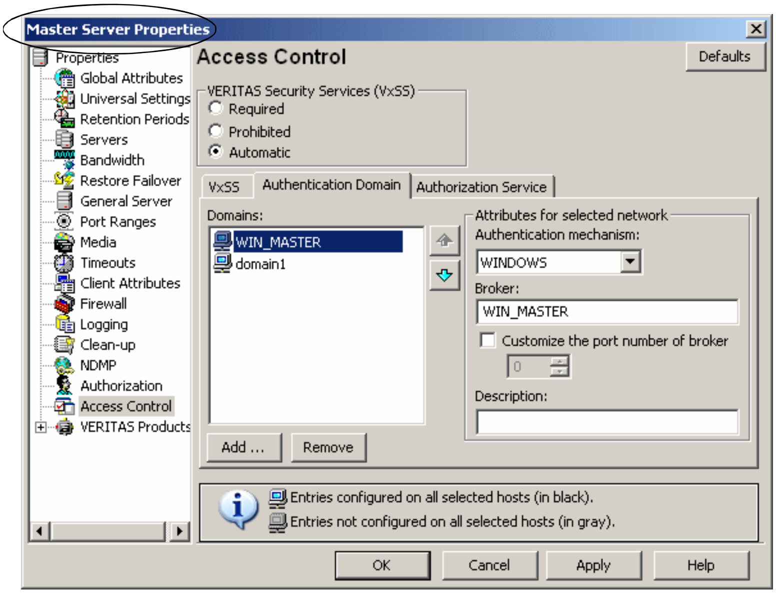
```
bpnbaz -AllowAuthorization win_master
Operation completed successfully.
```

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.



Master Server Properties

Access Control

VERITAS Security Services (VxSS)

○ Required
○ Prohibited
● Automatic

VxSS | Authentication Domain | Authorization Service

Domains:

- WIN_MASTER
- domain1

Attributes for selected network

Authentication mechanism: WINDOWS

Broker: WIN_MASTER

□ Customize the port number of broker

0

Description:

Entries configured on all selected hosts (in black).

Entries not configured on all selected hosts (in gray).

- 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 *`Install_path`*`\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 *Install_path*\NetBackup\bin\admincmd

   On the master server, run:

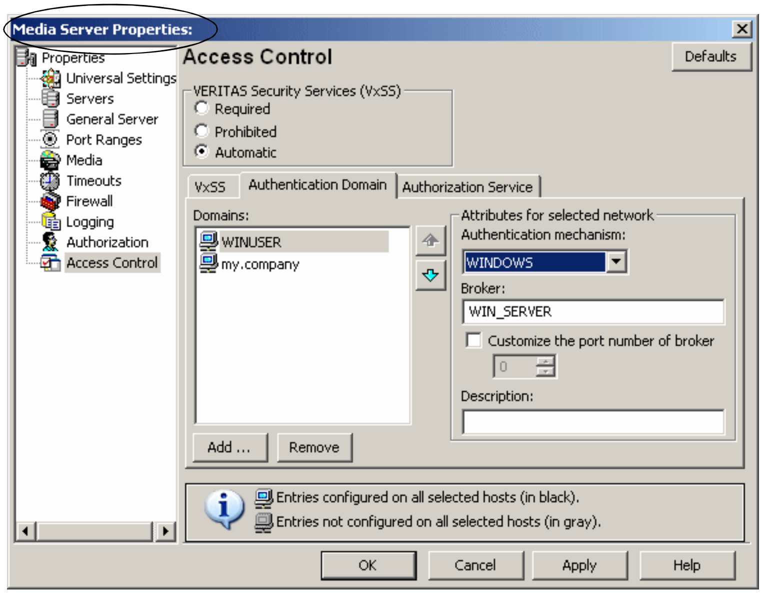
   ```
   bpnbaz -AllowAuthorization win_media
   Operation completed successfully.
   ```

   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:



Access Control

VERITAS Security Services (VxSS)

○ Required

○ Prohibited

● Automatic

Domains:

WINUSER

my.company

Attributes for selected network

Authentication mechanism: WINDOWS

Broker: WIN_SERVER

□ Customize the port number of broker: 0

Description:

Entries configured on all selected hosts (in black).

Entries not configured on all selected hosts (in gray).

- 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.
   ```

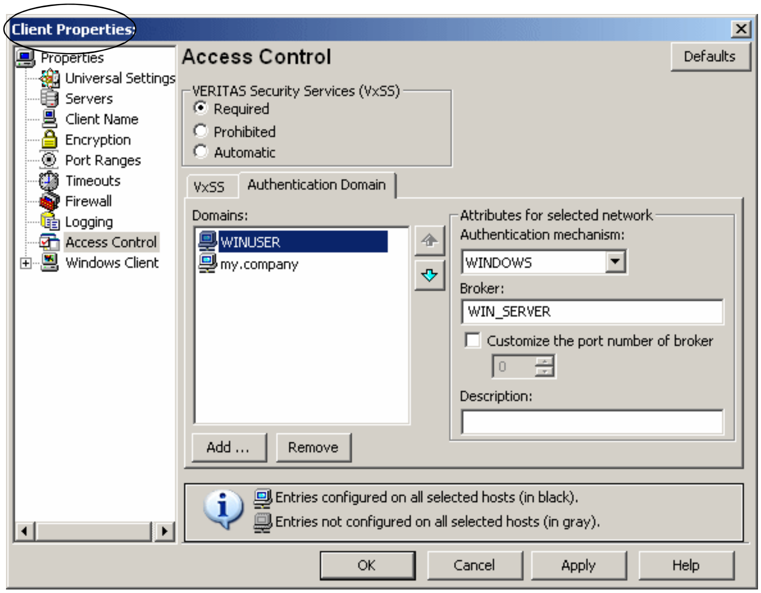
5. To create a credential for the client, run the following command on the client *(win_client)*:

   ```
   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:



Access Control

VERITAS Security Services (VxSS)
● Required
○ Prohibited
○ Automatic

Domains:
WINUSER
my.company

Attributes for selected network
Authentication mechanism: WINDOWS
Broker: WIN_SERVER
☐ Customize the port number of broker
0
Description:

Entries configured on all selected hosts (in black).
Entries not configured on all selected hosts (in gray).

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 administrator on the system where you plan to install the VxSS Root Broker software.
- 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, reboot the system and 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 `Install_path\VERITAS\NetBackup\bin\`

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

   After shutting down NetBackup services, check that the VxSS services have been started. If needed, start Authentication (`vxatd`) first, then Authorization (`vrtsaz`). Use the Services utility that Windows provides, since these services do not appear in the NetBackup Activity Monitor. Depending on how you are configured, At and At may already be active.

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

Note The steps below require a password that should not be a user or administrator 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.

After installing the Authentication Server software, reboot the system.

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 `*Install_path*\NetBackup\bin\admincmd`

Before running `bpnbaz` commands, check that both the Authentication service (`vxatd`) and the Authorization service (`vxazd`) are running. If necessary, start the At service first, then the Az service. Use the Window Services since these do not appear in the NetBackup Activity Monitor.

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 services 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**.

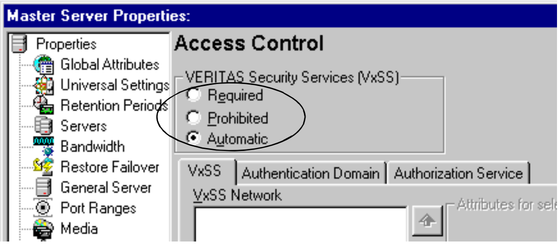
Master Server and Media Server Host Properties

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.



Master Server Properties:

Access Control

VERITAS Security Services (VxSS)

○ Required
○ Prohibited
● Automatic

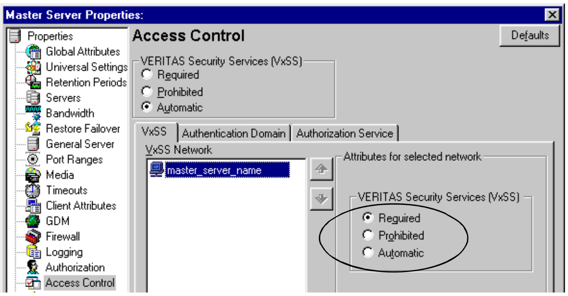
Note VERITAS recommends setting the master server VxSS property to **Automatic** until the clients are configured for Access Control. Then, if desired, change the VxSS on the master server to **Required**.

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.



Master Server Properties:

Access Control

VERITAS Security Services (VxSS)
○ Required
○ Prohibited
● Automatic

VxSS Network: master_server_name

Attributes for selected network

VERITAS Security Services (VxSS)
● Required
○ Prohibited
○ Automatic

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.

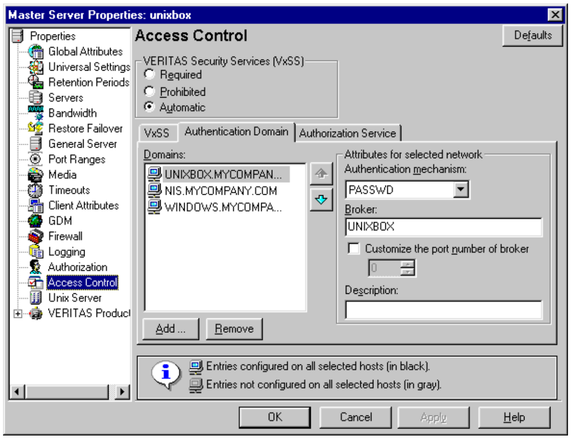
Add the domain you wish users to authenticate against. Be sure to select the proper authentication mechanism.

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.


Master Server Properties: unixbox

Access Control

VERITAS Security Services (VxSS)
○ Required
○ Prohibited
● Automatic

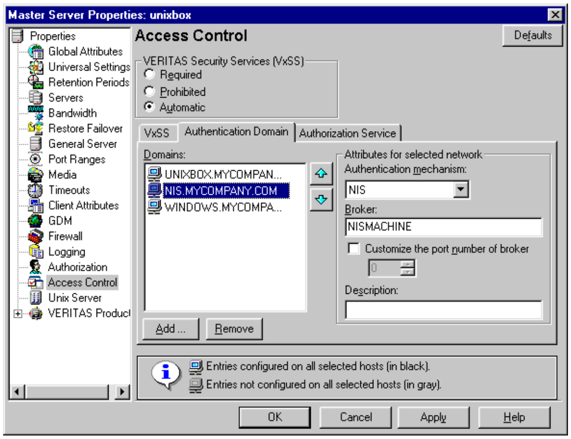
Domains:
UNIXBOX.MYCOMPAN...
NIS.MYCOMPANY.COM
WINDOWS.MYCOMPA...

Attributes for selected network
Authentication mechanism: PASSWD
Broker: UNIXBOX
□ Customize the port number of broker
0
Description:

Entries configured on all selected hosts (in black).
Entries not configured on all selected hosts (in gray).

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

Notice that the authentication mechanism for this domain is NIS.


Master Server Properties: unixbox

Access Control

VERITAS Security Services (VxSS)
○ Required
○ Prohibited
● Automatic

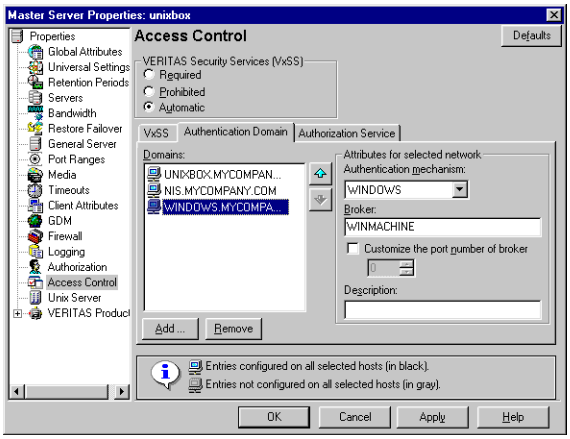
Domains:
UNIXBOX.MYCOMPAN...
NIS.MYCOMPANY.COM
WINDOWS.MYCOMPA...

Attributes for selected network
Authentication mechanism: NIS
Broker: NISMACHINE
□ Customize the port number of broker
0
Description:

Entries configured on all selected hosts (in black).
Entries not configured on all selected hosts (in gray).

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

Notice that the authentication mechanism for this domain is WINDOWS.


Master Server Properties: unixbox

Access Control

VERITAS Security Services (VxSS)
○ Required
○ Prohibited
● Automatic

Domains:
UNIXBOX.MYCOMPAN...
NIS.MYCOMPANY.COM
WINDOWS.MYCOMPA...

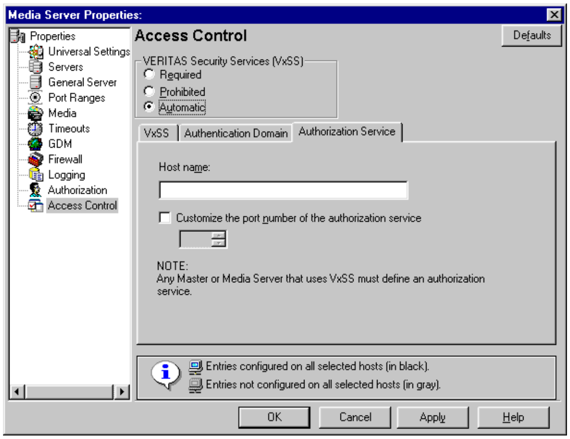
Attributes for selected network
Authentication mechanism: WINDOWS
Broker: WINMACHINE
□ Customize the port number of broker
0
Description:

Entries configured on all selected hosts (in black).
Entries not configured on all selected hosts (in gray).

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 service (typically the master). If needed, specify the alternate port for which this service has been configured. The default listening port for the Authorization service is 4032.

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



Access Control

VERITAS Security Services (VxSS)
○ Required
○ Prohibited
● Automatic

Host name:

□ Customize the port number of the authorization service

NOTE:
Any Master or Media Server that uses VxSS must define an authorization service.

Entries configured on all selected hosts (in black).
Entries not configured on all selected hosts (in gray).

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`

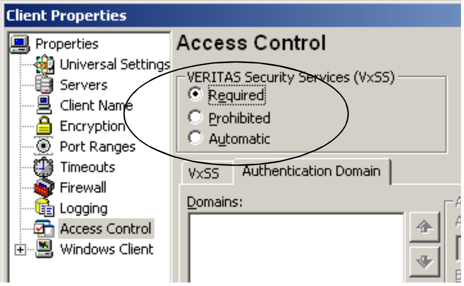
Client Host Properties

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**.


Client Properties

Access Control

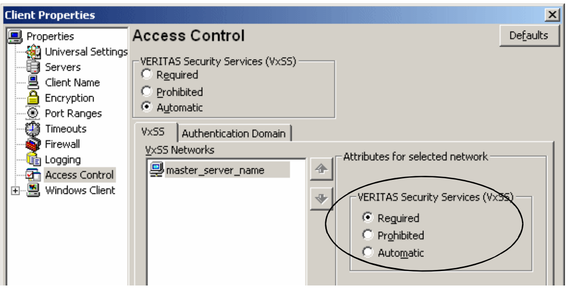
VERITAS Security Services (VxSS)
● Required
○ Prohibited
○ Automatic

VxSS | Authentication Domain

Domains:

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.


Client Properties

Access Control

VERITAS Security Services (VxSS)
○ Required
○ Prohibited
● Automatic

VxSS | Authentication Domain

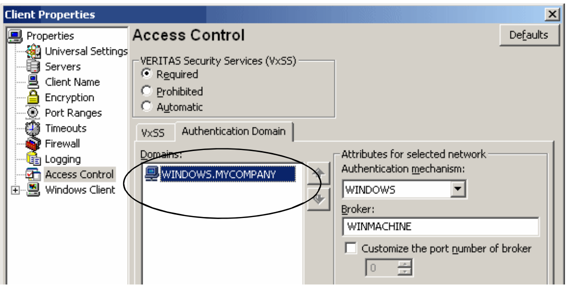
VxSS Networks
master_server_name

Attributes for selected network

VERITAS Security Services (VxSS)
● Required
○ Prohibited
○ Automatic

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.


Client Properties

Access Control

VERITAS Security Services (VxSS)
● Required
○ Prohibited
○ Automatic

VxSS | Authentication Domain

Domains:
WINDOWS.MYCOMPANY

Attributes for selected network
Authentication mechanism: WINDOWS
Broker: WINMACHINE
□ Customize the port number of broker
0

Access Management Troubleshooting Guidelines

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

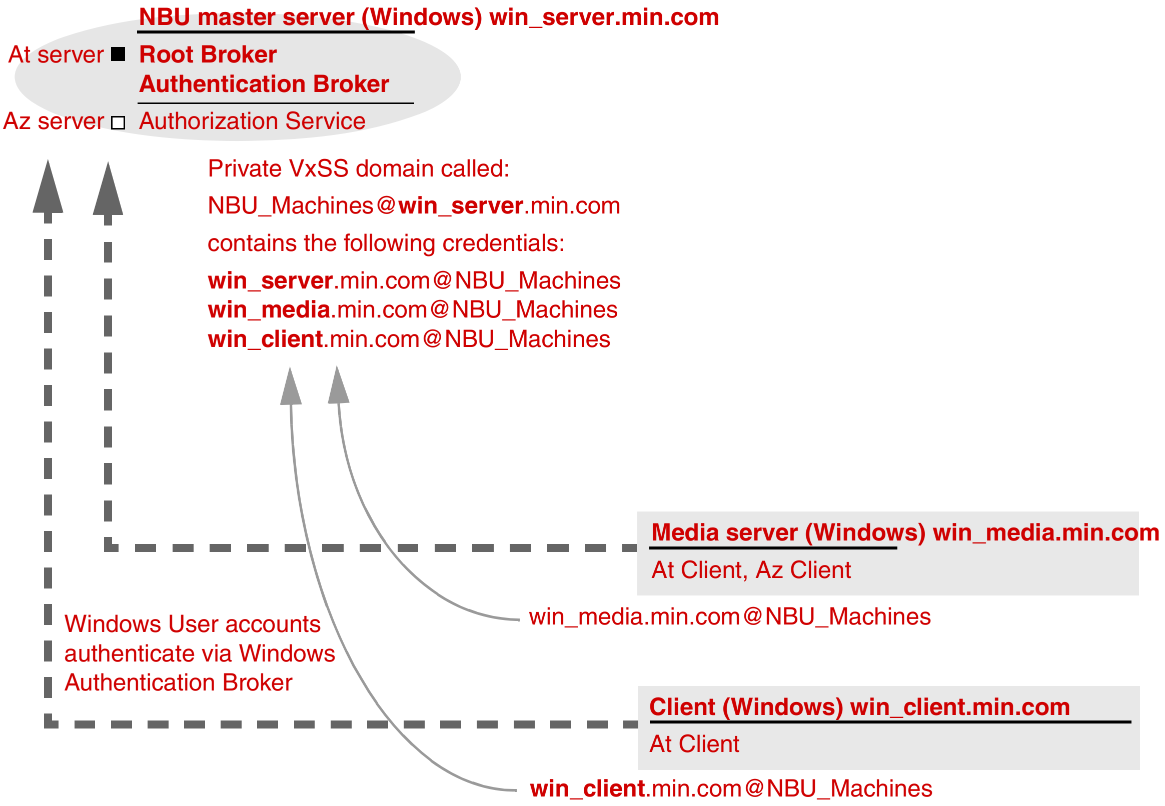
	Windows	**UNIX**
Master Servers	win_master	unix_master
Media Servers	win_media	unix_media
Clients	*win_client*	unix_client

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


NBU master server (Windows) win_server.min.com
At server ■ Root Broker
Authentication Broker
Az server □ Authorization Service
Private VxSS domain called:
NBU_Machines@**win_server**.min.com
contains the following credentials:
win_server.min.com@NBU_Machines
win_media.min.com@NBU_Machines
win_client.min.com@NBU_Machines
Media server (Windows) win_media.min.com
At Client, Az Client
win_media.min.com@NBU_Machines
Windows User accounts
authenticate via Windows
Authentication Broker
Client (Windows) win_client.min.com
At Client
win_client.min.com@NBU_Machines

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

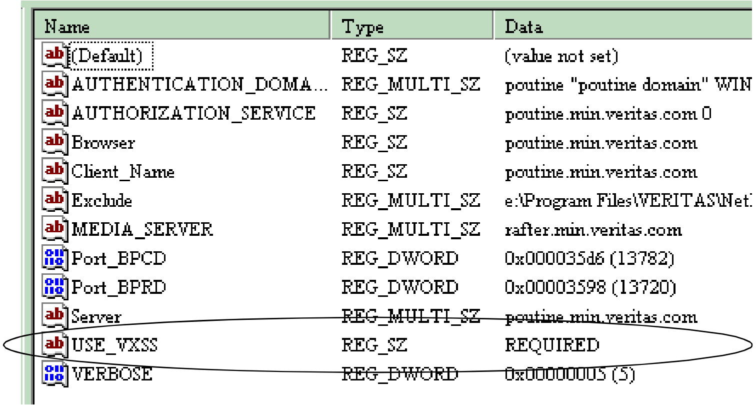
Use the Windows Task Manager to make sure that vxatd.exe and vxazd.exe are running on the designated host. If necessary, start them.

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.

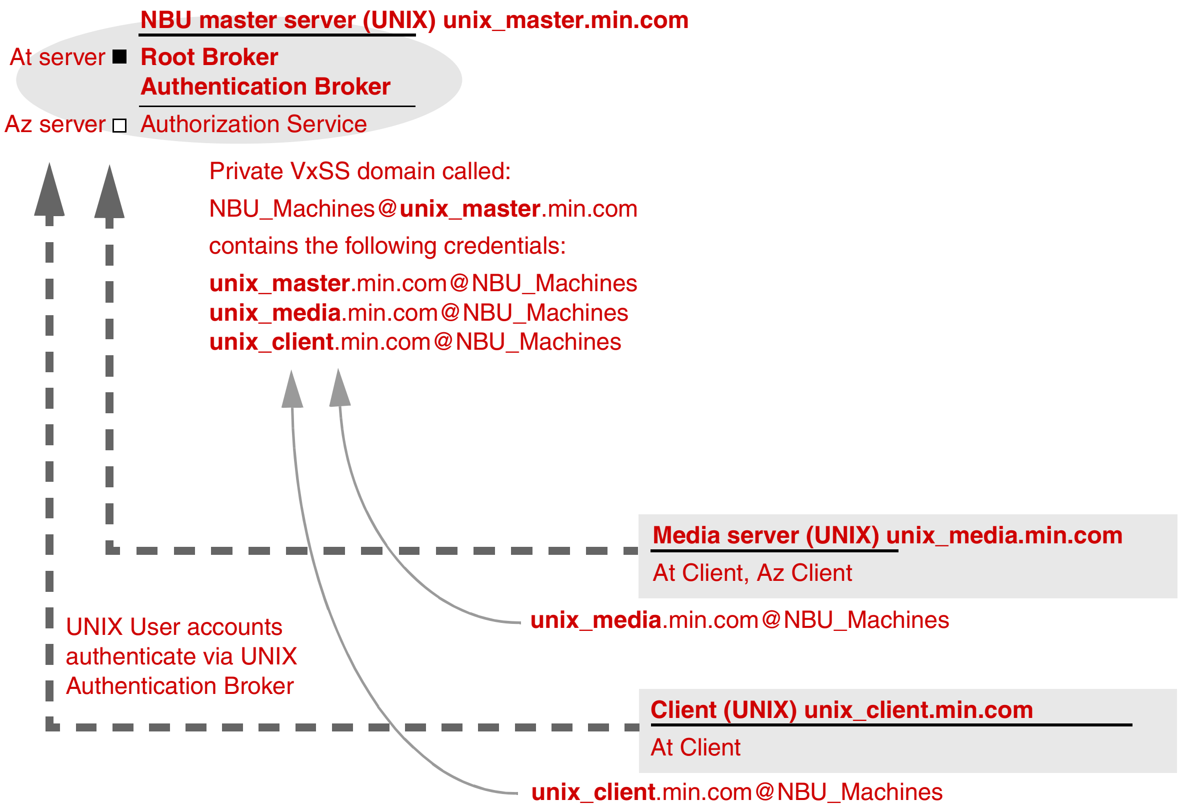
Verify Correct Authentication Domains

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


NBU master server (UNIX) unix_master.min.com
At server ■ Root Broker
Authentication Broker
Az server □ Authorization Service
Private VxSS domain called:
NBU_Machines@unix_master.min.com
contains the following credentials:
unix_master.min.com@NBU_Machines
unix_media.min.com@NBU_Machines
unix_client.min.com@NBU_Machines
Media server (UNIX) unix_media.min.com
At Client, Az Client
unix_media.min.com@NBU_Machines
UNIX User accounts
authenticate via UNIX
Authentication Broker
Client (UNIX) unix_client.min.com
At Client
unix_client.min.com@NBU_Machines

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.

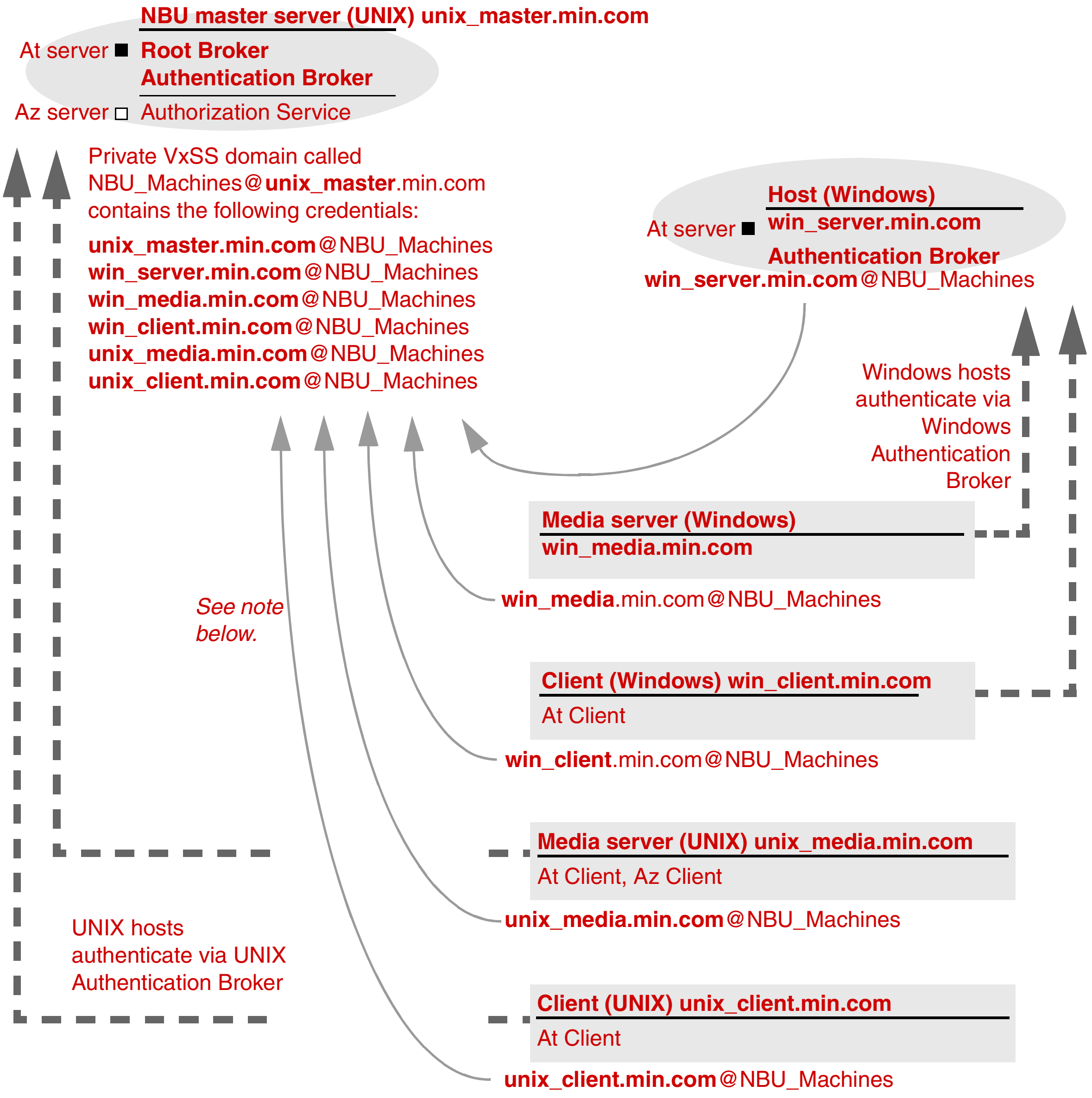
This can also be verified in `bp.conf` using `vi`.

```
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


NBU master server (UNIX) unix_master.min.com
At server ■ Root Broker
Authentication Broker
Az server □ Authorization Service
Private VxSS domain called
NBU_Machines@unix_master.min.com
contains the following credentials:
unix_master.min.com@NBU_Machines
win_server.min.com@NBU_Machines
win_media.min.com@NBU_Machines
win_client.min.com@NBU_Machines
unix_media.min.com@NBU_Machines
unix_client.min.com@NBU_Machines
Host (Windows)
At server ■ win_server.min.com
Authentication Broker
win_server.min.com@NBU_Machines
Windows hosts
authenticate via
Windows
Authentication
Broker
Media server (Windows)
win_media.min.com
win_media.min.com@NBU_Machines
See note
below.
Client (Windows) win_client.min.com
At Client
win_client.min.com@NBU_Machines
Media server (UNIX) unix_media.min.com
At Client, Az Client
unix_media.min.com@NBU_Machines
UNIX hosts
authenticate via UNIX
Authentication Broker
Client (UNIX) unix_client.min.com
At Client
unix_client.min.com@NBU_Machines

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.

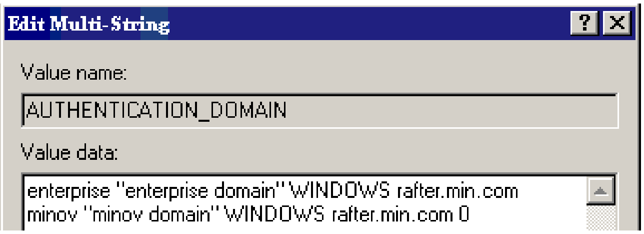
Verify Authentication Domains

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.



Value name:
AUTHENTICATION_DOMAIN

Value data:
enterprise "enterprise domain" WINDOWS rafter.min.com
minov "minov domain" WINDOWS rafter.min.com 0

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.
```

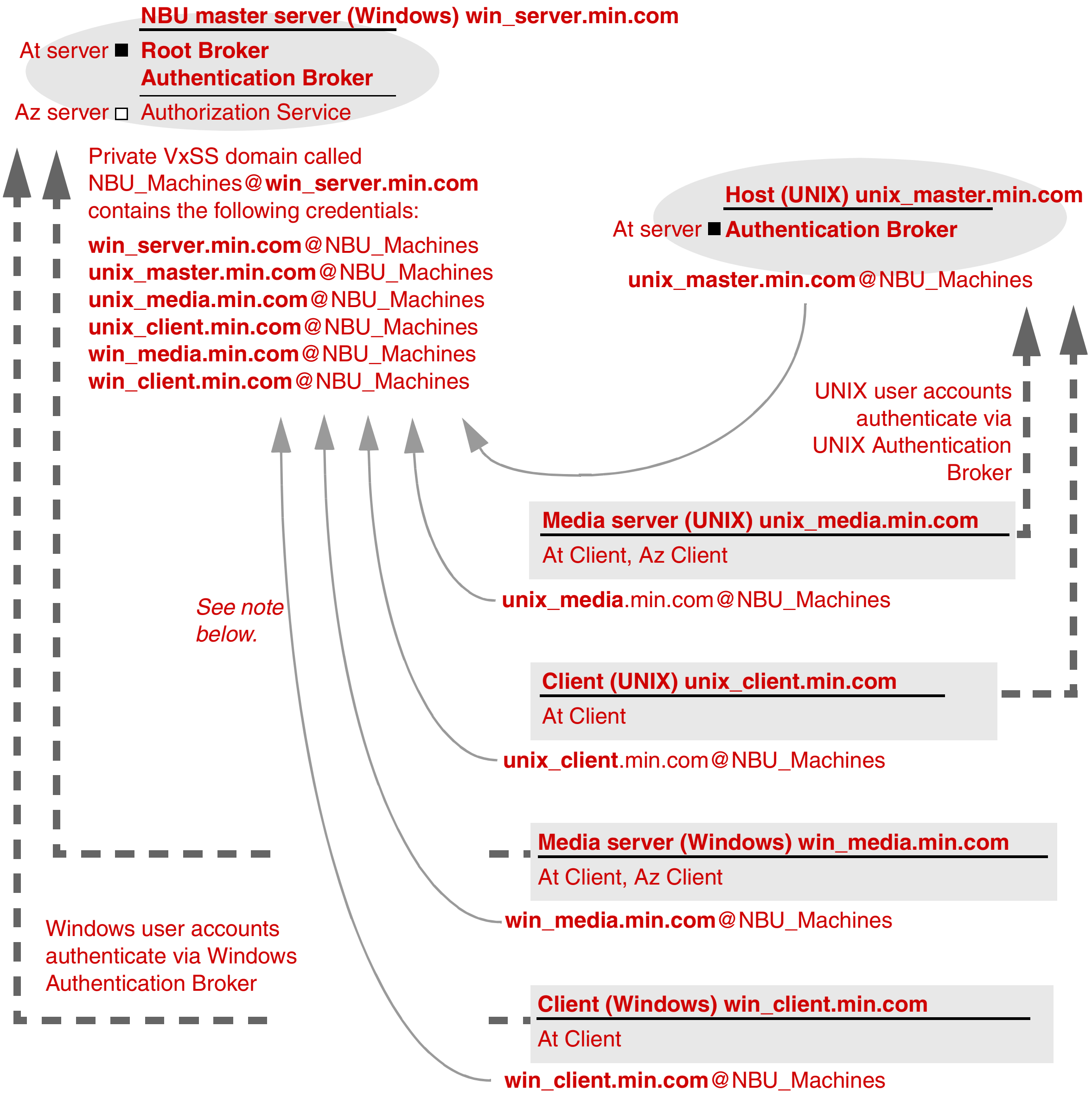
Verifying the Windows Authentication Broker

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



NBU master server (Windows) win_server.min.com

At server ■ **Root Broker**

Authentication Broker

Az server □ Authorization Service

Private VxSS domain called NBU_Machines@**win_server.min.com** contains the following credentials:

win_server.min.com@NBU_Machines
unix_master.min.com@NBU_Machines
unix_media.min.com@NBU_Machines
unix_client.min.com@NBU_Machines
win_media.min.com@NBU_Machines
win_client.min.com@NBU_Machines

Host (UNIX) unix_master.min.com

At server ■ **Authentication Broker**

unix_master.min.com@NBU_Machines

UNIX user accounts authenticate via UNIX Authentication Broker

Media server (UNIX) unix_media.min.com

At Client, Az Client

unix_media.min.com@NBU_Machines

See note below.

Client (UNIX) unix_client.min.com

At Client

unix_client.min.com@NBU_Machines

Media server (Windows) win_media.min.com

At Client, Az Client

win_media.min.com@NBU_Machines

Windows user accounts authenticate via Windows Authentication Broker

Client (Windows) win_client.min.com

At Client

win_client.min.com@NBU_Machines

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 30.

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 services listen at the following ports:

Authentication:

```
netstat -a -n | find "2821"
```

Authorization:

```
netstat -a -n | find "4032"
```

Stopping VxSS Services

When stopping the VxSS services, 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.exe` utility to create identities under which to run *cron* or *at* jobs.

`nbac_cron.exe` 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 `*Install_path*\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 Console**, **New Window from Here**, **Login as New User**, **Backup, Archive, and Restore**, **Print Setup**, **Print Preview**, **Print**, **Send**, **Export**, **Close**, and **Exit** are described in Chapter 1 of the *NetBackup System Administrator's Guide for Windows, Volume I.*

Option	Description
Edit	Options **Undo**, **Cut**, **Copy**, **Paste**, **New**, **Change**, **Delete**, **Find**, **Find Next**, **Find Previous**, and **Find All** are described in Chapter 1 of *NetBackup System Administrator's Guide, Volume I*. The **Change** option is available when a user or NBU user group is selected in the details pane.
View	Options **Toolbar**, **Status Bar**, **Tree**, **Previous Pane**, **Next Pane**, **Customize**, **Options**, **Refresh**, **Refresh All**, **Large Icons**, **Small Icons**, **List**, **Details**, **Columns**, **Sort**, **Filter**, and **Clear Filter** are described in Chapter 1 of *NetBackup System Administrator's Guide, Volume I*.
Actions	The Actions menu contains the following options when **Access Management** is selected: ◆ **New Group:** Click to create a new NetBackup user group. ◆ **Copy to New 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**, **VERITAS Web Page**, **License Keys**, **Current NBAC User**, and **About NetBackup Administration Console** are described in Chapter 1 of *NetBackup System Administrator's Guide, 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 66 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)

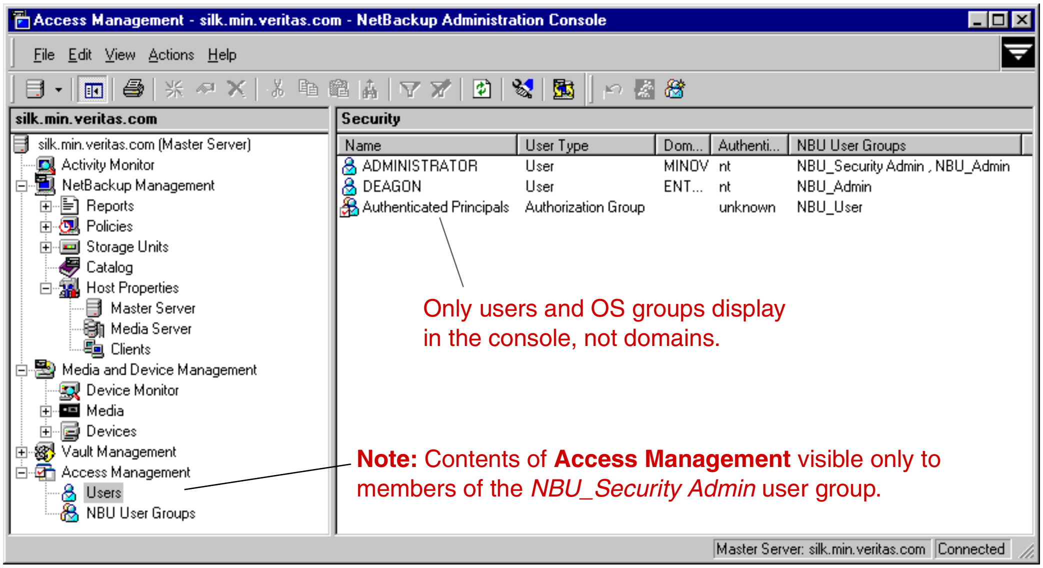
Note Permissions are granted to individuals in user groups, not to individuals on a per-host basis. If a machine is authenticated within the configuration, any individual in the user group can operate NetBackup to the extent that they are authorized to do so. There are no restrictions based on a machine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



Name	User Type	Dom...	Authenti...	NBU User Groups
ADMINISTRATOR	User	MINOV	nt	NBU_Security Admin , NBU_Admin
DEAGON	User	ENT...	nt	NBU_Admin
Authenticated Principals	Authorization Group		unknown	NBU_User

Only users and OS groups display in the console, not domains.

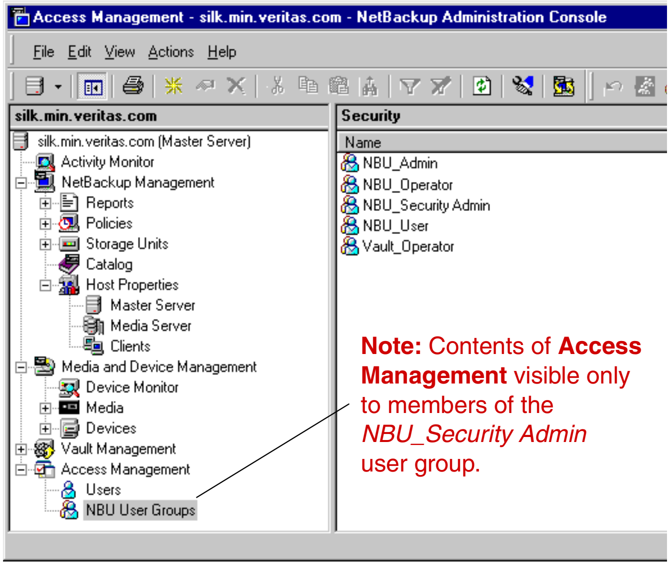
Note: Contents of **Access Management** visible only to members of the *NBU_Security Admin* user group.

- On the server hosting the Authorization services, members of the Administrator group are implicit members 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



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

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** > **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.

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** > **NBU User Groups**.

2. Select **Actions** > **New Group**. The New 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 on users, see "Users Tab" on page 62.

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 on permissions, see "Permissions Tab" on page 64.

6. Select an Authorization Object, 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** > **NBU 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 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 an Authorization Object, then select the permissions for the object.

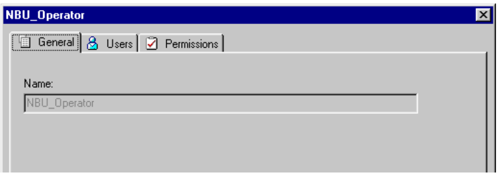
8. Click **OK** to save the user group and the group permissions. The new name for the user group appears in the Details pane.

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

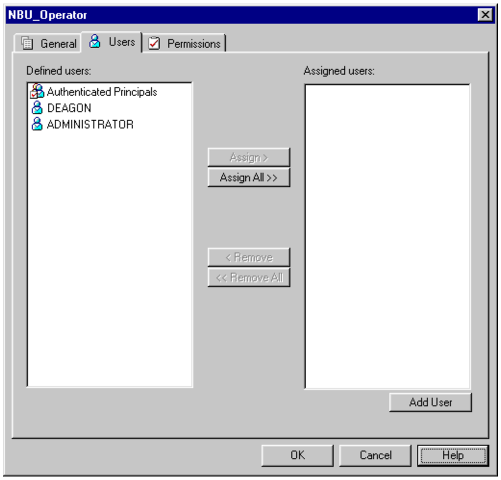
The General tab contains the name of the user group. If creating a new user group, the **Name** field can be edited.



Name: NBU_Operator

Users Tab

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



Authenticated Principals
DEAGON
ADMINISTRATOR

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.

Add User

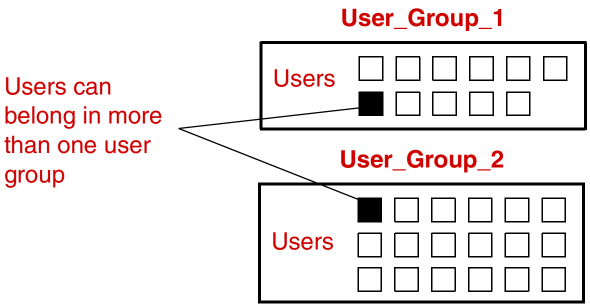
Click **Add User** to add a user to the **Defined Users** list. After adding a user, the name appears in the **Defined Users** list and the Security Administrator can assign the user to the user group. (See "To add a new user to a user group" on page 63.)

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.

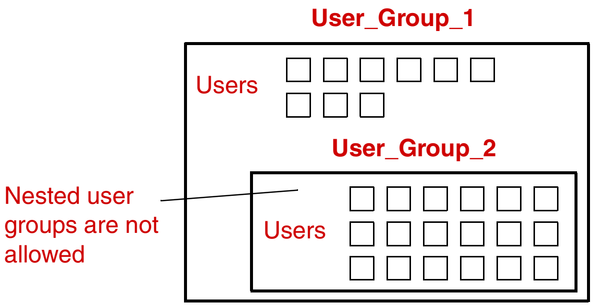
Defining a User Group

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.



Logging in as a New User

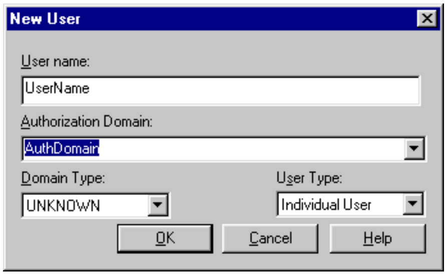
The **File** > **Login as New User** option is available on systems configured for Access Control. Logging into NetBackup as a different user is useful when, for example, a member of the *NBU_Admin* user group has finished administrative activities and needs to log in again as a Security Administrator to administer **Access Management**.

▼ 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 **Add User**.


New User

User name: UserName

Authorization Domain: AuthDomain

Domain Type: UNKNOWN

User Type: Individual 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

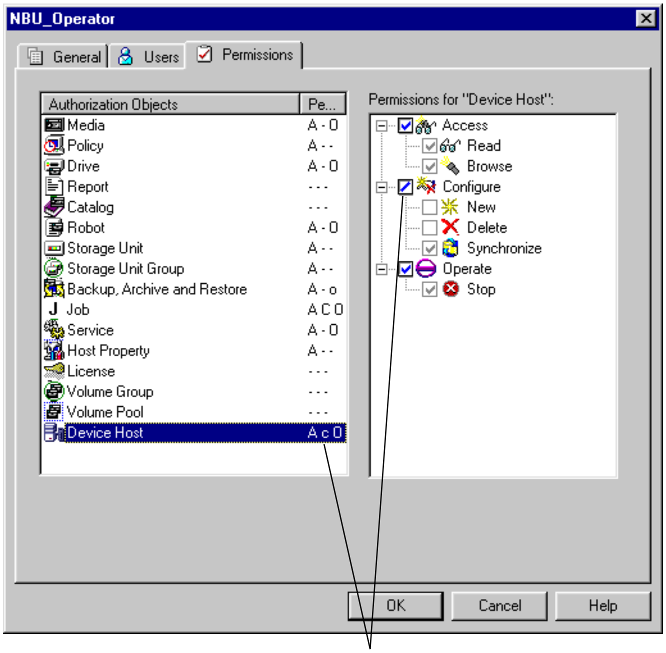
In general, an authorization object correlates to a node in the NetBackup Administration Console tree.

The *Authorization Object* column contains the NetBackup objects to which permissions can be granted.

The *Perms* column indicates the permission sets for which the selected user group is configured. An authorization object may be granted one of three permission sets:

- Access (A)
- Configure (C)
- Operate (O)

A lowercase letter in the *Perms* column indicates that only some, but not all, of the permissions in a permission set have been granted for the object.



NBU_Operator

Authorization Objects	Pe...
Media	A - O
Policy	A - -
Drive	A - O
Report	- - -
Catalog	- - -
Robot	A - O
Storage Unit	A - -
Storage Unit Group	A - -
Backup, Archive and Restore	A - o
Job	A C O
Service	A - O
Host Property	A - -
License	- - -
Volume Group	- - -
Volume Pool	- - -
Device Host	A c O

Permissions for "Device Host":

- ☑ Access
  - ☑ Read
  - ☑ Browse
- ☑ Configure
  - □ New
  - □ Delete
  - ☑ Synchronize
- ☑ Operate
  - ☑ Stop

Lowercase *c* indicates that full configure access has not been granted to members of the *NBU_ Operator* user group

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	---	---

Drives Tab Permissions in the Activity Monitor

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

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

Drives Tab Permission 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	---	X	---	---	---
	Delete	---	X	---	---	---
Operate	Up drive	---	X	X	---	---
	Down drive	---	X	X	---	---
	Reset drive	---	X	X	---	---

Services Tab Permissions in the Activity Monitor

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

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

Services Tab Permission Defaults

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

* The Read and Browse permissions do not have an affect on the Services tab. This information is harvested from the server using user level calls to access the task 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 (Administrator), then:

- The user will be able to restart a service from within the NetBackup Administration Console or from the command line.
- The user will be able to stop a service from within the NetBackup Administration Console but not from the command line.

If a user is a member of the NBU_Admin user group, but *is not* logged on as an OS administrator (Administrator), then:

- The user will *not* be able to restart a service from within the NetBackup Administration Console or from the command line.
- The user will *not* be able to stop a service from within the NetBackup Administration Console but the user can use the command line.
  (For example, `bprdreq -terminate`, `bpdbm -terminate`, or `stopltid`.)

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.

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.

Example methods_allow.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 79.)

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.

Exampl**e names_allow.txt File**

```
# 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.

Syntax Rules for **names_allow.txt**

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 79.)

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 79.)

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 101.)

File Location of authorize.txt

Platform	Path
UNIX	/usr/openv/var/authorize.txt

File Location of authorize.txt	
Windows	*install_path*\NetBackup\var\authorize.txt

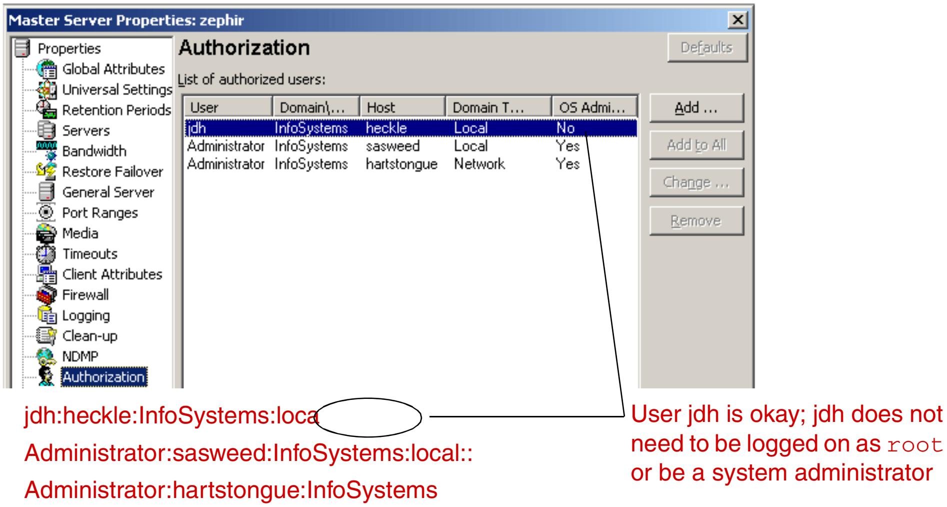
authorize.txt File Format

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 tab entries with the corresponding `authorize.txt` file.

Comparing Authorization Property Tab Entries and authorize.txt Entries



Authorization

List of authorized users:

User	Domain\...	Host	Domain T...	OS Admi...
jdh	InfoSystems	heckle	Local	No
Administrator	InfoSystems	sasweed	Local	Yes
Administrator	InfoSystems	hartstongue	Network	Yes

jdh:heckle:InfoSystems:loca

Administrator:sasweed:InfoSystems:local::

Administrator:hartstongue:InfoSystems

User jdh is okay; jdh does not need to be logged on as `root` or be a system administrator

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.

Example authorize.txt File Entries

```
# 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 78.)

Commands

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

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 101.)

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/
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

Location of Unhashed Files

Windows	*install_path*\NetBackup\var\auth\vopie\unhashed\ *localhost*\ *remotehost*.txt

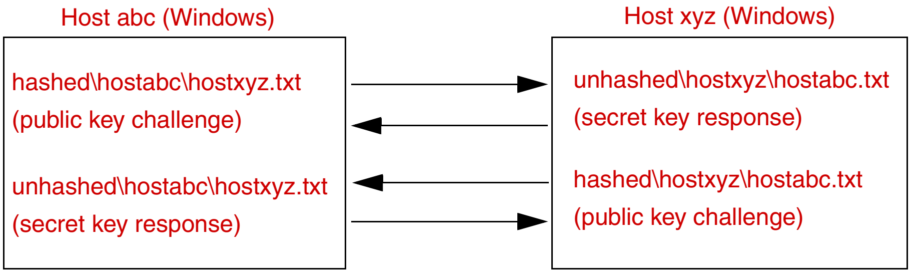
Where:

- *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 the administrator 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

Location of Temporary Files	
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.

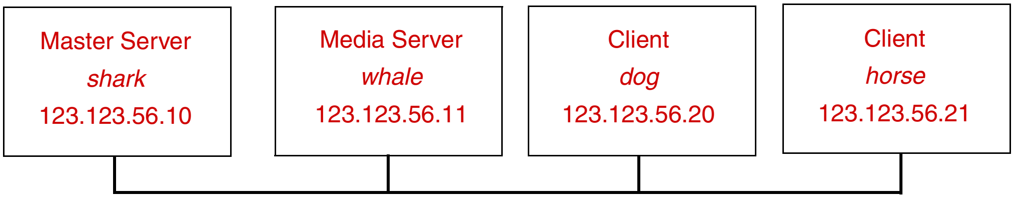
2. Configure NetBackup policies and add clients to the policies.

3. Run:
`install_path\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 Windows*, 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):

   ```
   install_path\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, `C:\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):

```
install_path\NetBackup\bin\admincmd\bpauthsync -methods
-methods_allow C:\tmp\ma.txt -servers -clients
```

The information in `C:\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):

   ```
   install_path\NetBackup\bin\admincmd\bpauthsync -methods
   -methods_allow NUL -clients horse
   ```

   This disables authentication on the client.

2. On the master server, remove the entry for *horse* from the `install_path\NetBackup\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):

   ```
   install_path\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, `C:\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):

   ```
   install_path\NetBackup\bin\admincmd\bpauthsync -vopie -methods
   -methods_allow C:\tmp\ma.txt -servers -clients horse
   ```

   The information in `C:\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:

   ```
   C:\install_path\NetBackup\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):

   ```
   install_path\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:

   ```
   install_path\NetBackup\bin\admincmd\bpauthsync -vopie -methods
   -servers -clients horse -methods_allow

   install_path\NetBackup\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 *`install_path`*`\NetBackup\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):

   ```
   install_path\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 `\NetBackup\var\auth` 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):

   ```
   install_path\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 98.

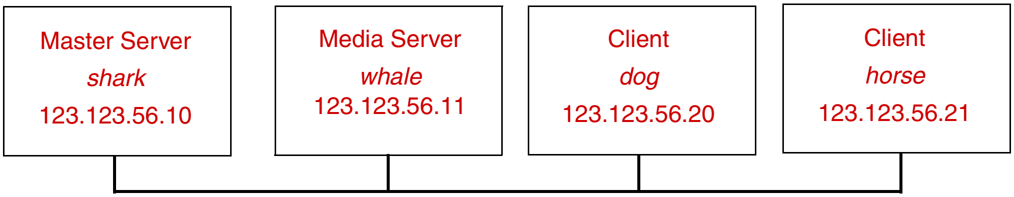
Configuring for the noauth method is similar to configuring for the vopie method with these exceptions:

- 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.

noauth Authentication Examples

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



noauth Example 1: Typical 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, C:\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):

   ```
   install_path\NetBackup\bin\admincmd\bpauthsync -methods
   -methods_allow C:\tmp\ma.txt -servers -clients
   ```

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

noauth Example 2: Authentication for a Client

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):

   ```
   install_path\NetBackup\bin\admincmd\bpauthsync -methods
   -methods_allow NUL -clients horse
   ```

   This disables authentication on the client.

2. On the master server, remove the entry for *horse* from the `install_path\NetBackup\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):

   ```
   install_path\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, `C:\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):

```
install_path\NetBackup\bin\admincmd\bpauthsync -methods
-methods_allow.txt C:\tmp\ma.txt -servers -clients horse
```

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

noauth Example 4: Restoring Authentication after Client Disk Crash

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
`C:\install_path\NetBackup\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):

   ```
   install_path\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):

   ```
   install_path\NetBackup\bin\admincmd\bpauthsync -methods
   -servers -clients horse -methods_allow
   install_path\NetBackup\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*.

noauth Example 5: Restoring Authentication on NetBackup Master Server

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):

   ```
   install_path\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 *`install_path`*`\NetBackup\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.

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.

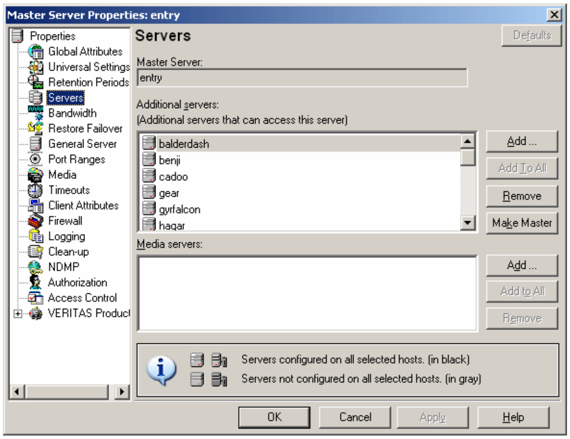
If a match exists, the request is authorized (allowed). If the request is not authorized, the request can proceed only if the NetBackup Administration Console making the request contains:

- 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 tab.

  (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*).



Master Server Properties: entry

Servers

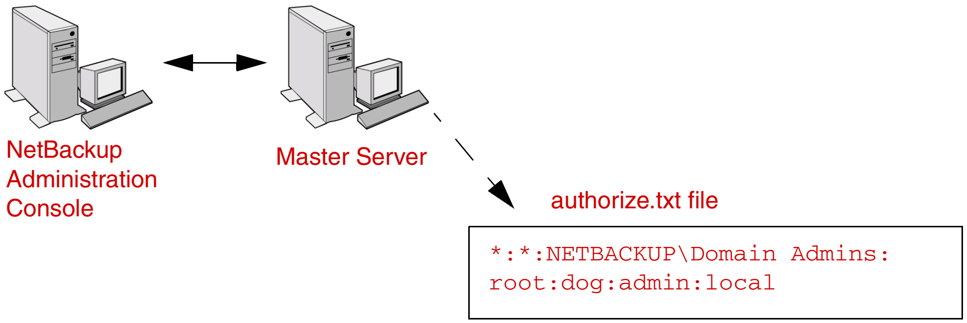
Master Server: entry

Additional servers:
(Additional servers that can access this server)

balderdash
benji
cadoo
gear
gyrfalcon
hagar

Media servers:

Servers configured on all selected hosts. (in black)
Servers not configured on all selected hosts. (in gray)



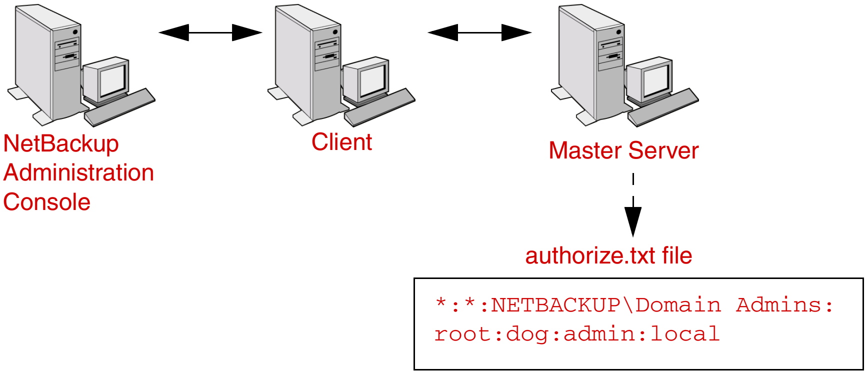
```
*:*:NETBACKUP\Domain Admins:
root:dog:admin:local
```

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.



```
*:*:NETBACKUP\Domain Admins:
root:dog:admin:local
```

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 492.)

2. Enable NetBackup authentication. (See "Enabling NetBackup Enhanced Authentication" on page 101.)

3. Add an authorized user (creating an `authorize.txt` file). (See "Adding an Authorized User" on page 101.)

4. Optionally, specify the preferred group. (See "Using the Administration Console to Specify Preferred Groups (Optional)" on page 102.)

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.

For more on authentication, see "Enhanced Authentication" on page 89 and "Media Manager Security" in the *Media Manager System Administrator's Guide*.

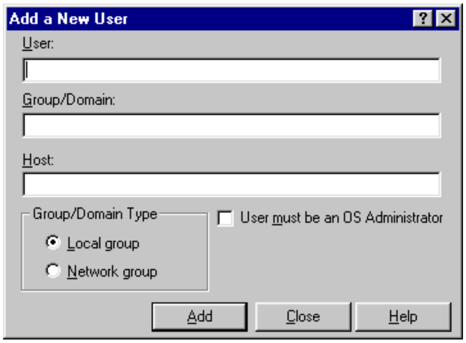
Adding an Authorized User

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 a New 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.

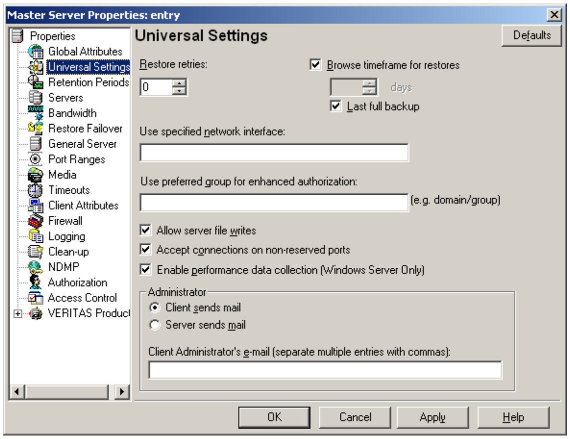
Using the Administration Console to Specify Preferred Groups (Optional)

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**.



Master Server Properties: entry

Universal Settings

Restore retries: 0

☑ Browse timeframe for restores

days

☑ Last full backup

Use specified network interface:

Use preferred group for enhanced authorization:

(e.g. domain/group)

☑ Allow server file writes

☑ Accept connections on non-reserved ports

☑ Enable performance data collection (Windows Server Only)

Administrator

● Client sends mail

○ Server sends mail

Client Administrator's e-mail (separate multiple entries with commas):

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**.

Additional Configuration 3

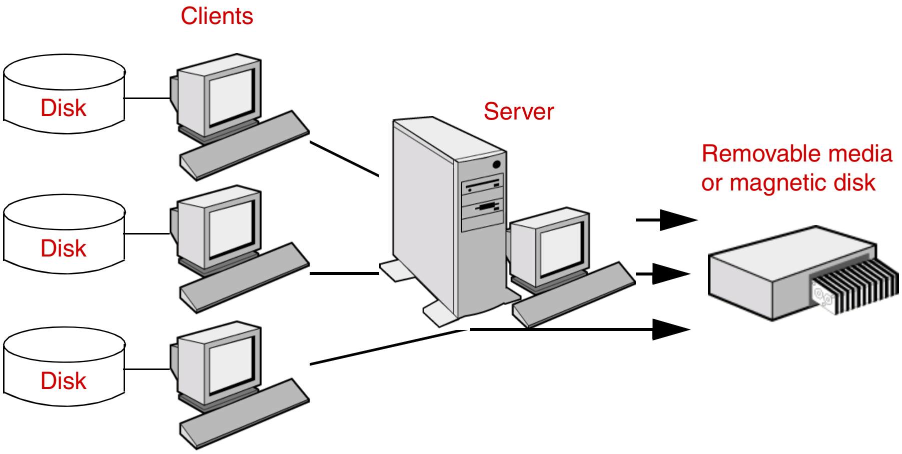
This chapter explains settings that, in most instances, are optional. The sections in this chapter include the following:

- "Multiplexing" on page 106
- "Using Multiple NetBackup Servers" on page 112
- "Configuring a Master and Media Server Grouping" on page 113
- "Adding a Media Server" on page 116
- "NetBackup Configuration Options" on page 119
- "Dynamic Host Name and IP Addressing" on page 122
- "Configuring E-mail Notifications" on page 128
- "Specifying the Locale of the NetBackup Installation" on page 129

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.

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 44 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 123 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.

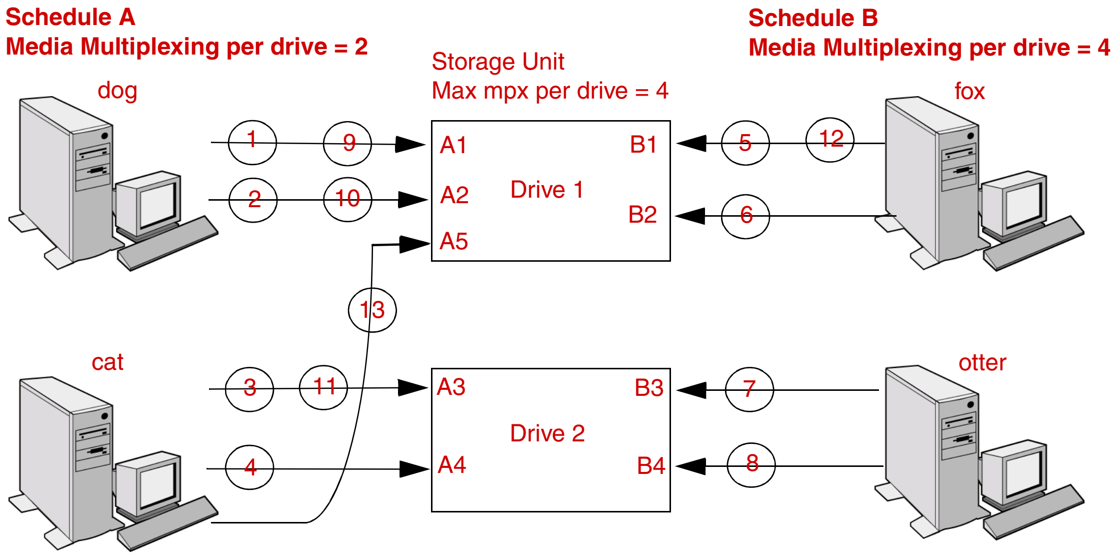
When NetBackup multiplexes jobs, it continues to add jobs to a drive until the number of jobs on the drive matches either of the following:

- 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 84 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. (See "Maximum Data Streams" on page 379 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.

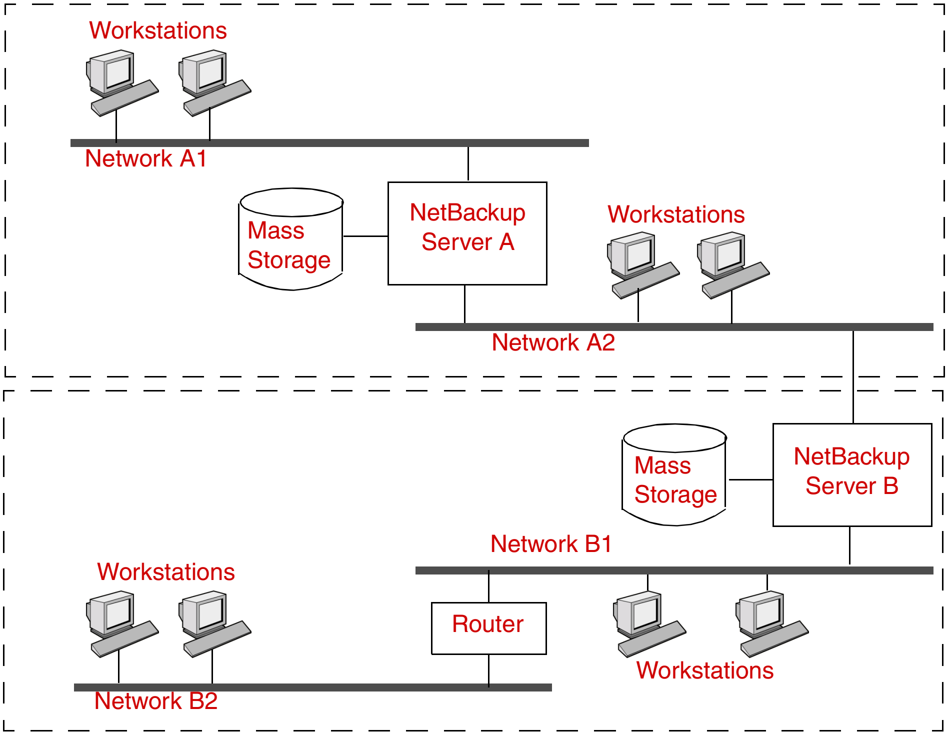
Demultiplexing

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.

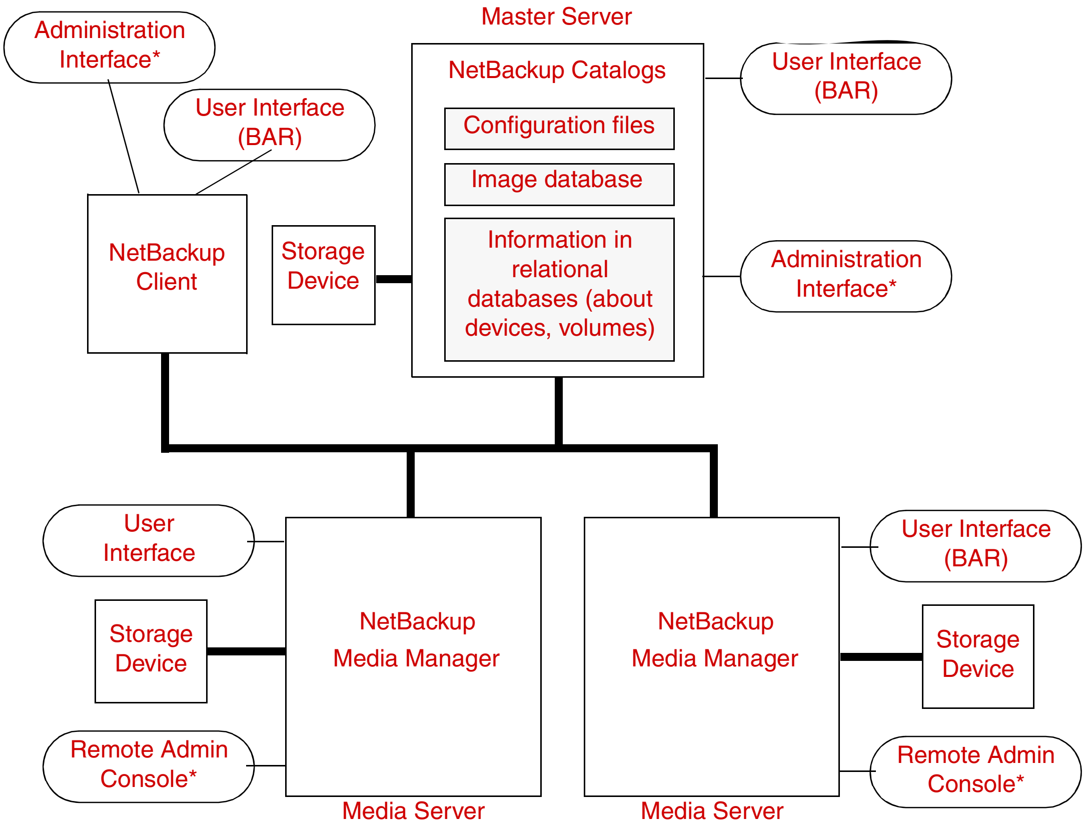
Grouping refers collectively to the master and its media servers. In a grouping of NetBackup servers, a client can have its backup directed to any device on any server in the grouping.

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 213 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**.

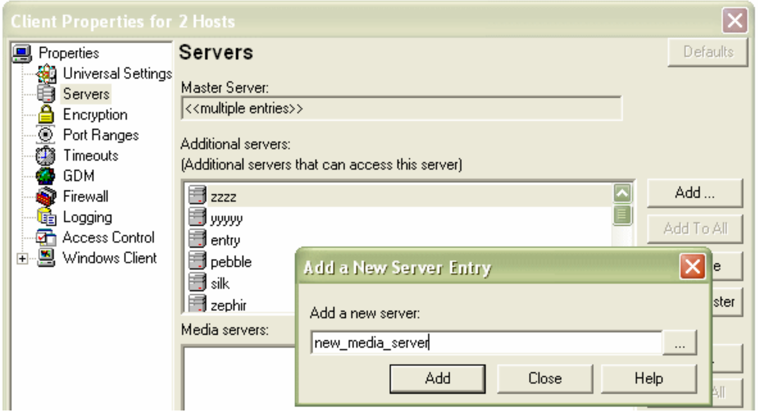
   It is possible to make this change to more than one host at a time. For example, change all clients at once:

   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.



Client Properties for 2 Hosts

Servers

Master Server: <<multiple entries>>

Additional servers:
(Additional servers that can access this server)

zzzz
yyyyy
entry
pebble
silk
zephir

Media servers:

Add a New Server Entry

Add a new server: new_media_server

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

For more information, see “Servers Properties” on page 457 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. Generally, these options are configured in the NetBackup Administration Console, under **Host Properties**.

However, the following configuration options are not configurable within the Administration Console. If you wish to change a default value, use the `bpgetconfig` command to obtain a list of configuration entries, then use `bpsetconfig` to change the entries as desired. The commands are described in *NetBackup Commands for Windows*.

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.exe`) database.

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).

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.exe`) queues, using no cached EMM information. Full evaluations include, for example, matching job resource requests with available resources.

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.

NBRB_REEVAL_PERIOD

The `NBRB_REEVAL_PERIOD` entry serves as a performance tuning option for the Intelligent Resource Manager and NetBackup Resource Broker (`nbrb.exe`). 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.

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.

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.exe`) 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.exe` 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`.

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:

```
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.

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 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:

`install_path``\NetBackup\db\client`

You can create, update, list, and delete client entries with the `bpclient` command. The `bpclient` command is in the following directory:

`install_path``\NetBackup\bin\admincmd`

- To create a dynamic client entry:

  ```
  bpclient.exe -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.exe -delete -client client_name
  ```

- To list a client entry:

  ```
  bpclient.exe -L -client client_name
  ```

- To list all client entries:

```
bpclient.exe -L -All
```

In our example, you can enter these commands to create the 20 clients:

```
cd install_path\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:

```
install_path\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 446 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.

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.

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 for Windows, Volume I*.)

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).

Reference Topics 4

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 122.)

NetBackup uses TCP/IP host names to connect to NetBackup servers and clients. NetBackup validates its connections by performing a reverse host name lookup. That is, NetBackup determines the IP address of a connection and then uses the IP address to look up the host name with `gethostbyaddr()`. For this to work reliably, the host name and address resolution must be set up correctly in DNS, WINS, or the local `%Systemroot%\system32\drivers\etc\hosts` file (if necessary).

Note Sometimes placing the system host name and IP address in the `%Systemroot%\system32\drivers\etc\hosts` file accelerates name lookups.

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`.

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.

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.

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.

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` 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` 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.

```
install_path\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` 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` returned `danr`.
- The master server's network services `gethostbyname` 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. 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.

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 138 for methods to compute the transfer rate for your clients.

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 139
- “Network Transfer Plus End-of-Backup-Processing Rate” on page 139

The Microsoft Windows System Monitor also displays the NetBackup transfer rate. (See “Using the System Monitor” on page 140.)

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

Using the System Monitor

NetBackup adds the NetBackup Disk/Tape performance object to the list of objects monitored by the Windows System Monitor. Four counters are available for the NetBackup Disk/Tape performance object:

- Disk/Tape Read Bytes (GB)
- Disk/Tape Read Bytes/sec (KB)
- Disk/Tape Write Bytes (GB)
- Disk/Tape Write Bytes/sec (KB)

The NetBackup performance object supports *instances* in the System Monitor. The instances can be drive names, in the case of tape drives, or absolute paths in the case of disks, to which NetBackup is writing, or from which NetBackup is reading.

The System Monitor displays object instances when NetBackup begins to read or write from the disk or tape. The read or write counters are updated depending on the type of NetBackup operation performed. The object instance is removed from the list once the NetBackup operation is completed.

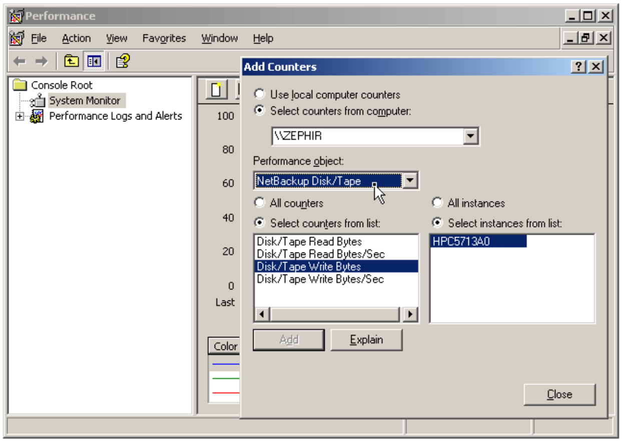
If the performance monitoring is done either locally or remotely during a NetBackup read or write operation, the object instance continues to exist after NetBackup operation is completed. In this case, the object instance is removed when performance monitoring is stopped.

When remotely monitoring NetBackup counters, the initiating computer attaches to the target computer's WinLogon process through RPC, thereby locking the object instances. Thus, the object instances remain until the system is rebooted.

▼ To use the System Monitor with NetBackup

1. Open the System Monitor on your Windows system. The Performance dialog appears.

2. Click the plus sign (+) to add a counter to the display. Select **NetBackup Disk/Tape** from the **Performance objects** drop-down list.



Add Counters

○ Use local computer counters
● Select counters from computer:
\\ZEPHIR

Performance object:
NetBackup Disk/Tape

○ All counters
● Select counters from list:
Disk/Tape Read Bytes
Disk/Tape Read Bytes/Sec
Disk/Tape Write Bytes
Disk/Tape Write Bytes/Sec

○ All instances
● Select instances from list:
HPC5713A0

Note In order for the NetBackup objects to be available for selection, the following conditions must be met:
- The drive must be connected to a Windows media server (or SAN media server).
- A NetBackup job must be active (a drive is in use).
- The user must have permissions to read the Windows registry.
- Performance data collection is enabled (select **Host Properties** > **Media Servers** > **Universal Settings > Enable Performance Data Collection**).

3. Select the counter to display from the list of available counters. Available counters are:

   - Disk/Tape Read Bytes (GB)
   - Disk/Tape Read Bytes/sec (KB)
   - Disk/Tape Write Bytes (GB)
   - Disk/Tape Write Bytes/sec (KB)

4. Select one or more object instances from the list of instances. Instances are displayed when NetBackup begins to read or write from the disk or tape drives.

5. Click **Add**.

   The NetBackup counter you selected is displayed in the Performance dialog. The number of bytes read or written and the rate is updated dynamically.

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 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 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

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:

```
Install_path\VERITAS\NetBackup\bin\backup_notify.cmd
Install_path\VERITAS\NetBackup\bin\backup_exit_notify.cmd
Install_path\VERITAS\NetBackup\bin\dbbackup_notify.cmd
Install_path\VERITAS\NetBackup\bin\diskfull_notify.cmd
Install_path\VERITAS\NetBackup\bin\mail_dr_info.cmd
Install_path\VERITAS\NetBackup\bin\nbmail.cmd
Install_path\VERITAS\NetBackup\bin\restore_notify.cmd
Install_path\VERITAS\NetBackup\bin\session_notify.cmd
Install_path\VERITAS\NetBackup\bin\session_start_notify.cmd
Install_path\VERITAS\NetBackup\bin\userreq_notify.cmd
```

Scripts that run on clients:

```
Install_path\VERITAS\NetBackup\bin\goodies\bpstart_notify.bat
Install_path\VERITAS\NetBackup\bin\goodies\bpend_notify.bat
Install_path\VERITAS\NetBackup\bin\goodies\parent_end_notify.cmd
Install_path\VERITAS\NetBackup\bin\goodies\parent_start_notify.cmd
```

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 150 and "bpend_notify.bat (Microsoft Windows clients only)" on page 155.

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.cmd

The backup_notify.cmd 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.cmd 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.cmd

The backup_exit_notify.cmd 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

Parameter	Description
`exitstatus`	Exit code for the entire backup job.

For example:

```
backup_exit_notify.cmd freddie production fulls FULL 0
backup_exit_notify.cmd 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

```
Install_path\VERITAS\NetBackup\bin\goodies\bpstart_notify.bat
```

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:

`Install_path``\VERITAS\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.
%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.

Parameter	Description
%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.

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.

For a UNIX client, if you need notification whenever the client completes a backup or archive operation, copy

```
Install_path\VERITAS\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.cmd

The `dbbackup_notify.cmd` 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.cmd DISK /disk1/bpsync1 SUCCESS

dbbackup_notify.cmd OPTICAL AA0001 FAIL

dbbackup_notify.cmd 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.cmd

The `diskfull_notify.cmd` 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.cmd bpdm /disk1/images/host_08193531_c1_F1
```

Note

In previous releases, the `diskfull_notify.cmd` 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.cmd

Use `mail_dr_info.cmd` to send NetBackup disaster recovery information to specified recipients after running an online, hot catalog backup.

To create the script, copy *`Install_path`*`\VERITAS\NetBackup\bin\nbmail.cmd` from the master server into *`Install_path`*`\NetBackup\bin\mail_dr_info.cmd`.

Update the script using the following script 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.cmd is present in *Install_path*\NetBackup\bin. If mail_dr_info.cmd exists, NetBackup passes the parameters to the script.

Note All NetBackup email notifications require that a public domain SMTP mail client, such as blat, be configured. For details, see the comments in the nbmail.cmd script.

nbmail.cmd

Use nbmail.cmd to send specified recipients notifications about scheduled backups.

To create the script, copy *Install_path*\VERITAS\NetBackup\bin\nbmail.cmd from the master server into *Install_path*\NetBackup\bin of each client that is to receive the notification.

Update the script using the following script 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 nbmail.cmd exists is present in *Install_path*\NetBackup\bin. If nbmail.cmd exists, NetBackup passes the parameters to the script.

Note All NetBackup email notifications require that a public domain SMTP mail client, such as blat, be configured. For details, see the comments in the `nbmail.cmd` script.

parent_end_notify.cmd

NetBackup calls the `parent_end_notify.cmd` script each time a parent job ends.

To create the script, copy `*Install_path*\VERITAS\NetBackup\bin\goodies\parent_end_notify.cmd` from the master server into `*Install_path*\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.cmd

NetBackup calls the `parent_start_notify.cmd` script each time a parent job starts.

To create the script, copy `*Install_path*\VERITAS\NetBackup\bin\goodies\parent_start_notify.cmd` from the master server into `*Install_path*\NetBackup\bin` on the client.

Update the script using the following parameters:

Parameter	Description
`clientname`	Name of the client from the NetBackup catalog.

Parameter	Description
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.cmd

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.cmd 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.
operation	One of the following: restore, verify, duplication, import

For example:

```
restore_notify.cmd bptm bilbo_0695316589 duplication
```

session_notify.cmd

The `session_notify.cmd` 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.cmd

The `session_start_notify.cmd` 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.cmd

The `userreq_notify.cmd` 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.cmd backup mercury jdoe

userreq_notify.cmd archive mercury jdoe

userreq_notify.cmd manual_backup mercury jdoe

userreq_notify.cmd restore mercury jdoe

userreq_notify.cmd list mercury jdoe
```

UNIX Reference Topics 5

This chapter contains information that pertains specifically to administering UNIX NetBackup clients or media servers from a Windows NetBackup master server.

Most administrative tasks on the UNIX systems can be performed by using the NetBackup administration interface on a Windows NetBackup server or administration client.

This chapter includes the following sections:

Cross Mount Points

The following information applies specifically to UNIX clients.

Note The **Cross Mount Points** option applies only to certain policy types and NetBackup allows you to select it in only those instances.

The **Cross Mount Points** option controls whether NetBackup will cross file system boundaries during a backup or archive on UNIX clients or whether NetBackup enters volume mount points during a backup or archive on Windows clients.

- If you select **Cross Mount Points**, NetBackup backs up or archives all files and directories in the selected path, regardless of the file system. For example, if you specify root (/) as the file path, NetBackup backs up root (/) and all files and directories under it in the tree. Usually, this means all the client's files, other than those available through NFS.
- If you clear **Cross Mount Points**, NetBackup backs up or archives only files and directories that are in the same file system as the selected file path. This lets you back up a file path such as root (/) without backing up all the file systems that are mounted on it (for example, `/usr` and `/home`).

Notes on Cross Mount Points

- **Cross Mount Points** has no effect on UNIX raw partitions. If the raw partition that is being backed up is the root partition and has mount points for other file systems, the other file systems are not backed up even if you select **Cross Mount Points**.
- Do not use **Cross Mount Points** in policies where you use the `ALL_LOCAL_DRIVES` directive in the backup selection list.

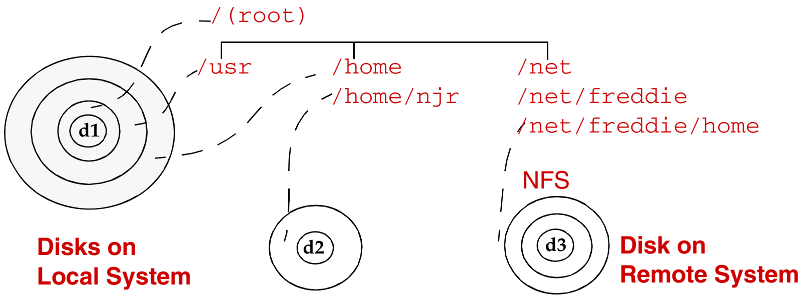
How Cross Mount Points Setting Interacts With Follow NFS

To back up NFS mounted files, select **Follow NFS**. The table below summarizes the behavior of **Cross Mount Points** and **Follow NFS**:

Cross Mount Points	Follow NFS	Resulting Behavior
No	No	No crossing of mount points. This is the default.
No	Yes	Back up NFS files if the file path is (or is part of) an NFS mount.
Yes	No	Cross local mount points but not NFS mounts.
Yes	Yes	Follow the specified path across mount points to back up files and directories (including NFS), regardless of the file system where they reside.

Cross Mount Point Examples

The next two examples illustrate the concepts mentioned above. In these examples, assume the client disks are partitioned as shown below.



Here, the client has `/`, `/usr`, and `/home` in separate partitions on disk d1. Another file system named `/home/njr` exists on disk d2 and is mounted on `/home`. In addition, disk d3 contains a directory named `/net/freddie/home` that is NFS-mounted on `/net/freddie`.

Example 1

Assume that you clear **Cross Mount Points** and **Follow NFS** and have the following entries in the backup selection list:

```
/
/usr
```

```
/home
```

In this case, NetBackup considers only the directories and files that are in the same file system as the backup selection list entry it is processing. It does not back up `/home/njr` or `/net/freddie/home`.

Example 2

Assume that you select **Cross Mount Points** and **Follow NFS** and include only / in the backup selection list.

In this case, NetBackup backs up all the files and directories in the tree, including those under `/home/njr` and `/net/freddie/home`.

To not back up everything, leave / out of the list and separately list the files and directories you want to include. The following backup selection list backs up only `/usr` and individual files under `/`:

```
/usr
/individual_files_under_root
```

Exclude and Include Lists on UNIX Clients

Note Exclude and include lists do not apply to user backups and archives.

On UNIX clients, you create the exclude and include lists in the following files on the client:

```
/usr/openv/netbackup/exclude_list
```

```
/usr/openv/netbackup/include_list
```

The following topics explain the rules for creating these lists on UNIX clients.

Creating an Exclude List on a UNIX Client

If you create a `/usr/openv/netbackup/exclude_list` file on a UNIX client, NetBackup uses the contents of the file as a list of patterns to skip during automatic full and incremental backups.

Note Exclude and include lists do not apply to user backups and archives.

The following types of files typically appear in an exclude list:

- `*.o` files
- `core` files

- `a.out` files
- Files prefixed or suffixed by ~ (backups for editors)
- Files and directories under `/tmp`, `/usr/tmp`
- Man pages
- Software that you can restore from original installation tapes
- Automounted directories
- CD-ROM file systems
- NetBackup automatically excludes the following file system types:
    - `mntfs` (Solaris)
    - `proc` (all UNIX platforms)
    - `cdrom` (all UNIX platforms)
    - `cachefs` (AIX, Solaris, SGI, UnixWare)

Note VERITAS suggests that you always specify automounted directories and CD-ROM file systems in the exclude list. Otherwise, if they are not mounted at the time of a backup, NetBackup must wait for a timeout before proceeding.

Check with users before excluding any files from their backups.

Syntax Rules

The following syntax rules apply to exclude lists:

- Blank lines or lines beginning with a pound sign (#) are ignored.
- Only one pattern per line is allowed.
- The following special or wildcard characters are recognized:

  [ ]

  ?

  *

  { }
- To use special or wildcard characters literally (that is, as non-wildcard characters), precede them with a backslash (\). For example, assume the brackets in the following are to be used literally

  ```
  /home/abc/fun[ny]name
  ```

  In the exclude list, precede them with a backslash as in

```
/home/abc/fun\[ny\]name
```

Note A backslash (\) acts as an escape character only when it precedes a special or wildcard character as in the above example. This means that NetBackup normally interprets a backslash literally and it is a legal character to use in pathnames.

- If you exclude all files in the backup selections list by using / or * or both symbols together (/*), NetBackup backs up only what is specified by full path names in the include list.
- Spaces are considered legal characters. Do not include extra spaces unless they are part of the file name.

  For example, if you want to exclude a file named

  `/home/testfile` (with no extra space character at the end)

  and your exclude list entry is

  `/home/testfile` (with an extra space character at the end)

  NetBackup cannot find the file until you delete the extra space from the end of the file name.
- End a file path with / to exclude only directories with that path name (for example, `/home/test/`). If the pattern does not end in / (for example, `/usr/test`), NetBackup excludes both files and directories with that path name.
- To exclude all files with a given name, regardless of their directory path, just enter the name without a preceding slash. For example:

  ```
  test
  ```

  rather than

  ```
  /test
  ```

  This is equivalent to prefixing the file pattern with

  ```
  /
  /*/
  /*/*/
  /*/*/*/
  ```

  and so on.
- Do not use patterns with links in the names. For example, assume `/home` is a link to `/usr/home` and `/home/doc` is in the exclude list. The file is still backed up in this case because the actual directory path, `/usr/home/doc`, does not match the exclude list entry, `/home/doc`.

Example of an Exclude List

In this example, an exclude list contains the following entries:

```
# this is a comment line

/home/doe/john

/home/doe/abc/

/home/*/test

/*/temp

core
```

Given the exclude list above, the following files and directories are excluded from automatic backups:

- The file or directory named `/home/doe/john`.
- The directory `/home/doe/abc` (because the exclude entry ends with /).
- All files or directories named `test` that are two levels below home.
- All files or directories named `temp` that are two levels below the root directory.
- All files or directories named `core` at any level.

Exclude Lists for Specific Policies or Schedules

NetBackup allows you to create an exclude list for a specific policy or a policy and schedule combination. To do this, create an exclude_list file with a *.policyname* or *.policyname.schedulename* suffix. The following are two examples for a policy named *wkstations* that contains a schedule named *fulls*:

```
/usr/openv/netbackup/exclude_list.wkstations
/usr/openv/netbackup/exclude_list.wkstations.fulls
```

The first file affects all scheduled backups in the policy named *wkstations*. The second file affects backups only when the schedule is named *fulls*.

For a given backup, NetBackup uses a single exclude list—the list containing the most specific name. For example, if there are files named:

`exclude_list.wkstations` and `exclude_list.wkstations.fulls`

NetBackup uses only:

```
exclude_list.wkstations.fulls
```

Creating an Include List on a UNIX Client

To add back in files that you eliminate with the exclude list, create a `/usr/openv/netbackup/include_list` file. The same syntax rules apply as explained previously for the exclude list.

Note Exclude and include lists do not apply to user backups and archives.

To illustrate the use of an include list, we use the example from the previous discussion. The exclude list in that example causes NetBackup to omit all files or directories named test from all directories beneath `/home/*/test`.

In this case, add back in a file named `/home/jdoe/test` by creating a `/usr/openv/netbackup/include_list` file on the client and adding the following to it:

```
# this is a comment line
/home/jdoe/test
```

To create an include list for a specific policy or policy and schedule combination, use a *.policyname* or *.policyname.schedulename* suffix. The following are two examples of include list names for a policy named *wkstations* that contains a schedule named *fulls*.

```
/usr/openv/netbackup/include_list.workstations
/usr/openv/netbackup/include_list.workstations.fulls
```

The first file affects all scheduled backups in the policy named workstations. The second file affects backups only when the schedule is named *fulls*.

For a given backup, NetBackup uses only one include list and that is the one with the most specific name. For example, assume there are files such as the following:

`include_list.workstations` and `include_list.workstations.fulls`

In such a case, NetBackup uses only the following:

```
include_list.workstations.fulls
```

Schedules for User Backups or Archives

To have NetBackup use a specific policy and schedule for user backups or archives of a UNIX client, add the following options to the `/usr/openv/NetBackup/bp.conf` file.

- `BPARCHIVE_POLICY`
- `BPARCHIVE_SCHED`
- `BPBACKUP_POLICY`
- `BPBACKUP_SCHED`

These options can also be added to a user's `$HOME/bp.conf` file on the client.

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

- 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 180 explains the limited supported for IDR in NetBackup 6.0.
- "Supported Windows Editions" on page 180 documents the Windows versions supported by IDR.
- "Overview of IDR Use" on page 181 explains the main steps involved in using the disaster recovery software.
- "About the DR Files" on page 182 introduces the DR (Disaster Recovery) files and explains their importance in disaster recovery.
- "Configuring NetBackup Policies for IDR" on page 183 explains how to configure policies that contain clients that are using IDR.
- "Backing Up the System to be Protected" on page 184 explains that you must backup the system before you create the bootable media used in recovery.
- "Creating IDR Media" on page 184 explains how to use this wizard to prepare the bootable media that is used to recover your data.
- "Updating IDR Media" on page 190 explains how and when to update the IDR media so it is always ready when you need it.
- "Recovering Your Computer" on page 193 explains how to perform disaster recovery.
- "Notes on Recovering Specific Platforms" on page 200 provide information on recovering data on specific types of platforms.
- "IDR Frequently Asked Questions" on page 201 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 180.
- 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 194.)

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.

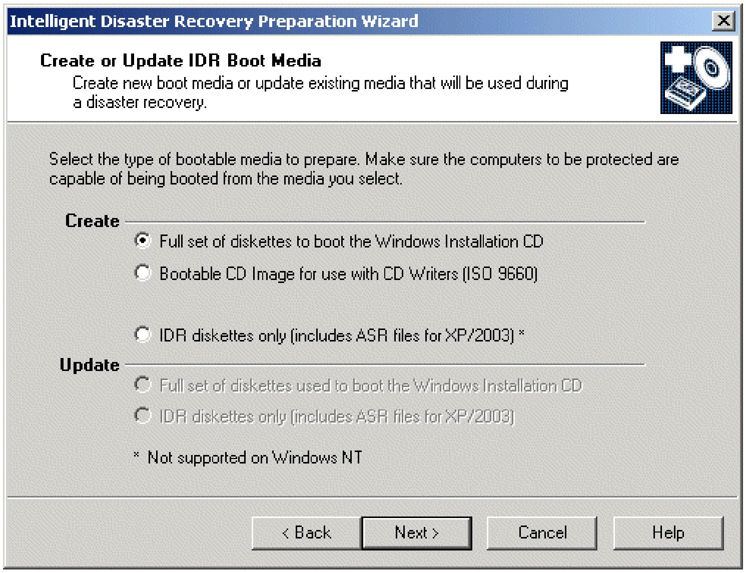
   Windows NT requires five diskettes and Windows 2000 requires six. Windows XP and Windows Server 2003 do not support bootable diskettes.

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.



Intelligent Disaster Recovery Preparation Wizard

Create or Update IDR Boot Media

Create new boot media or update existing media that will be used during a disaster recovery.

Select the type of bootable media to prepare. Make sure the computers to be protected are capable of being booted from the media you select.

Create

● Full set of diskettes to boot the Windows Installation CD

○ Bootable CD Image for use with CD Writers (ISO 9660)

○ IDR diskettes only (includes ASR files for XP/2003) *

Update

○ Full set of diskettes used to boot the Windows Installation CD

○ IDR diskettes only (includes ASR files for XP/2003)

* Not supported on Windows NT

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 187.

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.

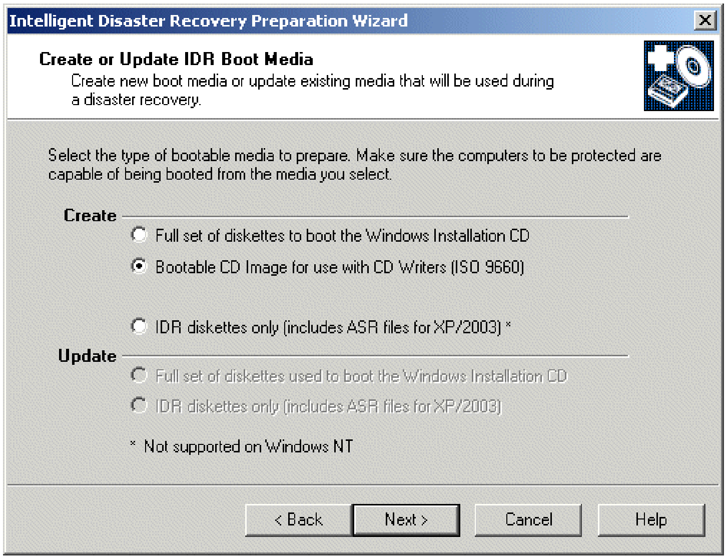
▼ To create a bootable CD image

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.



Intelligent Disaster Recovery Preparation Wizard

Create or Update IDR Boot Media

Create new boot media or update existing media that will be used during a disaster recovery.

Select the type of bootable media to prepare. Make sure the computers to be protected are capable of being booted from the media you select.

Create

○ Full set of diskettes to boot the Windows Installation CD

● Bootable CD Image for use with CD Writers (ISO 9660)

○ IDR diskettes only (includes ASR files for XP/2003) *

Update

○ Full set of diskettes used to boot the Windows Installation CD

○ IDR diskettes only (includes ASR files for XP/2003)

* Not supported on Windows NT

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 187.

Caution Test your bootable CD to ensure that your system can boot from it. (See "Step 1: Boot Your Computer" on page 194.)

Creating IDR Diskettes

Two formatted, 1.44 MB floppy diskettes are required to create IDR diskettes.

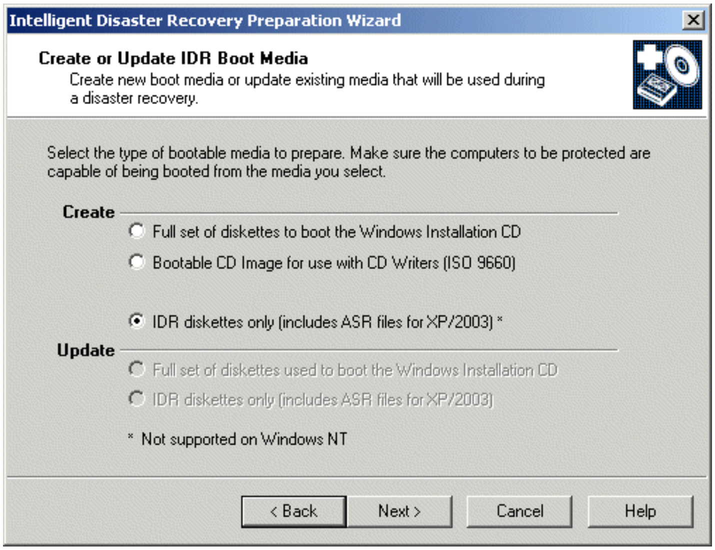
▼ To create IDR diskettes

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.



Intelligent Disaster Recovery Preparation Wizard

Create or Update IDR Boot Media

Create new boot media or update existing media that will be used during a disaster recovery.

Select the type of bootable media to prepare. Make sure the computers to be protected are capable of being booted from the media you select.

Create

○ Full set of diskettes to boot the Windows Installation CD

○ Bootable CD Image for use with CD Writers (ISO 9660)

● IDR diskettes only (includes ASR files for XP/2003) *

Update

○ Full set of diskettes used to boot the Windows Installation CD

○ IDR diskettes only (includes ASR files for XP/2003)

* Not supported on Windows NT

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 188.

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.

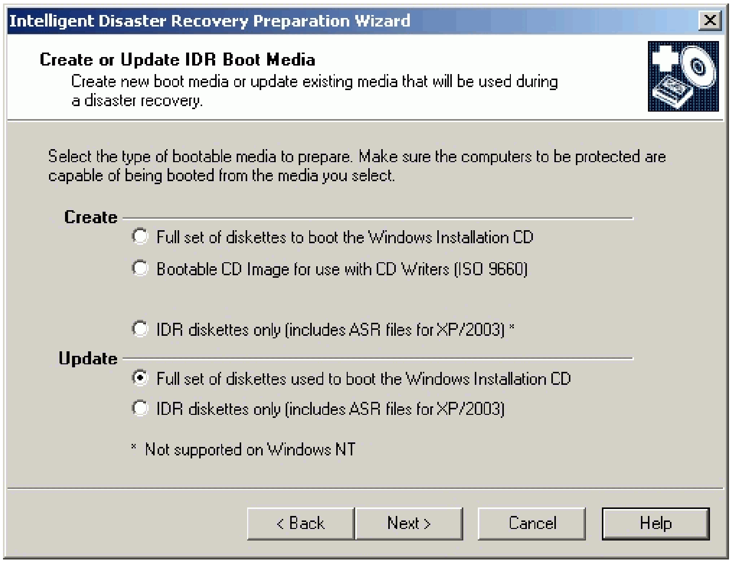
▼ To update IDR bootable diskettes

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.



Intelligent Disaster Recovery Preparation Wizard

Create or Update IDR Boot Media

Create new boot media or update existing media that will be used during a disaster recovery.

Select the type of bootable media to prepare. Make sure the computers to be protected are capable of being booted from the media you select.

Create
- ○ Full set of diskettes to boot the Windows Installation CD
- ○ Bootable CD Image for use with CD Writers (ISO 9660)
- ○ IDR diskettes only (includes ASR files for XP/2003) *

Update
- ● Full set of diskettes used to boot the Windows Installation CD
- ○ IDR diskettes only (includes ASR files for XP/2003)

* Not supported on Windows NT

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 193.)

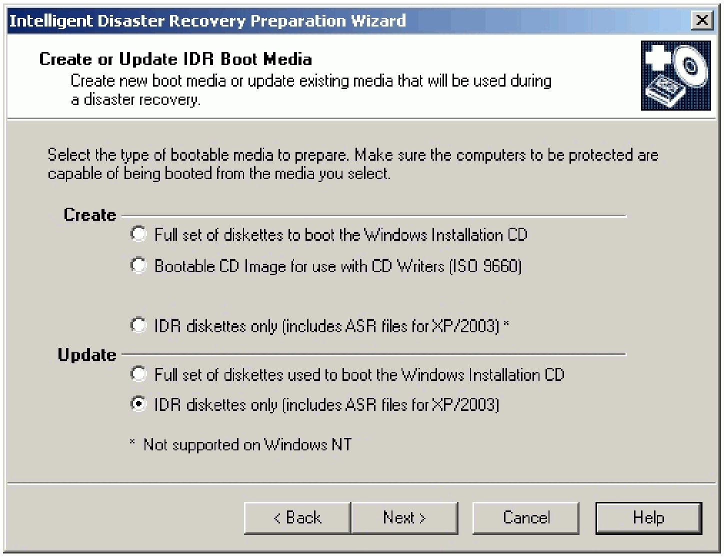
▼ To update IDR diskettes using IDR Preparation Wizard

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.



Intelligent Disaster Recovery Preparation Wizard

Create or Update IDR Boot Media

Create new boot media or update existing media that will be used during a disaster recovery.

Select the type of bootable media to prepare. Make sure the computers to be protected are capable of being booted from the media you select.

Create

○ Full set of diskettes to boot the Windows Installation CD

○ Bootable CD Image for use with CD Writers (ISO 9660)

○ IDR diskettes only (includes ASR files for XP/2003) *

Update

○ Full set of diskettes used to boot the Windows Installation CD

● IDR diskettes only (includes ASR files for XP/2003)

* Not supported on Windows NT

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 195.

▼ 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 195.

   - 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 195.

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 196.

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 200.) 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 193.

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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